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ORIGINAL ARTICLE

Credibility, readability and content analysis of treatment recommendations for adolescents with nonspecific back pain published on consumer websites

S. D. Hauber[1,2] | **K. Robinson**[1,2] | **R. Fechner**[3,4] | **J. W. Pate**[3] | **K. O'Sullivan**[1,2]

[1]School of Allied Health, University of Limerick, Limerick, Ireland

[2]Health Research Institute, University of Limerick, Limerick, Ireland

[3]Graduate School of Health, University of Technology Sydney, Sydney, New South Wales, Australia

[4]Queensland Interdisciplinary Paediatric Persistent Pain Service, Children's Health Queensland Hospital and Health Service, South Brisbane, Queensland, Australia

Correspondence
S. D. Hauber, Health Research Institute, University of Limerick, Health Science Building, Limerick, Ireland.
Email: sara.hauber@ul.ie

Abstract

Background: Parents may seek out health information online when their adolescent has nonspecific back pain to better understand treatment options. Such information directed towards consumers has not been previously analysed.

Methods: A descriptive cross-sectional content analysis was performed to describe the treatments recommended on consumer websites for nonspecific back pain in adolescents. The credibility and readability of the websites were also assessed. Systematic Google searches were completed in five countries, and relevant content from eligible web pages was analysed. An a priori codebook with 34 treatment-related codes was developed. Nine additional codes were inductively created during analysis. Credibility was assessed using the JAMA benchmark. Readability was assessed via the Flesch Kincaid Grade Level.

Results: Of 245 web pages, 48 were deemed eligible and analysed. Of 43 treatment codes, 37 were present in at least one web page. The five most frequently identified codes were See the doctor/get a diagnosis (found on 85% of web pages), Ergonomics/posture/biomechanics (52%), Reassurance (48%), Physiotherapy (48%) and Non-prescription pharmaceuticals/supplements (46%). Only 21% of the web pages met all four JAMA benchmark criteria, and 15% cited at least one recent or high-quality source. The median Flesch Kincaid Grade Level score was 9.0 (range 3.5–12.9).

Conclusions: Parents of adolescents with nonspecific back pain may find that treatment recommendations published online are numerous and varied, with visits to the doctor encouraged. The credibility scores of these web pages are generally low, while the median reading level may be too high for the general population.

Significance Statement: This analysis reveals that public-facing websites with recommendations for treating adolescent nonspecific back pain do not cite the most recent, high-quality research. Although web pages correctly encourage

physical activity and exercise over surgery and prescription medications, they do not reflect the psychologically informed or interdisciplinary care emphasized in recently published treatment recommendations. Clinicians must be aware that caregivers of their adolescent patients with nonspecific back pain may be exposed to online messages that encourage them to keep seeking a diagnosis.

1 | INTRODUCTION

The prevalence of back pain in adolescents has received increasing attention in the previous decade. An analysis of the 2013/2014 Health Behaviour in School-aged Children (HBSC) study data, which includes data from a sample of more than 200,000 adolescents aged 11, 13 or 15 from 42 countries, showed that chronic backache, without headache or stomach ache, was present in 7.7% (SD ± 1.8) of the population (Gobina et al., 2019). Masiero et al. (2021) found in a sample of more than 6000 Italian adolescents aged 14–19 that 2549 (49%) reported at least one episode of lower back pain. Of those, 14% reported nonspecific disabling lower back pain, and more than 40% consulted a healthcare practitioner regarding lower back pain. Chronic pain conditions, including lower back pain, have been shown to increase the likelihood that children aged 6–17 will miss school (Groenewald et al., 2019) and such conditions predict lower educational attainment and vocational functioning as young adults (Murray et al., 2020).

