Description of self-efficacy for managing symptoms and emotions in a large rheumatology clinic population

R. Dayno[1], M.D. George[1], M. Blum[2], K. DeQuattro[1], S. Kolasinski[1], D. DiRenzo[1]

[1]Department of Medicine, Division of Rheumatology, University of Pennsylvania, Philadelphia, PA; [2]Section of Rheumatology, Lewis Katz School of Medicine at Temple University, Philadelphia, PA, USA.

Abstract

Objective

Self-efficacy is the inner confidence in one's ability to manage specific goals or tasks. The purpose of this study was to describe self-efficacy for people living with various rheumatologic disease and explore its associations with health-related quality of life (HRQoL).

Methods

This study was a retrospective, cross-sectional analysis of patients in a large rheumatology division who had office visits and completed questionnaires from May 2022 to January 2023. Questionnaires included the Patient Reported Outcome Measurement Information System (PROMIS)-29 v. 2.1 and Self-Efficacy for Managing Symptoms (SE Symptoms) and Emotions (SE Emotions) Computer Adaptive Tests, among others. Rheumatologic diagnosis was confirmed by the rheumatologist at the time of the encounter and additional comorbidities were identified via chart review. Mean PROMIS T-scores were compared across demographics and rheumatologic diagnosis and multivariable linear regression models (MLR) were constructed to explore determinants of self-efficacy.

Results

There were 1,114 patients who completed office visits during the study timeframe; 401 patients (36%) had complete data. Compared to those with high SE symptoms and SE emotions those with low SE symptoms and SE emotions had significantly worse HRQoL in all PROMIS domains by 5–10 mean T-score units ($p<0.001$). Fatigue, depression, and pain interference were strong determinants of SE symptoms and fatigue, anxiety, and depression were strong determinants of SE emotions in MLR.

Conclusion

Self-efficacy can be easily measured as part of routine clinical care using highly precise and reliable PROMIS measures. Self-efficacy is low amongst patients with rheumatologic diseases followed in a large academic center for routine care and is highly associated with HRQoL.

Key words

self-management, quality of life, anxiety, depression, pain

Rachel Dayno, MD
Michael D. George, MD, MSCE
Marissa Blum, MD, MS
Kimberly DeQuattro, MD
Sharon Kolasinski, MD
Dana DiRenzo, MD, MHS

Please address correspondence to:
Rachel Dayno
University of Pennsylvania,
5th Floor Rheumatology,
3400 Spruce Street,
Philadelphia, PA 19104, USA.
E-mail: rachel.dayno@gmail.com

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ORCID iD
R. Dayno: 0000-0002-2209-7056
M. George: 0000-0002-0398-2308
D. DiRenzo: 0000-0001-9350-1821

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Introduction

Self-efficacy is the inner belief in one's ability to succeed in specific situations and tasks (1). Self-efficacy for managing the symptoms and emotions associated with chronic disease may have considerable impact on not only health-related quality of life (HRQoL) but also health outcomes and healthcare utilisation. Self-efficacy is one determinant of how an individual may successfully navigate the adversity that accompanies chronic disease, in addition to resiliency, mindfulness, and coping capacity (2).

Self-efficacy plays a pivotal role in determining how individuals perceive and respond to challenges related to their emotional and physical well-being. Self-efficacy for managing emotions reflects one's ability to regulate and cope with one's emotional experiences (3, 4). It is closely associated with emotional resilience and psychological well-being. Self-efficacy for managing symptoms refers to one's ability to adhere to treatment regimens, recognise signs of symptom exacerbation, utilise self-care strategies to alleviate symptoms, and seek medical care, when necessary.

There have been several studies in patients with rheumatoid arthritis (RA) (5-8) and systemic lupus erythematosus (SLE) (9) correlating self-efficacy to pain, physical function, and other aspects of HRQoL. Specifically, studies have shown that patients with arthritis who have high levels of self-efficacy report lower levels of pain, fatigue, physical disability, and psychological distress (7, 8, 10, 11). Self-efficacy is also associated with better coping capacity in patients with arthritis, especially for pain-related anxiety (12). A systematic review of the role of self-efficacy in patients with RA corroborated these findings (13). Care-coordination approaches through patient navigators have been shown to improve self-efficacy in SLE (14) and it is hypothesised that similar programs may be translated across other rheumatologic diseases.

Despite the previous work mentioned above, there is limited data showing how self-efficacy varies across rheumatologic conditions and in different practice settings. Understanding self-efficacy for managing chronic disease may help inform the anticipated needs of people living with rheumatologic diseases and triage healthcare resources in the future. We used highly precise and reliable computer adaptive tests (CATs) from the Patient Reported Outcomes Measurement Information System (PROMIS) and administered within the electronic health record to better understand self-efficacy for managing symptoms and emotions. We hypothesised that self-efficacy would differ based on patient and clinical demographics including disease duration and comorbidities. We also hypothesised that pain interference, or pain's impact on daily activities and function, would be a significant predictor of self-efficacy in this patient population.

