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Google Internet searches related to inflammatory arthritis: An observational study using Google Trends data

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Abstract

Objective: The Internet has transformed how patients access health information. We examined Google search engine data to understand which aspects of health are most often searched for in combination with inflammatory arthritis (IA).

Methods: Using Google Trends data (2011–2022) we determined the relative popularity of searches for 'patient symptoms' (pain, fatigue, stiffness, mood, work) and 'treat-to-target' (disease-modifying drugs, steroids, swelling, inflammation) health domains made with rheumatoid arthritis (RA), psoriatic arthritis (PsA), and axial spondyloarthritis (AxSpA) in the UK/USA. Google Trends normalises searches by popularity over time and region, generating 0–100 scale relative search volumes (RSV; 100 represents the time-point with most searches). Up to five search term combinations can be compared.

Results: In all IA forms, pain was the most popular patient symptom domain. UK/USA searches for pain gave mean RSVs of 58/79, 34/51, and 39/63 with RA, PsA, and AxSpA; mean UK/USA RSVs for other patient symptom domains ranged 2–7/2–8. Methotrexate was the most popular treat-to-target search term with RA/PsA in the UK (mean 28/21) and USA (mean 63/33). For AxSpA, inflammation was most popular (mean UK/USA 9/34). Searches for pain were substantially more popular than searches for methotrexate in RA and PsA, and inflammation in AxSpA. Searches increased over time.

Conclusions: Pain is the most popular search term used with IA in Google searches in the UK/USA, supporting surveys/qualitative studies highlighting the importance of improving pain to patients with IA. Routine pain assessments should be embedded within treat-to-target strategies to ensure patient perspectives are considered.

KEYWORDS
axial spondyloarthritis, Internet, pain, psoriatic arthritis, rheumatoid arthritis

1 | INTRODUCTION

Information sought by patients and the public about medical problems helps identify the issues that are most important to them. Over 9 billion Internet searches are made using the Google search engine every day (Moran, 2023), with a sample of these search data freely available for analysis using the Google Trends tool. A decade ago, Nuti et al. summarised the early use of Google Trends data in healthcare research (Nuti et al., 2014). Since then, several studies have used these data to explore public interest in rheumatoid arthritis (RA) and other forms of inflammatory arthritis (IA). These include studies: (a) examining general trends in searches over time, with Wu et al. reporting that searches for RA had increased in popularity over the last decade (Wu et al., 2019); (b) examining geographical variation in searches for arthritis, with Dey et al. reporting that searches for non-infectious and infectious forms of arthritis differed between countries based on their economic status (Dey et al., 2020), and (c) examining trends in searches in relation to specific events, with Kardes et al. reporting that the popularity of searches for many rheumatic disease declined during the initial COVID-19 pandemic period (Kardeş et al., 2021), and Kaminski and Hrycaj reporting that when celebrities are reported to have different rheumatic diseases (including IA) there is an aligned increase in the popularity of searches for these conditions (Kamiński & Hrycaj, 2023).

Internet searches often combine a range of search terms. Google Trends provides the capability to examine the popularity of such combined searches, which can provide informative data about the focus of interest of patients and the public. We used this function to examine which aspects of health are most often searched for in conjunction with searches for IA, providing crucial insight into the health domains that may be of most importance to patients with IA and the public. Our rationale for this was to explore an apparent paradox in the way in which IA is managed, with rheumatology teams primarily focussing on reducing joint inflammation using disease-modifying anti-rheumatic drugs (DMARDs) in an approach termed 'treat-to-target' (Smolen et al., 2010), but patients primarily wanting symptoms that are not necessarily related to inflammation improved. This is particularly true for pain, with surveys of people with IA showing that two-thirds of people with RA are dissatisfied with their arthritis pain (Taylor et al., 2010), three-quarters of people with psoriatic arthritis (PsA) have ongoing joint pain (Coates et al., 2020), and one third of patients with axial spondyloarthritis (AxSpA) have pain as their main disease-related fear (Garrido-Cumbrera et al., 2019). Qualitative research provides similar findings; for example, a systematic review of qualitative studies in PsA showed that pain is patients' most frequent symptom (Alexis Ogdie et al., 2020). However, as these studies only include a minority of people with IA, their generalisability is uncertain.