Associations between parents' characteristics and adolescent pain have not been studied in samples of adolescents who present exclusively with lower back pain. However, parental factors such as parenting style (Shaygan et al., 2021; Shibata et al., 2020), as well as protective behaviours and pain catastrophising (Donnelly et al., 2020), are associated with the occurrence of chronic pain (including back pain) in childhood and in increases in children's pain and pain-related disability respectively. In addition, parents' own perceived health status, threat perception and psychosocial factors may predict whether they seek healthcare for their adolescent with persistent pain (Calvano & Warschburger, 2016; Janicke et al., 2001; Tsao et al., 2011).

Parents are known to use the internet to gather information about their children's health-related symptoms (Kubb & Foran, 2020; Yardi et al., 2018), especially when their child has a chronic condition (Treadgold et al., 2020). Although parents have said they consider the credibility of a website's author in their online searches, this behaviour has not been shown in practice (Benedicta et al., 2020). Therefore, any information available online about childhood health conditions, such as persistent back pain, has the potential to be read by parents. This is concerning, because Ferreira et al. (2019) and Santos et al. (2022) have shown that online information about adult lower back pain is largely inaccurate and lacks credible sources. In addition, caregivers with lower levels of education or health literacy may find the reading level of online health information a barrier to its use (Park et al., 2016). Thus, we undertook a cross-sectional content analysis to describe what consumer-facing websites recommend for the treatment of nonspecific back pain in adolescence and to determine the credibility and readability of those websites. Our research questions were: (1) What treatments do consumer websites recommend for nonspecific adolescent back pain and how are those treatments described? (2) How credible are the consumer websites containing information about treatments for nonspecific adolescent back pain? (3) How readable is the information about treatments for nonspecific adolescent back pain on consumer websites?

2 | METHODS

2.1 | Study design and definitions

This was a descriptive cross-sectional analysis of online information. The study protocol was registered on Open Science Framework (Hauber, Robinson, Fechner, et al., 2023). In this study, we assessed three separate phenomena: the textual content of web pages, website credibility and web page readability. Methods for each analysis are described below.

2.2 | Terminology

For this report, we use the term ‘web page’ to refer to the specific content of the URL that was served up by Google as a result of our searches (e.g., https://www.domain.com/back-pain/). In contrast, the word ‘website’ refers to the main domain on which the analysed web page was found (e.g., https://www.domain.com). Only the specific web page(s) served up by Google were assessed for eligibility; no other web pages on the main domains were assessed or analysed, apart from some characteristics such as website owner/funder (see JAMA

benchmark item; Silberg, 1997) and country and affiliation of the website as a whole.

Adolescence is considered the life phase between childhood and adulthood. 'Adolescence encompasses elements of biological growth and major social role transitions, with the timing of these development patterns varying across time and place' (Sawyer et al., 2018, p. 1). The World Health Organization (WHO, n.d.-a) has defined the age range of adolescence as 10–19. However, most countries in the Organization for Economic Co-operation and Development (OECD, 2016, p. 2), including the overwhelming majority of states and provinces in all five countries included in our analysis, consider age 18 to be the first year of legal adulthood.

2.3 | Inclusion and exclusion criteria

Only web pages available to and written for the public, and written in English, were eligible. Only web page text and downloadable materials available for free and pertaining to the treatment of nonspecific back pain were reviewed. Text published on websites of professional associations but written for general audiences and not previously published in a professional journal was included. Video and audio content was eligible if a transcript of the content, written in English, was accessible free of charge and without the need for users to create an account.

Because our population of interest was adolescents, we screened out web pages that only pertained to infants, toddlers or lower grade primary school children. Web pages that were explicitly labelled as 'Ads' or 'Sponsored' in search results, and those that were membership only, that required an account or password to access, or that were expressly written for a professional audience (e.g. Up-to-date content for clinicians, physio-pedia) were excluded. Any peer-reviewed text published in an academic journal and served up in the search results was excluded, because the audience for these articles is primarily academics and researchers rather than parents. Text regarding the possible causes, red flag symptoms and diagnosis of back pain pathologies, and text describing treatments for specific injuries (e.g. fractures) or pathologies (e.g. spondylolisthesis, scoliosis, cancer pain), was excluded from analysis. Text written about treating back pain in the general or adult population, rather than treating back pain in childhood and adolescence, was ineligible.