Materials and methods

This study is a retrospective, cross-sectional analysis of patients who received outpatient care from rheumatologists at urban and suburban clinic sites at the University of Pennsylvania, Division of Rheumatology, from May 1, 2022 to January 1, 2023. The clinic locations included two clinics on the campuses of the University of Pennsylvania and Penn Presbyterian Medical Center in Philadelphia, Pennsylvania and a suburban affiliated site (Cherry Hill, New Jersey). This study was reviewed and considered exempt by the University of Pennsylvania Institutional Review Board (no. 852186).

Variables extracted via chart review included: age, gender, race, ethnicity, rheumatologic/non-rheumatologic diagnosis relevant to visit, disease duration, biologic or conventional synthetic disease modifying agents, current glucocorticoid use, current opioid use, and current antidepressant use. The rheumatologic disease diagnosis (rheumatoid arthritis, psoriatic arthritis, systemic lupus erythematosus, scleroderma, Sjögren's disease, idiopathic inflammatory myopathy) was confirmed via the study rheumatologist at the time of the appointment visit and had to be present as an encounter diagnosis when extracted via chart review. Comorbidities including hyperlipidaemia, type 2 diabetes, chronic obstructive pulmonary disease (COPD), congestive heart

failure (CHF), cardiovascular disease (CVD), stroke, anxiety, depression, and fibromyalgia were extracted from the chart if listed as an encounter diagnosis, as part of the problem list, or part of the history. The fibromyalgia diagnosis was not necessarily confirmed by the rheumatologist and may have been present on the problem list as entered by the primary care physician or other treating specialist. Other synonymous terms such as pain amplification or chronic pain were not included as part of the fibromyalgia definition.

Patient-reported outcome measures

Patient questionnaires were sent via the electronic medical record's (EPIC) patient portal at the start of the clinic week, within seven days prior to the appointment as part of routine clinical care. Questionnaires were accompanied by a brief message that instructed the patient to voluntarily complete the questionnaires pertaining to quality of life for review at the appointment.

Questionnaires included the PROMIS-29 v. 2.1 collection of short, fixed forms (physical function, anxiety, depression, fatigue, sleep disturbance, ability to participate in social roles and activities, pain interference, pain intensity), PROMIS Self-Efficacy for Managing Symptoms computer adaptive test (SE Symptoms) (CAT), and PROMIS Self-Efficacy for Managing Emotions (SE Emotions) CAT. Each PROMIS measure was scored on a 5-point Likert scale and translated into standardised T-scores with a mean of 50 and standard deviation of 10 based on US population normative values (15). A higher PROMIS measure reflects more of a concept, and a lower PROMIS measure reflects less of a concept. The T-score range for PROMIS SE Emotions is 25 to 67 (16). The T-score range for PROMIS SE Symptoms is 23 to 69 (16).

The Routine Assessment of Patient Index Data-3 (RAPID-3) was separately administered to clinic patients at the time of appointment triage by office personnel (medical assistant or licensed practical nurse). The RAPID-3 includes questions about one's ability to perform daily tasks as well as a pain assessment and personal assessment. RAPID-3 scores range from 0–30, and higher scores reflect more severe pain and physical function (16).

Statistical plan

Mean patient demographic and clinical disease characteristics were calculated for patients with complete data and compared across low (mean PROMIS T-Score <45), average (mean PROMIS T-Score 45–55), and high (meant PROMIS T-Scores (>55) levels of self-efficacy for managing symptoms and managing emotions. Data was pooled for all patients with an autoimmune rheumatologic disease diagnosis (rheumatoid arthritis, psoriatic arthritis, systemic lupus erythematosus, scleroderma, Sjögren's disease, idiopathic inflammatory myopathy); patients with a diagnosis of osteoarthritis only were excluded unless explicitly stated. A subset analysis for each rheumatologic disease can be found in supplementary materials (Supplementary Table S1). Mean PROMIS T-Score comparisons were made via t-tests, ANOVA or Kruskal-Wallis with *post-hoc* Dunn test, where applicable, and depending on normality as well as Pearson's correlation. Mean PROMIS T-Scores were also compared across tertiles of PROMIS pain interference (mean T-scores <50, ≥50 and <60, ≥60). To have 80% power at the 5% significance level to detect an effect size of 5 T-score unit differences between rheumatologic disease groups (10 T-score unit standard deviation assumed), 64 patients were required per group.

Univariate and multivariate linear regression models were used to determine the relative contribution of different factors for self-efficacy for managing symptoms and emotions. Independent variables of interest included the PROMIS T-Scores for anxiety, depression, physical function, fatigue, and pain interference. Covariates included rheumatologic disease, age, sex, race, comorbid fibromyalgia, use of conventional DMARDs, use of biologic DMARDs, and use of glucocorticoids.

Results

Partial or full demographic and clinical visit data, for which the questionnaires were launched, was available for 1,114 consecutive and unique patient visits with osteoarthritis, rheumatologic disease, or both during the study period. There were 470 (42%) patients who at least partially completed PROMIS-29 measures and PROMIS Computer Adaptive Tests (CATs) for Self-Efficacy for Managing Symptoms (SE Symptoms) and Emotions (SE Emotions). Complete data was available on 401 patients (36%), among whom 331 (83%) had rheumatologic disease and 70 (17%) had osteoarthritis without rheumatologic disease. Patients with rheumatoid arthritis (n=69), psoriatic arthritis (n=58), lupus (n=41), dermatomyositis (n=55), systemic sclerosis (n=25), and Sjögren's disease (n=83) were included. Patients who completed PROMIS measures/CATs were mostly non-Hispanic white (95%), and female (81%) with a mean (SD) age of 54 (15), similar to non-completers. Non-completers were more often black (31% *vs*. 18%, $p<0.001$) with higher mean (SD) RAPID3 total scores compared to completers (11.6 (6.5) *vs*. 10.9 (6.5), $p=0.06$).