Examining search engine data therefore provides an alternative method to evaluate the areas of health that are most important to people with IA. We examined data on Google searches to determine the relative popularity of searches for different aspects of health made in conjunction with the three main subtypes of IA (RA, PsA, and AxSpA) in the two largest English-speaking countries (the UK and USA). We divided searches into those terms related to symptoms (such as pain and fatigue) and those related to treat-to-target concepts (such as inflammation and DMARDs). Our aims were firstly, to compare the relative popularity of searches related to patient symptoms made in conjunction with IA; secondly, to compare the relative popularity of searches related to treat-to-target concepts made in conjunction with IA; and thirdly, to compare the relative popularity of searches related to the most popular patient symptom and the most popular treat-to-target concept made in conjunction with IA.

2 | METHODS

2.1 | Google Trends

We used data from Google Trends, which provides information on search requests made using Google (2024). As there are billions of daily searches on Google, this tool provides analyses of a sample of these searches.

Google Trends generates data using two steps. First, a combination of 'search terms' is entered which are contained within a single Google search (e.g., 'rheumatoid arthritis pain' looks for all searches containing this combination of words in any order). Second, normalised data is generated on the relative popularity of this search term combination by country as follows: (a) in each month the number of searches for the search term combination (numerator) is divided by the total number of all searches (denominator); (b) the results are scaled from 0 (month when the proportion of searches for the search term combination is lowest) to 100 (month it is highest), providing a relative search volume (RSV). Google Trends allows comparisons of the relative popularity of up to five search term combinations (e.g., comparing whether searches for 'rheumatoid arthritis pain' or 'rheumatoid arthritis inflammation' are more popular). The same data normalisation steps are undertaken, but the scaling process pools the searches for the various search term combinations together.

We used data from the two most populous primary English-speaking countries (UK and USA) from 1 January 2011 to the 31 December 2022. We started from 1 January 2011 as there was an improvement to Google Trend's geographical assignment processes at that time, which could potentially affect data processing before and after the change.

2.2 | IA subtypes

We evaluated the main IA forms (RA, PsA, and AxSpA). As AxSpA has various synonyms, we explored the relative popularity of these, finding that 'Ankylosing spondylitis' was most popular (Table S1) and this was therefore used to represent AxSpA in all searches.

2.3 | Health aspects

We evaluated the following five 'patient symptom' health domains: (1) pain, (2) fatigue, (3) stiffness, (4) mood, and (5) work. We evaluated the following five 'treat-to-target' health domains: (1) swelling, (2) inflammation, (3) steroids, (4) synthetic DMARDs, and (5) biologics/targeted synthetic DMARDs. All domains were evaluated in RA and PsA; synthetic DMARDs was omitted in AxSpA as they are not used to manage this condition in the absence of a peripheral IA. We followed Nuti et al.'s search strategy recommendations for Google Trends, ensuring their transparency and reproducibility (Nuti et al., 2014). Over 100 search term combinations were considered (details provided in full in Table 1).

2.4 | Determining the most popular health domains

As Google Trends allows users to simultaneously compare the relative popularity of up to five search terms only, we used a staggered approach to determine the most popular health domain. First, we split each patient symptom domain into 'groups' containing up to five search terms with a common theme. For example, for the domain of pain, its groups comprised one 'general pain' group (containing terms about pain, pain relief, and analgesics), two 'NSAID' groups (containing terms about NSAIDs or specific NSAID names), one 'opioid' group (containing terms about opioids or specific opioid names), and one 'other' group (containing terms about paracetamol or gabapentinoids). Second, the most popular search term in each group was

TABLE 1 Search terms evaluated in combination with IA diagnosis by health domain.