2.4 | Search strategy

A systematic Google search was performed in April 2023 using three variations of search terms designed to return information on treatments for back pain, unrelated to a specific diagnosis or injury, in adolescence: how to relieve long-term back pain in teenager; help for teen with lasting back pain; how to stop 15-year-old's back ache. Little is known about how parents devise search terms for online health information searches (Kubb & Foran, 2020), although Benedicta et al. (2020) describe that parents may build increasingly specific search terms iteratively after they scan initial search results. Thus, we began search-term selection by piloting the general search terms 'adolescent persistent back pain' and 'chronic musculoskeletal pain in children' after finding no information on related terms in Google Trends (https://trends.google.com/trends). Between 50% and 65% of the web pages returned from those searches were focused on epidemiology, symptom identification or clinical evaluation and were written for an academic audience. Therefore, we used the guidance contained in the 'Ranking Results' section of Google's 'How Search Works' page (Google, n.d.) to devise more specific, relevant search queries. For example, because this analysis was tightly focused on text containing advice about treatment that parents might be searching for, it was decided to (a) include terms such as 'help' or 'relieve' and (b) use words that a general non-clinical population might use when searching online. These search terms returned more web pages containing information on back pain treatment, rather than evaluation/diagnosis and symptom descriptions, and pages were more likely to be written for a general audience than pages associated with our initial piloted terms. We then included terms such as 'lasting' and 'long-term' to retrieve web pages that gave advice about persistent nonspecific pain, rather than acute or event-related pain. However, both our piloted and final searches illustrated that most online content about back pain in adolescence is not organized by duration or specificity of pain.

After completing these trial searches, each of our three final search terms was agreed by the authors (of whom, four are parents of children under age 18) as likely to return relevant results in at least one of our five selected countries. We intentionally altered phrasing (e.g. back pain vs. back ache) to capture regional differences in nomenclature.

Our selected terms were searched using the Google search engine on the Google Chrome browser. A virtual private network (VPN) was set to each of five countries: Australia, Canada, Ireland, England and the United States, and the country code Top Level Domain (ccTLD) for each country was used: Google.com.au, Google.ca, Google.ie, Google.co.uk, Google.com. The browser's cache was cleared between each search. The first two pages of website results were screened for each of the three searches in each of the five countries, resulting in

a total of 299 web pages to be screened for eligibility (the remaining one Google search result was an image, not a web page).

2.5 | Eligibility screen

The corresponding author (SDH) and a second author (RF) independently screened the titles and content of the 245 search results remaining after duplicates were removed to determine whether those web pages matched our inclusion criteria. A third author (KOS) was engaged to arbitrate disagreements about five web pages; 48 web pages were deemed eligible.

2.6 | Data extraction

2.6.1 | Data for qualitative, credibility and readability analysis

All web page text related to back pain treatments was copied and pasted into an Excel (Microsoft Corp., Redmond, WA, USA) file developed by the authors. For this study, we defined 'treatment' as any action or activity recommended as a method to relieve back pain or improve function during a pain episode. (A recommended action or activity could also be 'rest' or the avoidance of a particular action or activity.) Each web page URL was assigned a signifier (e.g. WP1, WP2), similar to a participant code, for ease of reference in the data analysis phase.

2.6.2 | Website and web page descriptive data

We extracted the following data from each website, where available: (a) website characteristics (owner/funder, country of ownership, affiliation [government agency, healthcare provider, professional association, other]); (b) web page text and author characteristics (year the web page text was last updated and/or published, credentials of the authors of the text being assessed); (c) source characteristics (What percentage of the publications cited in the text were published within the preceding 5 years?; What percentage of the source publications are considered high-quality publications [published reports of randomized controlled trials, systematic reviews, meta-analyses or clinical guidelines or consensus statements from professional medical associations, not funded by industry]?). All data were extracted and placed in Excel (Microsoft Corp., Redmond, WA, USA) files developed by the authors. Data extraction was completed by SDH, and KR verified a random sample of 20% of the web pages to ensure accurate data extraction.