The mean (SD) T-score for SE Emotions was 47.6 (7.9) and the mean (SD) T-score for SE Symptoms was 44.9 (8.2) for those with rheumatologic disease and with complete data (n=331), both below US population normative values. The mean (SD) T-score for SE Emotions was 47.3 (8.0) and the mean (SD) T-score for SE Symptoms was 44.7 (8.5) for those with osteoarthritis (n=70) which did not significantly differ compared to those with rheumatologic disease. T- scores followed a normal distribution and there was not a ceiling effect (<5%). The data suggests a trend in lower self-efficacy scores amongst men, Hispanics, and people with comorbid fibromyalgia, anxiety, and depression (Table I). PROMIS SE Symptoms had moderate negative correlation with the RAPID-3 (r=-0.581) and PROMIS physical function (r=0.594). PROMIS SE Emotions had low moderate correlation with the RAPID-3 (r=-0.430) and PROMIS physical function (r=0.354).

There were no significant differences in mean age, sex, race, disease duration, comorbidities, and PROMIS measures between rheumatologic diagnoses (Suppl. Table S1). Additionally,

Table I A. Demographic and clinical characteristics of people living with rheumatologic disease with fully completed PROMIS questionnaires, grouped by self-efficacy level (low, average, high) for managing symptoms. *p*-value derived from ANOVA of self-efficacy categories.

A Patient characteristics		Low SE Symptoms n=170	Average SE Symptoms n=125	High SE Symptoms n=36	*p*-value
Age, mean (SD)		51.7 (14.5)	54.0 (15.7)	58.5 (14.4)	0.038
Sex, n (%)	Male	24 (14.1)	26 (20.8)	8 (22.2)	0.24
	Female	146 (85.9)	99 (79.2)	28 (77.8)	
Ethnicity	non-Hispanic	157 (94.6)	111 (91.0)	35 (100.0)	0.13
	Hispanic	9 (5.4)	9 (11.0)	0 (0.0)	
Race	White	105 (61.8)	84 (67.2)	27 (75.0)	0.38
	Black	35 (20.6)	18 (14.4)	6 (16.7)	
	Other #	10 (5.9)	12 (9.6)	1 (2.8)	
	Not identified	20 (11.8)	11 (8.8)	2 (5.6)	
Disease duration, mean months (SD)		43.5 (52.5)	42.9 (47.3)	58.3 (51.3)	0.24
Comorbidities, n (%)	Anxiety	43 (26.7)	15 (12.4)	4 (11.8)	0.005
	Depression	15 (9.7)	4 (3.4)	2 (6.1)	0.12
	Fibromyalgia	88 (53.3)	49 (39.5)	18 (51.4)	0.060
	Cardiovascular*	39 (22.9)	17 (13.6)	4 (11.1)	0.062
Presence of Osteoarthritis (OA)	Rheumatic Disease w/ OA	37 (21.8)	15 (12.0)	5 (13.9)	0.077
	Rheumatic Disease only	133 (78.2)	110 (88.0)	31 (86.1)	
Current medications, n (%)**	cDMARDs	110 (64.7)	86 (68.8)	25 (69.4)	0.71
	bDMARDs	24 (14.1)	25 (20.0)	7 (19.4)	0.38
	Glucocorticoid	63 (37.1)	50 (40.0)	12 (33.3)	0.74
	Mood Stabilising	74 (43.5)	19 (15.2)	3 (8.3)	<0.001
	Opiates**	25 (14.7)	10 (8.0)	1 (2.8)	0.048
RAPID 3, mean (SD)		13.6 (5.7)	7.9 (5.5)	3.9 (4.4)	<0.001

* Cardiovascular disease: cardiovascular disease, congestive heart failure, stroke history

Other :Asian, Pacific-Islander, Native American

** cDMARD (conventional DMARD): methotrexate, sulfasalazine, azathioprine, mycophenolate mofetil, mycophenolic acid, leflunomide, cyclophosphamide, cyclosporine, tacrolimus, voclosporin.

bDMARD (biologic DMARD): adalimumab, certolizumab, etanercept, golimumab, abatacept, tocilizumab, sarilumab, belimumab, anifrolumab, ustekimumab, guselkumab, ixekisumab, secukinumab, infliximab, rituximab, golimumab, abatacept, tocilizumab