'Patient symptom' domains	Search terms
Pain	• *Group 1—General pain:* Pain, pain relief, analgesic, analgesia • *Group 2—NSAIDs a:* NSAID, NSAIDs, naproxen, ibuprofen, diclofenac • *Group 3—NSAIDs b:* Celecoxib, etoricoxib, meloxicam • *Group 4—Opioids:* Opioid, opioids, morphine, codeine, tramadol • *Group 5—Other:* Paracetamol (UK) or acetaminophen (USA), pregabalin, gabapentin.
Fatigue	• *Group 1—Fatigue:* Fatigue, tyred, tiredness, exhausted, exhaustion • *Group 2—Sleep:* Sleep, sleepy
Stiffness	• *Group 1—Stiffness:* Stiffness, stiff, early morning stiffness, EMS
Mood	• *Group 1—Depression:* Mood, low mood, depression, sad, sadness • *Group 2—Anxiety:* Anxiety, anxious, worry, worried
Work	• *Group 1—Work:* Work, working, job, occupation. • *Group 2—Employment:* Employment, unemployment, employed, unemployed.
'Target-to-treat' domains	**Search terms**
Steroids	• *Group 1—General steroid:* Steroid, steroids • *Group 2—Specific steroid:* Prednisolone, methylprednisolone, depo, depo-medrone.
Synthetic DMARDs	• *Group 1—General DMARD:* Dmard, dmards, disease-modifying anti-rheumatic drug, disease-modifying anti-rheumatic drugs • *Group 2—Specific DMARD a:* Disease-modifying antirheumatic drug, disease-modifying antirheumatic drugs, azathioprine, ciclosporin, cyclosporine • *Group 3—Specific DMARD b:* Hydroxychloroquine, leflunomide, methotrexate, sulfasalazine, sulphasalazine
Biologics and targeted synthetic DMARDs	• *Group 1—Biologics a: RA:* Biologic, biologics, tofacitinib, baricitinib, filgotinib. *PsA:* Biologic, biologics, tofacitinib, upadacitinib, apremilast. *AxSpA:* Biologic, biologics, ixekizumab, secukinumab. • *Group 2—Biologics b: RA:* Abatacept, sarilumab, tocilizumab, rituximab. *PsA:* Ustekinumab, risankizumab, guselkumab, ixekizumab, secukinumab. • *Group 3—JAK specific: RA:* JAK, JAK inhibitor, janus kinase, janus kinase inhibitor, upadacitinib. *PsA:* JAK, JAK inhibitor, janus kinase, janus kinase inhibitor. *AxSpA:* JAK, JAK inhibitor, janus kinase, janus kinase inhibitor, upadacitinib. • *Group 4—Anti TNF a:* TNF, Anti-TNF, TNF inhibitor, tumour necrosis factor, tumour necrosis factor inhibitor. • *Group 5—Anti TNF b:* Adalimumab, certolizumab, etanercept, golimumab, infliximab.
Synovitis	• *Group 1—Synovitis:* Swelling, swollen, swollen joint, swollen joints, synovitis.
Inflammation	• *Group 1—Inflammation general:* Inflammation, inflamed, inflammatory marker, inflammatory markers. • *Group 2—Inflammation specific:* CRP, C-reactive protein, C reactive protein, ESR, erythrocyte sedimentation rate.

Abbreviation: AxSpA, axial spondyloarthritis; IA, inflammatory arthritis; PsA, psoriatic arthritis; RA, rheumatoid arthritis.
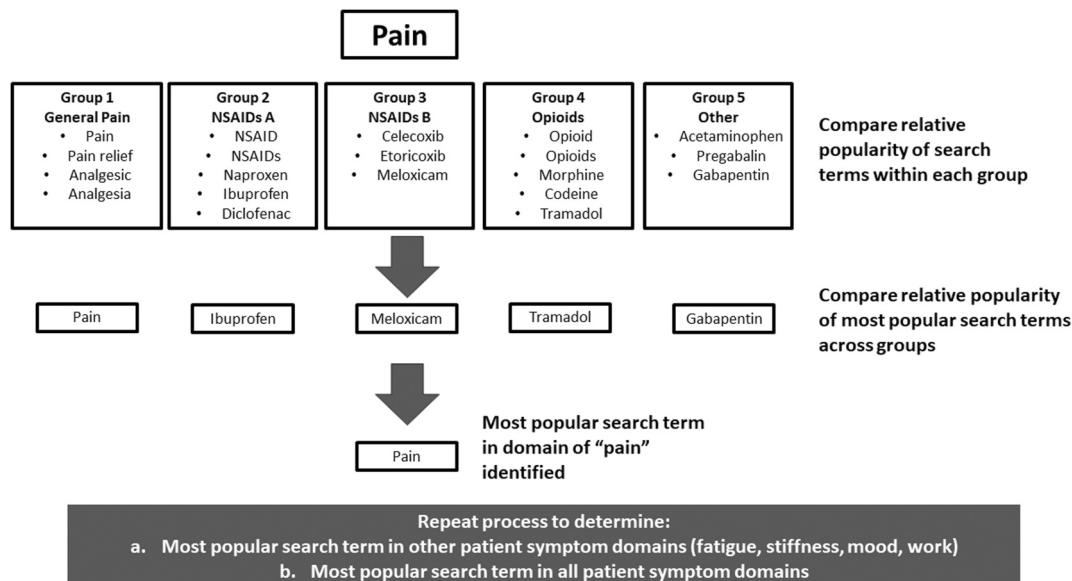
FIGURE 1 Staggered process undertaken to determine most popular patient symptom domain. The most popular search terms in each 'pain' group in this example are from the USA results.