2.6.3 | Deviation from protocol

We originally intended to use four website affiliations: government agency, hospital or medical centre, professional association or other. We changed the category 'hospital or medical centre' to 'healthcare provider' in order to encompass a wider range of website affiliations, such as individuals in private practice.

2.7 | Data analysis

Data on the descriptive characteristics of each website and web page were analysed via simple counts, percentages and/or mean/median/mode.

To answer RQ1, we undertook directed manifest content analysis (Hsieh & Shannon, 2005; Kleinheksel et al., 2020) to categorize and describe the content related to treatments for nonspecific back pain on eligible web pages. We first developed a codebook (see Table S1) which contained a list of potential treatment recommendations. We based this list on the treatment recommendations for child and adolescent nonspecific back pain included in Frosch et al. (2022), best-practice guidelines for adults with musculoskeletal pain included in Lin et al. (2020) and our own clinical experience (three licensed physiotherapists, one occupational therapist and one post-rehabilitation fitness trainer). Each potential treatment was assigned a 'treatment code' (e.g. rest, graded motor imagery), and an operational definition was developed for each code. An audit trail of the codebook development process was maintained by SDH. Eligible website text was then coded deductively according to this list of codes. Text that did not fit existing codes was analysed inductively, and nine new treatment codes and operational definitions were agreed between two or more authors during data analysis (see Elo & Kyngäs, 2008, p. 111–112, for a description of this coding process). Coding was done at the word level, so statements such as 'If your child starts complaining of persistent back pain, they should be examined by a paediatric spine specialist immediately' were coded under multiple codes (e.g. 'See the doctor/get a diagnosis' and 'Act fast').

The corresponding author (SDH) undertook all coding. A second author (KR) coded text from 20% of the eligible web pages, and the coders' inter-rater reliability was determined by percentage agreement (Roaché, 2017) to be 97%.

To answer RQ2, we used the JAMA benchmark (Silberg, 1997), which includes four items to assess an

online source for credibility: (1) are authors and authors' credentials reported? (2) are references and sources reported? (3) is website ownership, sponsorship and funding fully disclosed? (4) are the dates the content was posted and updated shown? The presence of each item is reported as Yes/No. The JAMA benchmark does not offer a scoring system. However, convention has dictated that 1 point be awarded for each of the four items included in the benchmark (see, e.g., Basnet et al., 2023) so that a total from 0 to 4 can be reported (with higher scores representing greater credibility). Each web page's score was calculated, and the proportion of web pages meeting each criterion was also determined.

Because the JAMA benchmark does not capture nuance within its four items, we deemed two of our Website Characteristics to be adjunct measures of credibility as well: What percentage of the publications cited in the text were published within the preceding 5 years?; What percentage of the source publications are considered high-quality publications? The corresponding author independently accessed and reviewed each source listed on the web pages to determine if they met our definition of 'high quality,' as described above.

To answer RQ3, the Flesch Kincaid Grade Level (FKGL) of each eligible website's text was computed on 28 July 2023 using the tool at https://readable.com. This score is an indication of the number of years of education a reader would need to have completed to understand the text in question. Only text pertaining to back pain treatment, rather than text describing specific back pain diagnoses and symptoms, was included in this assessment. We assessed readability using the FKGL because its formula – 0.39*(total words/total sentences) + 11.8*(total syllables/total words) − 15.59 [https://readable.com/readability/flesch-reading-ease-flesch-kincaid-grade-level/] – gives greater weight to sentence length, rather than word length. Medical and technical terms may be greater in length than other words, and we did not wish to penalize web pages for using terms that would be needed for accurate treatment descriptions.