Mood medications=citalopram, escitalopram, fluoxetine, paroxetine, sertraline, desvenlafaxine, duloxetine, levomilnacipran, milnacipran, venlafaxine, amitriptyline, amoxapine, desipramine, doxepin, imipramine, nortriptyline, protriptyline, trimipramine, trazodone, acepromazine, acetophenazine, benperidol, bromperidol, butaperazine, carfenazine, chlorproethazine, chlorpromazine, chlorprothixene, clopenthixol, cyamemazine, dixyrazine, droperidol, fluanisone, flupentixol, fluphenazine, fluspirilene, haloperidol, levomepromazine, lenperone, loxapine, mesoridazine, metitepine, molindone, moperone, oxypertine, oxyprothepine, penfluridol, perazine, periclazine, perphenazine, pimozide, pipamperone, piperacetazine, pipotiazine, prochlorperazine, promazine, prothipendyl, spiperone, sulforidazine, thioproperazine, thioridazine, thiothixene, timiperone, trifluoperazine, trifluperidol, triflupromazine, zuclopenthixol, amoxapine, amisulpride, aripiprazole, asenapine, blonanserin, brexpiprazole, cariprazine, carpipramine, clocapramine, clorotepine, clotiapine, clozapine, iloperidone, levosulpiride, lumateperone, lurasidone, melperone, mosapramine, nemonapride, olanzapine, paliperidone, perospirone, quetiapine, remoxipride, reserpine, risperidone, sertindole, sulpride, sultopride, tiaprie, veralipride, ziprasidone, zotepine, bupropion.

patients across all diagnoses had a high degree of mean (SD) pain interference, especially within osteoarthritis (60.2 (8.4)), psoriatic arthritis (59.6 (10.3)), and Sjögren's disease (58.5 (8.4)) (Suppl. Table S1). There were high fatigue and sleep disturbance T-scores, particularly in patients with psoriatic arthritis and Sjögren's disease. There were low physical function T-scores across all disease groups (Suppl. Table S1). Of note, there was a high percentage of comorbid fibromyalgia, especially for patients with osteoarthritis (57%) and Sjögren's disease (55%) (Suppl. Table S1).

Compared to those with high SE Symptoms and high SE Emotions, those with low SE Symptoms and low SE Emotions had significantly worse HRQoL in all PROMIS domains. Anxiety, fatigue, pain interference, sleep disturbance, physical function, and social participation were significantly different (mean T-Score differences of 2–5 units) (17, 18) even between low, average, and high levels of self-efficacy (Table II). The largest differences between low and high levels of self-efficacy were seen in fatigue, pain interference, and physical function.

When analysing subgroups, patients who had low SE Emotions and low SE Symptoms had the worst HRQoL profiles overall in terms of mean T-scores for anxiety, depression, fatigue, and pain interference. In contrast, patients who had high SE Emotions and high SE Symptoms had the best HRQoL profiles (Fig. 1). Generally, there were incremental positive gains in HRQoL domain levels seen across SE profiles. Patients with low SE Emotions and high SE Symptoms had increased anxiety and depression. Patients with high SE Emotions and low SE Symptoms had increased fatigue and pain interference. When comparing mean SE Symptom

Table I B. Demographic and clinical characteristics of people living with rheumatologic disease with fully completed PROMIS questionnaires, grouped by self-efficacy level (low, average, high) for managing emotions. *p*-value derived from ANOVA of self-efficacy categories.

B

Patient characteristics		Low SE Emotions n=123	Average SE Emotions n=142	High SE Emotions n=66	*p*-value
Age, mean (SD)		51.8 (14.8)	53.3 (15.0)	56.0 (15.3)	0.18
Sex, n (%)	Male	14 (11.4)	23 (16.2)	21 (31.8)	0.002
	Female	109 (88.6)	119 (83.8)	45 (68.2)	
Ethnicity	non-Hispanic	117 (95.9)	124 (90.5)	62 (96.9)	0.10
	Hispanic	5 (4.1)	13 (9.5)	2 (3.1)	
Race	White	72 (64.2)	91 (64.1)	46 (69.7)	0.50
	Black	25 (20.3)	21 (14.8)	13 (19.7)	
	Other #	9 (7.3)	12 (8.5)	2 (3.0)	
	Not identified	10 (8.1)	18 (12.7)	5 (7.6)	
Disease duration, mean months (SD)		45.6 (52.3)	45.8 (52.0)	41.4 (44.3)	0.83
Comorbidities, n (%)	Anxiety	34 (28.6)	22 (16.7)	6 (9.2)	0.004
	Depression	12 (10.5)	7 (5.4)	2 (3.1)	0.12
	Fibromyalgia	64 (53.8)	63 (45.3)	28 (42.4)	0.25
	Cardiovascular*	27 (22.0)	26 (18.3)	7 (10.6)	0.15
Presence of Osteoarthritis (OA)	Rheumatic Disease w/ OA	25 (20.3)	20 (14.1)	12 (18.2)	0.40
	Rheumatic Disease only	98 (79.7)	122 (85.9)	54 (81.8)	
Current medications, n (%)**	cDMARDs	74 (60.2)	101 (71.1)	46 (69.7)	0.14
	bDMARDs	20 (16.3)	22 (15.5)	14 (21.2)	0.57
	Glucocorticoid	45 (36.6)	53 (37.3)	27 (40.9)	0.83
	Mood	53 (43.1)	35 (24.6)	8 (12.1)	<0.001
	Opiates	10 (8.1)	21 (14.8)	5 (7.6)	0.14
RAPID 3, mean (SD)		13.2 (6.5)	10.0 (5.8)	6.2 (5.3)	<0.001

See legend to Table IA.