determined by comparing the relative popularity of all search terms within it to each other and identifying the search term with the highest mean score across all timepoints. Third, the most popular search term in each patient symptom domain was determined by comparing the relative popularity of the most popular search term in each of the five groups to each other and identifying the term with the highest mean score across all timepoints. This was performed for each IA type in the UK and USA. The same approach was undertaken to determine the most popular treat-to-target domain. Finally, the most popular patient symptom and treat-to-target domains were compared to each other in the same way. This process is outlined in Figure 1, using the example of the domain of pain.

2.5 | Statistical programme

Data management and analysis was conducted using R (version 4.3.0).

3 | RESULTS

3.1 | Most popular search term in each patient symptom domain

The most popular search term in each patient symptom domain was similar in both the UK and USA across all forms of IA (Table 2). In RA, 'pain', 'fatigue', 'depression', and 'work' were the most popular search terms in each of the relevant domains in both countries, but 'stiff' was preferred in the UK and 'stiffness' in the USA (for the patient symptom domain of stiffness). In PsA and AxSpA, only the pain domain generated any search results in the UK. In contrast, in the

USA 'fatigue', 'depression', and 'work' all generated search results in PsA and 'fatigue', 'stiff', and 'work' all generated search results in AxSpA.

3.2 | Most popular patient symptom domain

In all forms of IA, in both countries, searches for the domain of pain were substantially more popular than searches for the other patient symptom domains; their popularity increased over time (Figure 2; with full data provided in Tables S2 and S3). In the UK, mean RSV scores for pain in RA, PsA, and AxSpA rose from 38.2 (95% CI 33.1, 43.3), 15.1 (95% CI 5.8, 24.3), and 33.5 (95% CI 23.0, 44.0) in 2011 to 78.3 (95% CI 71.5, 85.2), 54.3 (95% CI 41.0, 67.6), and 55.7 (95% CI 48.1, 63.2) in 2022. In the USA, mean RSV scores were 62.1 (95% CI 58.6, 65.6), 27.8 (95% CI 20.2, 35.4), and 35.9 (95% CI 30.9, 41.0) in 2011 rising to 91.8 (95% CI 87.4, 96.3), 81.5 (95% CI 75.5, 87.5), and 76.8 (95% CI 72.2, 81.5) in 2022. Mean RSV scores for searches for non-pain domains in the UK for RA ranged from 0.8 to 9.9 (with no scores generated for PsA and AxSpA) and in the USA for RA, PsA, and AxSpA ranged from 1.7 to 12.3, 0.6 to 9.4, and 0.7 to 6.6.

3.3 | Most popular search term in each treat-to-target domain

The most popular treat-to-target domain search terms in the UK and USA were 'steroids', 'methotrexate', 'TNF' or 'biologics', 'swollen' or 'swelling', and 'inflammation' (Table 2). Not all search terms generated search results in all forms of IA. For example, 'steroids' only generated search results in RA, and 'biologics' were not searched for in PsA or AxSpA in the UK.

TABLE 2 Mean RSV scores over study period for most popular search terms in each health domain subgroup.