3 | RESULTS

Tables S2 and S3 provide a complete list of eligible web pages and their characteristics. The 48 eligible web pages were affiliated with organizations based in six countries. Most were affiliated with healthcare providers (HCP, which included every type of provider ranging from single practitioners to larger hospitals and medical centres) or government agencies (GOV). Twenty-nine web pages (60%) contained no linked or identifiable sources. Only 6% of the 80 sources provided were deemed high quality. (See table note in Table S3 for our agreed definition of 'high quality' source material).

3.1 | Directed manifest content analysis

Of our 43 codes (see the codebook in Table S1), 37 were identified in at least one web page. Only one recommendation (See the doctor/get a diagnosis) was present in more than 75% of the eligible web pages. The only other code present in more than 50% of the web pages was Ergonomics/posture/biomechanics. The overall emphasis on most web pages was on 'biomedical' treatments such as physical positioning/movement, often to address structural features of the spine. Only one code (Reassurance) not directly related to physical or structural phenomena was present in more than 13% of the web pages. Our numbers represent the total number of web pages on which each code appeared at least once. See Table 1 for a complete frequency breakdown and sample text representing each code.

Below, we present a further analysis of the five most frequently cited codes: See the doctor/get a diagnosis, Ergonomics/posture/biomechanics, Reassurance, Physiotherapy and Non-prescription pharmaceuticals and supplements.

3.1.1 | See the doctor/get a diagnosis

This code was present at least once on 85% of eligible web pages. Many of the web pages that recommended seeing a doctor or getting a diagnosis mentioned specific time frames in which a doctor's advice should be sought. However, these time frames varied from days to months: 'Relief can take 3 months or more. If your child's symptoms get worse or don't improve, contact your care team to discuss options and next steps' (WP36) contrasts with, for example, 'All lower back pain in children should be considered seriously and medical advice should always be sought if the pain persists longer than a few days' (WP7). The overwhelming sentiment was that persistent pain indicates a reason to seek medical attention.

Some pages used vague language, leaving the reader to interpret exactly when a clinician's advice should be sought: 'However, you do need to be aware that spinal pain in children can be an indication of something more serious; if in doubt, refer to your G.P. surgery' (WP3), and 'If you are concerned about your child's back pain, visit a professional who specialises in treating children and young adults' (WP27). The most frequently recommended clinicians were GPs and paediatricians,

TABLE 1 Content analysis of web pages containing treatment recommendations for adolescents with nonspecific back pain.