Table II. Comparison of PROMIS HRQoL Domains per low, average, and high levels of self-efficacy for **A**) managing symptoms and **B**) managing emotions.

A

HRQoL PROMIS Domain	Low SE Symptoms (Mean T-scores <45) n=170	Average SE Symptoms (Mean T-scores 45-55) n=125	High SE Symptoms (Mean T-scores >55) n=36
Fatigue	61.7 (8.6)[a]	51.2 (8.1)[b]	44.1 (8.6)[c]
Sleep disturbance	57.1 (7.9)[a]	52.4 (7.4)[b]	46.6 (10.1)[c]
Anxiety	57.5 (9.2)[a]	50.2 (8.4)[b]	45.0 (6.6)[c]
Depression	55.0 (8.3)[a]	46.4 (6.6)[b]	43.4 (4.7)[b]
Pain interference	62.8 (7.7)[a]	54.1 (7.9)[b]	46.0 (6.4)[c]
Physical function	38.8 (7.1)[a]	47.1 (7.6)[b]	53.7 (6.3)[c]
Social participation	42.6 (6.5)[a]	51.2 (6.5)[b]	60.9 (5.3)[c]

[abc]Values in the same row not sharing the same superscript are significantly different at $p<0.05$.

B

HRQoL PROMIS Domain	Low SE Emotions (Mean T-scores <45) n=123	Average SE Emotions (Mean T-scores 45-55) n=142	High SE Emotions (Mean T-scores >55) n=66
Fatigue	61.5 (9.6)[a]	54.6 (9.3)[b]	47.9 (8.9)[c]
Sleep disturbance	58.0 (7.2)[a]	53.5 (8.2)[b]	48.4 (8.8)[c]
Anxiety	60.4 (8.6)[a]	51.0 (7.8)[b]	45.4 (6.6)[c]
Depression	57.0 (7.8)[a]	48.2 (6.9)[b]	43.4 (4.9)[c]
Pain interference	61.6 (8.8)[a]	57.0 (8.9)[b]	51.9 (9.1)[c]
Physical function	40.4 (8.7)[a]	43.8 (8.3)[b]	48.6 (8.1)[c]
Social participation	43.0 (7.4)[a]	48.8 (7.9)[b]	54.7 (7.9)[c]

[abc]Values in the same row not sharing the same superscript are significantly different at $p<0.05$.

and SE Emotion levels across tertiles of pain interference (pain interference mean T-scores <50, ≥50 and <60, ≥60), those with high pain interference had the lowest degrees of SE. However, mean levels of SE for Symptoms and Emotions were significantly different across the tertiles of pain interference even at low and moderate levels ($p<0.05$).

In our multivariable linear regression model (MLR) for SE symptoms adjusted for rheumatologic disease (osteoarthritis only excluded), older age (β=0.079, $p=0.042$), fibromyalgia (β=0.093, $p=0.016$), current use of biologic DMARDs (β=0.122, $p<0.001$), depression (β=-0.164, $p=0.005$), fatigue (β= -0.265, $p<0.001$), and pain interference (β=-0.291, $p<0.001$) were found to be significant determinants of SE symptoms (Table III). Similarly, in our MLR for SE Emotions, anxiety (β= -0.321, $p<0.001$), depression (β= -0.280, p<0.001), and fatigue (β= -0.240, $p<0.001$) were associated with significantly lower SE Emotions (Table III).

Table III. Predictors of PROMIS Self Efficacy for Managing Symptoms and Emotions for people with rheumatologic disease. Standardised Beta coefficient reported.

	Self-Efficacy for Managing Symptoms				Self-Efficacy for Managing Emotions			
PROMIS HRQL Domain	Univariate β	*p*-value	Adjusted β *	p-value	Univariate β	*p*-value	Adjusted β *	*p*-value
Physical Function	0.596	**<0.001**	0.167	**0.003**	0.350	**<0.001**	-0.001	0.988
Anxiety	-0.514	**<0.001**	-0.067	0.253	-0.643	**<0.001**	-0.321	**<0.001**
Depression	-0.548	**<0.001**	-0.164	**0.005**	-0.632	**<0.001**	-0.280	**<0.001**
Fatigue	-0.651	**<0.001**	-0.265	**<0.001**	-0.533	**<0.001**	-0.240	**<0.001**
Pain Interference	-0.651	**<0.001**	-0.291	**<0.001**	-0.383	**<0.001**	0.011	0.869

*Adjusted for rheumatic disease, age, sex, race, comorbid fibromyalgia, use of conventional DMARDs, use of biologic DMARDs, use of glucocorticoids. Negative values reflect less self-efficacy. Positive values reflect more self-efficacy.