Domain	UK			USA		
	RA	PsA	AxSpA	RA	PsA	AxSpA
'Patient symptom' domains						
Pain	*General:* **Pain (60.6)** *NSAID a:* Naproxen (2.4)	*General:* **Pain (34.4)**	*General:* **Pain (38.7)**	*General:* **Pain (79.8)** *NSAID a:* Ibuprofen (1.8) *NSAID b:* Meloxicam (2.1) *Opioid:* Tramadol (1.0) *Other:* Gabapentin (1.1)	*General:* **Pain (51.2)**	*General:* **Pain (62.7)**
Fatigue	*Fatigue:* **Fatigue (18.4)** *Sleep:* Sleep (10.0)	-	-	*Fatigue:* **Fatigue (36.7)** *Sleep:* Sleep (15.8)	*Fatigue:* **Fatigue (29.7)** *Sleep:* Sleep (10.8)	*Fatigue:* **Fatigue (13.4)** *Sleep:* Sleep (10.0)
Stiffness	**Stiff (15.6)**	-	-	**Stiffness (34.0)**	-	**Stiff (5.9)**
Mood	*Anxiety:* Anxiety (7.4) *Depression:* **Depression (10.0)**	-	-	*Anxiety:* Anxiety (23.4) *Depression:* **Depression (23.5)**	*Depression:* **Depression (9.0)**	-
Work	*Work:* **Work (34.3)**	-	-	*Work:* **Work (39.0)**	*Work:* **Work (15.4)**	*Work:* **Work (19.0)**
'Treat-to-target' domains						
Corticosteroids	*General:* **Steroids (12.0)** *Specific:* Prednisolone (8.6)	-	-	*General:* **Steroids (25.5)**	-	-
Synthetic DMARDs	*General:* DMARDs (5.0) *Specific a:* **Methotrexate (31.5)**	*Specific a:* **Methotrexate (28.5)**	Not searched	*General:* DMARDs (8.4) *Specific a:* **Methotrexate (64.7)** *Specific b:* Azathioprine (2.8)	**Methotrexate (38.3)**	Not searched
Biologics or tsDMARDs	Biologics (13.1) Rituximab (11.8) **TNF (13.9)**	-	-	**Biologics (19.6)** Rituximab (9.7) TNF (14.8) Etanercept (7.4)	**Biologics (12.4)**	**Biologics (10.1)**
Synovitis	*Synovitis:* **Swollen (41.0)**	*Synovitis:* **Swollen (14.9)**	-	*Synovitis:* **Swollen (62.8)**	*Synovitis:* **Swelling (27.3)**	*Synovitis:* **Swelling (16.6)**
Inflammation	*General:* **Inflammation (25.0)** *Specific:* ESR (12.8)	-	*General:* **Inflammation (8.9)**	*General:* **Inflammation (43.8)** *Specific:* CRP (14.3)	*General:* **Inflammation (28.3)** *Specific:* CRP (12.8)	*General:* **Inflammation (26.2)** *Specific:* CRP (8.4)

Note: In each domain search terms are divided into 'subgroups' (as detailed in Table 1). The most popular search term (with mean relative search volume scores from the 1 January 2011 to the 31 December 2022) are provided, with the most popular search term in each domain given in bold. Subgroups where all search terms generate scores of 0 are not listed in the table.

Abbreviations: AxSpA, axial spondyloarthritis; PsA, psoriatic arthritis; RA, rheumatoid arthritis; RSV, relative search volume.

3.4 | Most popular treat-to-target domain

In RA, similar patterns of treat-to-target domain popularity were seen in both countries, with synthetic DMARDs being most popular, followed by synovitis and inflammation (Figure 2; Tables S2 and S3). The popularity of searches in all these domains increased between 2011 and 2022, particularly inflammation, rising from a mean RSV score of 8.5 (95% CI 3.3, 13.7) to 21.3 (95% CI 15.9, 26.6) in the UK and 30.5 (95% CI 19.5, 41.5) to 68.8 (95% CI 59.4, 78.3) in the USA. Minimal searches were made for the domains of corticosteroids and biologic/targeted synthetic DMARDs. In PsA, in both the UK and USA, synthetic DMARDs was also the most popular domain, followed by synovitis. In AxSpA, inflammation was the most popular domain in the USA, with its popularity rising over time to a mean RSV score of 58.2 (95% CI 43.4, 73.0) in 2022; inflammation was the only treat-to-target domain generating a score in the UK.
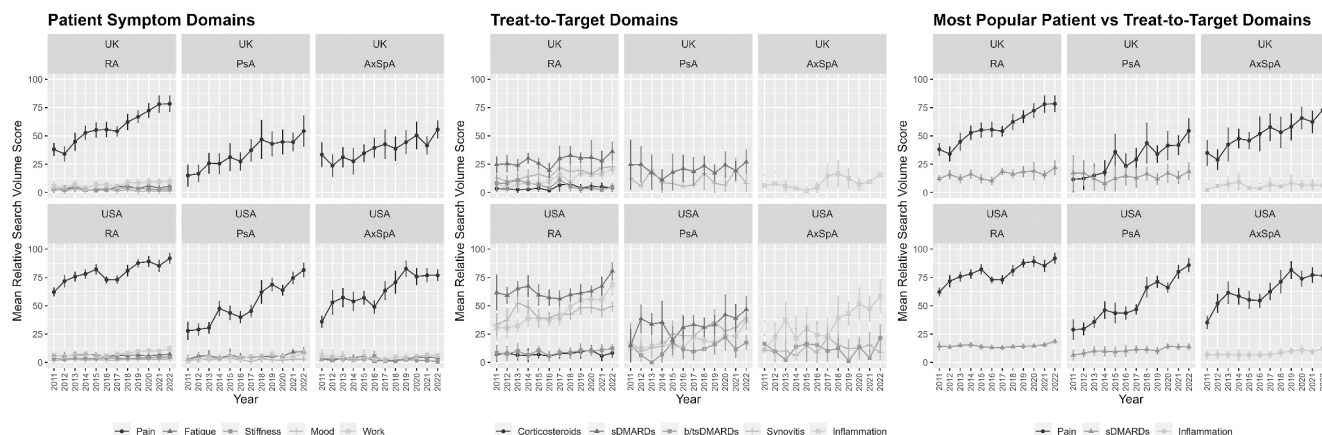
FIGURE 2 Relative popularity of health domains searched in combination with IA. Mean RSV scores with standard error bars are plotted in each calendar year for each patient symptom domain, each treat-to-target domain, and the most popular patient symptom and treat-to-target domain. IA, inflammatory arthritis; RSV, Relative Search Volume.