Code[a]	No. (%) of web pages	Example text
See the doctor/get a diagnosis	41 (85)	'If your child starts complaining of persistent back pain, they should be examined by a pediatric spine specialist immediately, as there are a number of treatment options available.' [WP25] 'Teens experiencing persistent back pain are encouraged to have it checked out by an orthopedic specialist.' [WP39]
Ergonomics/posture/ biomechanics	25 (52)	'Learn how to use good posture, safe lifting techniques, and proper body mechanics.' [WP12] 'Be aware of your posture every day. Think 'tall' when sitting, standing, and walking.' [WP44]
Reassurance	23 (48)	'Whilst this can be the case, the vast majority of cases are simply soft tissue injuries (muscles and ligaments) which can be easily treated.' [WP3] 'Children's lower back pain is generally benign and heals with medical advice and treatment.' [WP20]
Physiotherapy	23 (48)	'If your child is experiencing back pain, it is important to consult with a physiotherapist.' [WP10] 'Before treating your child's back pain the physiotherapist will carry out a full assessment to determine the cause of the back pain. Once the cause of back pain has been established appropriate physiotherapy treatment can commence.' [WP38]
Non-prescription pharmaceuticals and supplements	22 (46)	'Simple analgesics such as acetaminophen and ibuprofen are used in most patients.' [WP7] 'Pain Medicine: To help with the pain, give an acetaminophen product (such as Tylenol). Another choice is an ibuprofen product (such as Advil). Use as needed.' [WP43]
Unspecified exercise program	20 (42)	'Research and experience show that a daily exercise program can greatly reduce your child's back pain.' [WP24] 'Muscular back pain will get better with regular light exercises and stretches to aid flexibility.' [WP31]
Specific exercises/ activities	19 (40)	'Stronger core muscles such as the transverse abdominis ('abs') will support the spine and prevent the straining leading to back pain. Activities I advise parents to encourage are lots of walking, swimming, running and cycling.' [WP19] 'Low-impact walking each day may help improve the condition as the initial injury heals, and hamstring stretches and abdominal strengthening can help relieve persistent back pain.' [WP25]
Reduce sedentary behaviour/move more	19 (40)	'In any event- keeping strong physically and being active is the take home message' [WP8] 'Physical activity is essential to good health. Keep active.' [WP44]
Fix the backpack	17 (35)	'To prevent pain associated with school bags and posture, ensure your child has a good quality school bag. Quality school bags should come with adjustable straps and waist clip to weight close to the back. School bags should be sized in proportion to your child's height and weighs less than 10% of their body weight. Teach your child to always carry their bag on both shoulders and adjust straps to ensure the bag sits close to their back.' [WP6]
Rest	17 (35)	'Bedrest can help relieve pain at first, but it delays healing. Avoid bedrest after the first day.' [WP12] 'Muscular back pain will usually get better if your child rests.' [WP47]
Ice or heat	16 (33)	'Try using a heating pad on a low or medium setting for 15 to 20 minutes every 2 or 3 hours. Try a warm shower in place of one session with the heating pad. You can also try an ice pack for 10 to 15 minutes every 2 to 3 hours. Put a thin cloth between the ice pack and your skin.' [WP12]
Act fast	12 (25)	'As their skeleton is still growing, it's important to seek help sooner rather than later to avoid long-term problems.' [WP27] 'Early education and treatment will help to avoid any long term problems.' [WP38]

TABLE 1 (Continued)

Code[a]	No. (%) of web pages	Example text
Avoid aggravating activities	12 (25)	'Try to keep your child as active as you can, but stop or reduce any activity that causes pain.' [WP11] 'The child should temporarily avoid activities that involve twisting or bending, are high impact, or that make the back hurt more.' [WP46]
Diet/weight/hydration	11 (23)	'Children need to maintain an optimal balance of essential nutrients to promote muscle strength and spine health.' [WP4]
Chiropractic treatment	9 (19)	'Seeking diagnosis and treatment from a chiropractor in Brisbane as soon as possible can lead to successful and speedy recovery times.' [WP6]
Massage	8 (17)	'Massage and other soft tissue therapy – this can help to reduce pain and improve movement in the affected area' [WP9]
Pacing	8 (17)	'Encourage stretch breaks when sitting for long periods of time.' [WP33]
Passive support/devices	7 (15)	'Best Foot Forward – Make sure your child has good footwear; soft-soled shoes that are supportive and have a good grip will make it easier for them to carry a heavier school bag.' [WP2]
Resume normal activities	6 (13)	'The key thing is to continue with your everyday life and hobbies. Being active and exercising will not do you any harm and actually helps you to get better quicker.' [WP44]
Change the focus	6 (13)	'If possible, try to maintain school attendance, this helps your child have a regular routine, maintain social connections, and provide a distraction from focusing on symptoms.' [WP40]
Limit technology/screen time	5 (10)	'Limit television and computer time.' [WP21]
Vague	5 (10)	'A combination of treatments usually has the best success.' [WP36]
Parental/caregiver behaviour	4 (8)	'Make your home a stress-free environment (as much as possible)' [WP33]
Prescription pain medications	4 (8)	'Your child's doctor might prescribe non-steroidal anti-inflammatory drugs if there is unbearable pain and swelling.' [WP35]
Stress management	4 (8)	'Decreasing social media usage, increasing active activities and encouraging positive responses to stress rather than catastrophizing will help pain tolerance and decrease pain intensity.' [WP8]
Manual therapy	3 (6)	'Joint mobilisation – this usually involves gently moving the joints if they are restricted in movement.' [WP9]
Osteopathic treatment	3 (6)	'In summary, if your teen has back pain it will probably be a simple soft tissue injury which can be easily treated by an Osteopath, who can also suggest strategies for avoiding injuries in the future.' [WP3]
Acupuncture	3 (6)	'Some patients may benefit from acupuncture and massage therapy for the back, to help improve blood flow and improve healing in the affected tissues.' [WP45]
Graded exposure	3 (6)	'If you keep working on the higher level exercises, this will continue to aggravate your symptoms. Once your back pain has settled, you can gradually work back through the levels of exercises provided by your physiotherapist.' [WP44]
Psychotherapy/mental health treatment (non-CBT)	3 (6)	'Your child may work with a pediatric psychologist who is an expert in managing pain. The psychologist can teach your child other ways to manage pain and stress.' [WP36]
Online supports	3 (6)	'Simple breathing or relaxation exercises – a favourite of our chiropractors' is the smiling mind app.' [WP9]
Sleep	2 (4)	'Encourage healthy sleep habits, for example, setting regular bedtime, limiting screen time and using relaxation techniques.' [WP40]
Social connection	2 (4)	'Help them stay socially connected, you can talk to them about some of the challenges they may face with maintaining friendships and ways they can work to stay connected, or help them with what to say if asked about their pain.' [WP40]