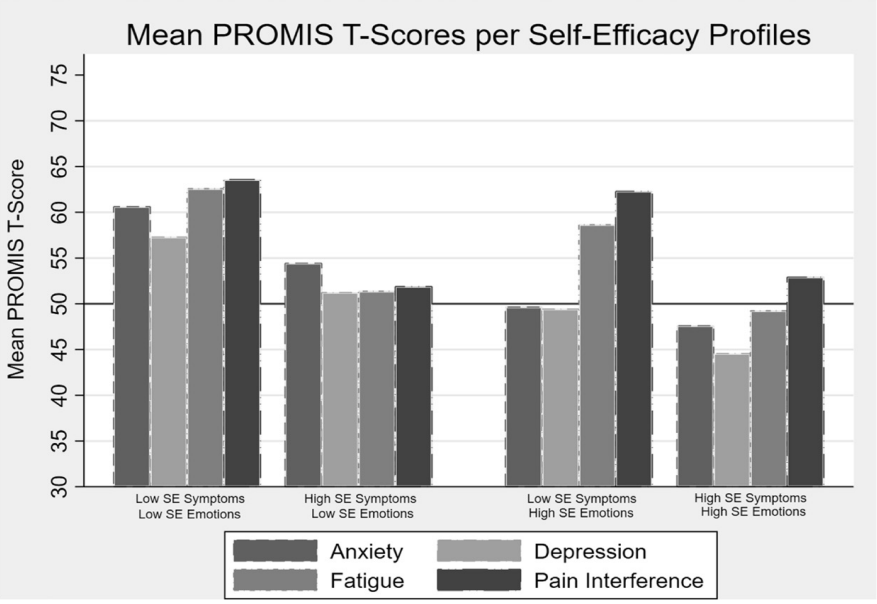

Fig. 1. Mean Health-Related Quality of Life T-Scores per low and high self-efficacy categories for people living with rheumatologic disease.
Low and high self-efficacy categories defined by mean self-efficacy scores (SE Symptoms, < or ³ T-Score of 45; SE Emotions, < or ³ T-Score of 47). Higher PROMIS measures reflect more of a concept, and lower PROMIS measures reflect less of a concept.

Discussion

This study revealed that the mean self-efficacy levels amongst patients in a large, academic rheumatology clinic population are lower than the projected United States (US) normative values. Patients with low SE Symptoms and low SE Emotions had the worst HRQoL profiles overall, representing a large patient care gap and unmet opportunity for improvement. Measuring self-efficacy was easily and accurately achieved through use of PROMIS Computer Adaptive Tests (CATs) embedded within the electronic medical record.

Identifying individuals with low self-efficacy profiles may help triage healthcare resources in the future. High levels of depression and fatigue, two symptoms highly correlated with healthcare utilisation (19), were associated with both SE Emotions and SE Symptoms. Similarly, anxiety was significantly associated with low SE Emotions and pain interference and physical function were significantly associated with low SE Symptoms. These findings are similar to prior literature in a general population with multi-morbidity and specifically those with rheumatologic diseases (20). For example, in patients with RA, anxiety levels have a strong inverse correlation with the degree of self-efficacy (10, 21, 22) and low self-efficacy at baseline is a strong predictor for declining health outcomes up to two years later (23). Similarly, in patients with systemic lupus erythematosus (SLE), self-efficacy for managing pain symptoms and pain catastrophising has been associated with levels of physical symptoms, especially fatigue, and psychological distress (9, 24). In patients with osteoarthritis, higher self-efficacy has been shown to correlate with reduced pain and increased physical function (25-29).

Multidisciplinary health-care teams involving physicians, nurses, psychologists, psychiatrists, and physical therapists that address fatigue, pain interference, and, importantly, mental health may improve patients' ability to cope with rheumatologic conditions and maximise their ability to function. Nurse-led multidisciplinary teams for patients with coronary artery disease have been shown to be effective (30), as well as for patients undergoing stem cell transplant (31). We found that even small improvements in self-efficacy (5 T-Score units) can be associated with significant positive differences in HRQoL domains, especially fatigue, pain interference, and anxiety (Table II). However, future studies will need to focus on the degree to which self-efficacy may change over time, with or without intervention, although educational interventions in patients with heart failure were shown to improve self-efficacy (32). Access to mental health resources, ideally embedded into the rheumatology clinic, may be an initial step to help patients improve self-efficacy when managing complex rheumatologic disease.

There are several strengths of this study. This study included a large cohort of patients utilising precise instruments administered in a routine clinical setting. Limitations include the large

number of excluded patients with incomplete questionnaires, lack of disease activity measures available in the data set, and the lack of confirmed fibromyalgia diagnosis by the rheumatologist. Additionally, this study may be biased towards individuals who are technologically literate. Sensitivity analysis for those that completed versus did not complete the questionnaires showed that completers on average were younger, had private insurance and were white. However, completers had similar RAPID-3 scores, a measure of disability and physical function, as non-completers. Finally, this is a cross-sectional analysis which limits our ability to make inferences regarding the relationship and influence of self-efficacy on symptoms and emotions. Planned longitudinal validation studies are required to understand possible collinear relationships between these concepts. However, prior studies in a rheumatoid arthritis population have demonstrated the ability of self-efficacy to mediate health behaviours over time (33, 34).