3.5 | Comparison of the most popular patient symptom and treat-to-target domain

In all IA types in both countries, searches in the most popular patient symptom domain of pain were substantially more popular than the most popular treat-to-target domain (synthetic DMARDs for RA and PsA; inflammation for AxSpA) in all years, except for 2011 and 2012 for PsA in the UK. For pain and synthetic DMARDs with RA (Table S2) mean UK RSV scores were 57.7 (95% CI 55.0, 60.5) and 15.8 (95% CI 14.6, 17.0), and USA scores were 79.2 (95% CI 77.5, 80.9) and 14.7 (95% CI 14.1, 15.2). For pain and synthetic DMARDs with PsA, mean UK scores were 30.1 (95% CI 26.5, 33.7) and 14.4 (95% CI 12.1, 16.7), and USA scores were 53.6 (95% CI 50.2, 57.1) and 10.7 (95% CI 9.8, 11.7). For pain and inflammation with AxSpA, mean UK scores were 51.8 (95% CI 48.4, 55.3) and 6.1 (95% CI 4.6, 7.6), and USA scores were 63.3 (95% CI 60.5, 66.1) and 8.2 (95% CI 7.2, 9.1).

4 | DISCUSSION

After systematically evaluating Google searches for over 100 health-related search terms made in conjunction with IA over 11 years in the UK and USA, we have found that 'pain' was overwhelmingly the most popular search term used in association with all forms of IA. This finding highlights the importance that patients and the public attribute to pain in their views about IA. Our analysis also showed that there is interest in a broad range of other issues related to IA, including fatigue, depression, work, key drugs used in IA, joint swelling, and inflammation. In addition, we found evidence that the popularity of searches for pain and other aspects of health in relation to IA have increased over time, suggesting that the Internet is increasingly used to obtain IA health-related information. The relative popularity of searches was broadly similar in the UK and USA, indicating that our findings are generalisable.

Although Google has dominated Internet searches for many years, new approaches to gaining information are increasingly coming to the fore. One example is ChatGPT, which is powered by artificial intelligence. Whilst Uz and Umay found this system provided reliable information about rheumatic diseases, they observed that it also had the potential to deliver misleading answers in some situations (Uz & Umay, 2023). Healthcare providers and a wide range of health charities provide extensive information about different aspects of IA and its management. It remains crucial to alert people with IA to online sources of reliable information and to highlight the potential limitations of some online information from unregulated sources. The rising levels of Google searches for information about IA over time suggests that online information is increasingly important for patients and the public, although diverse approaches to them accessing this information are likely to be used in the future.