Conclusion

This study shows that self-efficacy is low amongst patients with various rheumatologic diseases in a large academic center outside of a research setting. Fatigue, depression, and pain interference were strong determinants for SE symptoms and fatigue, depression, and anxiety were strong determinants for SE emotions in multivariable linear regression models. Self-efficacy can be effectively and efficiently measured as part of clinical care using PROMIS measures embedded within the electronic medical record. This represents an opportunity to better address self-efficacy and more broadly, HRQoL, in people living with rheumatologic disease to provide high quality care for patients.

References

1. FINNEY RUTTEN LJ, HESSE BW, ST. SAUVER JL *et al*.: Health self-efficacy among populations with multiple chronic conditions: the value of patient-centered communication. *Adv Ther* 2016; 33(8): 1440-51. https://doi.org/10.1007/s12325-016-0369-7
2. KEYE MD, PIDGEON AM: Investigation of the relationship between resilience, mindfulness, and academic self-efficacy. *Open J Soc Sci* 2013; 1(6): 1-4. https://doi.org/10.4236/jss.2013.16001
3. PETERS M, POTTER CM, KELLY L, FITZPATRICK R: Self-efficacy and health-related quality of life: A cross-sectional study of primary care patients with multi-morbidity. *Health Qual Life Outcomes* 2019; 17(1). https://doi.org/10.1186/s12955-019-1103-3
4. BENIGHT CC, CIESLAK R: Cognitive factors and resilience: how self-efficacy contributes to coping with adversities. *In*: SOITHWICK SM, LITZ BT, CHARNEY D, FRIEDMAN MJ (Eds.) *Resilience and Mental Health: Challenges Across the Lifespan*. *Cambridge University Press*. Published online 2011.
5. LORIG KR, RITTER PL, LAURENT DD, FRIES JF: Long-term randomized controlled trials of tailored-print and small-group arthritis self-management interventions. *Med Care* 2004; 42(4): 346-54. https://doi.org/10.1097/01.mlr.0000118709.74348.65
6. LORIG KR, SOBEL DS, RITTER PL, LAURENT D, HOBBS M: Effect of a self-management program on patients with chronic disease. *Eff Clin Pract* 2001; 4(6): 256-62.
7. SOMERS TJ, WREN AA, SHELBY RA: The context of pain in arthritis: self-efficacy for managing pain and other symptoms. *Curr Pain Headache Rep* 2012; 16(6): 502-8. https://doi.org/10.1007/s11916-012-0298-3
8. SOMERS TJ, SHELBY RA, KEEFE FJ *et al*.: Disease severity and domain-specific arthritis self-efficacy: Relationships to pain and functioning in patients with rheumatoid arthritis. *Arthritis Care Res* (Hoboken) 2010; 62(6): 848-56. https://doi.org/10.1002/acr.20127
9. SOMERS TJ, KURAKULA PC, CRISCIONE-SCHREIBER L, KEEFE FJ, CLOWSE MEB: Self-efficacy and pain catastrophizing in systemic lupus erythematosus: Relationship to pain, stiffness, fatigue, and psychological distress. *Arthritis Care Res* (Hoboken) 2012; 64(9): 1334-40. https://doi.org/10.1002/acr.21686
10. LIU L, XU N, WANG L: Moderating role of self-efficacy on the associations of social support with depressive and anxiety symptoms in Chinese patients with rheumatoid arthritis. *Neuropsychiatr Dis Treat*. 2017; 13: 2141-50. https://doi.org/10.2147/ndt.s137233
11. PRIMDAHL J, WAGNER L, HØRSLEV-PETERSEN K: Self-efficacy as an outcome measure and its association with physical disease-related variables in persons with rheumatoid arthritis: A literature review. *Musculoskeletal Care* 2011;9(3): 125-40. https://doi.org/10.1002/msc.210
12. STRAHL C, KLEINKNECHT RA, DINNEL DL: The role of pain anxiety, coping, and pain self-efficacy in rheumatoid arthritis patient functioning. *Behav Res Ther* 2000; 38(9): 863-73. https://doi.org/10.1016/s0005-7967(99)00102-3
13. MARTINEZ-CALDERON J, MEEUS M, STRUYF F, LUQUE-SUAREZ A: The role of self-efficacy in pain intensity, function, psychological factors, health behaviors, and quality of life in people with rheumatoid arthritis: a systematic review. *Physiother Theory Pract* 2020; 36(1): 21-37. https://doi.org/10.1080/09593985.2018.1482512
14. WHITE AA, BA A, FAITH TD *et al*.: the care-coordination approach to learning lupus self-management: A patient navigator intervention for systemic lupus inpatients. *Lupus Sci Med* 2021; 8(1): e000482. https://doi.org/10.1136/lupus-2021-000482
15. GRUBER-BALDINI AL, VELOZO C, ROMERO S, SHULMAN LM: Validation of the PROMIS® measures of self-efficacy for managing chronic conditions. *Qual Life Res* 2017; 26(7): 1915-24. https://doi.org/10.1007/s11136-017-1527-3
16. HEALTH MEASURES: https://www.healthmeasures.net.
17. AMTMANN D, KIM J, CHUNG H, ASKEW RL, PARK R, COOK KF: Minimally important differences for Patient Reported Outcomes Measurement Information System pain interference for individuals with back pain. *J Pain Res* 2016; 9: 251-55. https://doi.org/10.2147/jpr.S93391
18. CHEN C, KROENKE K, STUMP T *et al*.: Estimating minimally important differences for the PROMIS® pain interferences scales using three clinical trials. *Pain* 2017; 18(4): S63. https://doi.org/10.1016/j.jpain.2017.02.328
19. ROBINSON RL, GRABNER M, PALLI SR, FARIES D, STEPHENSON JJ: Covariates of depression and high utilizers of healthcare: Impact on resource use and costs. *J Psychosom Res* 2016; 85: 35-43. https://doi.org/10.1016/j.jpsychores.2016.04.002
20. PETERS M, POTTER CM, KELLY L, FITZPATRICK R: Self-efficacy and health-related quality of life: A cross-sectional study of primary care patients with multi-morbidity. *Health Qual Life Outcomes* 2019; 17(1): 37. https://doi.org/10.1186/s12955-019-1103-3
21. MATCHAM F, NORTON S, SCOTT DL, STEER S, HOTOPF M: Symptoms of depression and anxiety predict treatment response and long-term physical health outcomes in rheumatoid arthritis: secondary analysis of a randomized controlled trial. *Rheumatology* (Oxford) 2015; 55(2): 268-78. https://doi.org/10.1093/rheumatology/kev306
22. TREHARNE GJ, LYONS AC, BOOTH DA, KITAS GD: Psychological well-being across 1 year with rheumatoid arthritis: Coping resources as buffers of perceived stress. *Br J Health Psychol* 2007; 12(3): 323-45. https://doi.org/10.1348/135910706x109288
23. BREKKE M, HJORTDAHL P, KVIEN TK: Self-efficacy and health status in rheumatoid arthritis: a two-year longitudinal observational study. *Rheumatology* (Oxford) 2001; 40(4); 387-92. https://doi.org/10.1093/rheumatology/40.4.387
24. DRENKARD C, EASLEY K, BAO G, DUNLOP-THOMAS C, LIM SS, BRADY T: Cross-sectional study of the effects of self-efficacy on fatigue and pain interference in black women with systemic lupus erythematosus: the role of depression, age and education. *Lupus Sci Med* 2022; 9(1): e000566. https://doi.org/10.1136/lupus-2021-000566
25. LIMA YL, LEE H, KLYNE DM *et al*.: How do nonsurgical interventions improve pain and physical function in people with osteoarthritis? a scoping review of mediation analysis studies. *Arthritis Care Res* (Hoboken) 2023; 75(3): 467-81.

https://doi.org/10.1002/acr.24983
26. SHELBY RA, SOMERS TJ, KEEFE FJ, PELLS JJ, DIXON KE, BLUMENTHAL JA: Domain specific self-efficacy mediates the impact of pain catastrophizing on pain and disability in overweight and obese osteoarthritis patients. *J Pain* 2008; 9(10): 912-19. https://doi.org/10.1016/j.jpain.2008.05.008
27. BIELER T, ANDERSON T, BEYER N, ROSTHØJ S: The impact of self-efficacy on activity limitations in patients with hip osteoarthritis: results from a cross-sectional study. *ACR Open Rheumatol* 2020; 2(12): 741-49. https://doi.org/10.1002/acr2.11198
28. DEGERSTEDT Å, ALINAGHIZADEH H, THORSTENSSON CA, OLSSON CB: High self-efficacy - A predictor of reduced pain and higher levels of physical activity among patients with osteoarthritis: an observational study. *BMC Musculoskelet Disord* 2020; 21(1): 380. https://doi.org/10.1186/s12891-020-03407-x
29. PIHL K, ROOS EM, TAYLOR RS, GRØNNE DT, SKOU ST: Prognostic factors for health outcomes after exercise therapy and education in individuals with knee and hip osteoarthritis with or without comorbidities: a study of 37,576 patients treated in primary care. *Arthritis Care Res* (Hoboken) 2022; 74(11): 1866-78. https://doi.org/10.1002/acr.24722
30. JIANG W, ZHANG Y, YAN F, LIU H, GAO R: Effectiveness of a nurse-led multidisciplinary self-management program for patients with coronary heart disease in communities: a randomized controlled trial. *Patient Educ Couns* 2020;103(4): 854-63. https://doi.org/10.1016/j.pec.2019.11.001
31. CHEN Y, ZHU X, LU Y, XUE S, YANG J, LU L: The effect of multidisciplinary cooperative continuous nursing on the self-efficacy and quality of life in allogeneic hematopoietic stem-cell transplantation patients. *Int J Clin Exp Med* 2020; 13. www.ijcem.com/
32. YEHLE KS, PLAKE KS: Self-efficacy and educational interventions in heart failure: a review of the literature. *J Cardiovasc Nurs* 2010; 25(3): 175-88. https://doi.org/10.1097/jcn.0b013e3181c71e8e
33. HOLMAN H, LORIG K: Perceived self-efficacy in self-management of chronic disease. In: *Self-Efficacy: Thought Control of Action*. Taylor & Francis 1992, pp. 305-23.
34. LORIG K, CHASTAIN RL, UNG E, SHOOR S, HOLMAN HR: Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arthritis Rheum*. 1989; 32(1): 37-44. https://doi.org/10.1002/anr.1780320107