The main finding from our study–namely the high popularity of searches for pain in association with all forms of IA, in comparison to other aspects of health - reflects observational and qualitative studies demonstrating the importance that patients with IA place on improving their pain. Although controlling joint inflammation using synthetic, targeted synthetic, and biologic DMARDs is a crucial component of clinical care, which is highlighted in a range of clinical guidelines, we consider there is a strong case for clinicians to place a greater emphasis on regularly measuring pain and targeting its improvement in patients with IA. An integrative review synthesising the experiences and/or needs of patients living with RA by Poh et al. evaluated 38 published studies, which examined these issues. Of these, five qualitative studies highlighted the experience of severe pain caused by RA, which was often considered extreme and cease-less and had substantial impacts on people's daily activities (Poh et al., 2015). A more recent qualitative study including 15 patients with RA by Cozad et al., which sought to explore patient perceptions on how the burden of RA shapes their goals for living and preferences for symptom and side-effect management, showed that many wanted a reduction in pain, which would enable them to resume

doing the activities that they enjoyed (Cozad et al., 2023). Whilst clinicians primarily focus on achieving remission or low disease activity using DMARDs, patients achieving these targets can have ongoing pain (Ibrahim et al., 2022); furthermore these disease activity-based targets are rarely achieved long-term in a routine care setting (Scott et al., 2019). The limitations of biologic DMARDs at resolving pain are highlighted in an analysis of the British Society for Rheumatology Biologics Register, which found that–despite receiving high-cost biologic DMARDs–79% of patients with RA belonged to a 'persistent pain' trajectory (McWilliams et al., 2019). Interestingly, the popularity of associated searches for factors such as fatigue and depression in our study indicates an interest in symptoms related to pain, with Pollard et al. reporting that fatigue (as opposed to disease activity) is closely associated with pain in patients with RA (Pollard et al., 2006), and evidence existing that depression and pain intensity may have a bidirectional relationship in patients with RA (Euesden et al., 2017). The need to take more account of pain in patients with IA is attracting greater professional support and interest. One example is the decision of the British Society for Rheumatology to produce new guidelines on pain management in patients with IA (BSR, 2024). Our findings about the popularity of searches for pain in the context of IA support such initiatives.

Self-management strategies are important for patients with IA, helping them to live most effectively with this long-term condition. A good knowledge of IA (including its effects and treatments) is essential for self-management. Self-evidently the Internet provides a great deal of information about IA and its management. A qualitative study by Des Bordes et al., which explored the information needs of patients with RA, highlighted the importance of the Internet, with this (alongside doctors' offices) being their main source of information (des Bordes et al., 2018). This highlights a need to ensure that such online information is both appropriate and accurate. Whilst a survey of 46 websites confirmed that nearly all (98%) of those evaluated provided accurate information, none covered all of the essential topics for understanding IA and its management, and not all provided fully up-to-date information (Siddhanamatha et al., 2017). Another issue is ensuring that people have access to, and feel able to use, the Internet. In a recent UK-based survey of people with inflammatory rheumatic diseases, from 639 people, 19.7% did not have access to an Internet-enabled device, and 23% of people with RA reported they had never accessed the Internet (Hider et al., 2023). It is therefore important to ensure that information is available to patients in a variety of formats, and not exclusively online.

Our study has several strengths. First, it used a systematic approach to evaluate the most popular search terms. Second, it adhered to recommended methods to assessing search terms in Google Trends. Third, its findings were broadly replicated in the two main English-speaking countries (the UK and USA) suggesting generalisability. It also has several limitations. First, as anyone can search for anything in Google, we cannot know the extent to which searches were made by patients, their relatives or careers, or unrelated members of the public. Second, we do not know the characteristics of people that use Google for searches; it is likely to be favoured by people with higher levels of health literacy and digital skills. Third,

there are constraints on the number of search terms that can be simultaneously compared using Google Trends (a maximum of five). Fourth, there is limited information provided by Google Trends about how their search data are sampled.

5 | CONCLUSION

Our study has two main conclusions. First, is that pain is the most popular search term used in association with all forms of IA in Internet searches made using Google in the UK and USA. This supports existing surveys and qualitative studies highlighting the importance of improving pain to patients with IA. Second is that the popularity of searches using Google for pain and many other IA-related health aspects has risen over the last decade, highlighting the increasing use of the Internet by patients and the public to obtain health-related information. Taken together, these two study conclusions support the need to embed the measurement and treatment of pain within routine consultations for patients with IA, alongside the requirement for organisations treating and supporting patients with IA to work together to ensure that accurate and up-to-date information on IA is available online that covers all aspects of their disease.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.