(Continues)

TABLE 1 (Continued)

Code[a]	No. (%) of web pages	Example text
Surgery	1 (2)	'Surgery is considered for patients who do not respond to several weeks of nonsurgical care or those with a medical emergency.' [WP45]
Meditation/mindfulness	1 (2)	'Exercise and increased activity, with the release of endorphins (our feel-good hormone), can help increase feelings of well-being, as can using mindfulness apps as well as talking to your child about any worries they may have.' [WP27]
Intensive or interdisciplinary pain treatment	1 (2)	'A multidisciplinary approach works best to treat back pain in kids and teens. In this approach, physical, psychosocial, or occupational factors are addressed by a multidisciplinary team, including pediatricians, neurologists, neurosurgeons, and pediatric psychologists.' [WP45]
Cognitive behavioural therapy (CBT)	1 (2)	'Our – Spine Center psychologists, –, PhD, and –, PhD, use CBT to help patients with spinal conditions reduce risk, manage problems and promote overall health and healing.' [WP5]
Hospital/inpatient admission	0	
Music/arts-based therapy	0	
Injection/infusion	0	
Graded motor imagery	0	
Occupational therapy	0	
Education (pain science)	0	

Note: $N = 48$ web pages. The complete URLs for all web pages are available in Table S2. – indicates a proper name that has been deleted.

[a]Operational definitions for each code are available in Table S1.

although the general terms 'doctor,' 'medical practitioner' and 'healthcare provider' or even 'an expert' were also used.

This recommendation was most commonly accompanied by a statement of urgency, which we coded as 'Act fast' ($n = 12$ web pages), with some indicating that failure to act would lead to problems later: 'It's important that parents seek help for their children from an expert as soon as any pain starts – if conditions are left untreated it could lead to chronic back and neck problems in later life' (WP41). Other web pages made it clear that a diagnosis would aid in the child getting an accurate treatment. For example, 'A GP can play an important role in understanding and managing your child's pain. They will conduct a thorough investigation of your child's pain, which will inform how they develop a plan to manage it' (WP40).

3.1.2 | Ergonomics/posture/biomechanics

This code was present on 52% of eligible web pages. Sitting ($n = 16$) and standing ($n = 5$) with good posture were frequently mentioned aspects of this code. 'The right,' 'straight,' 'good' and 'proper' posture were all used to describe posture, with very few details about what that means. Sleeping position (e.g. 'Sleep on the side with a pillow between the knees' [WP43]) and correct lifting technique (e.g. 'Children should be reminded to bend their knees and NOT their backs when picking things up and putting them down' [WP44]) were each mentioned as a solution to back pain in 5 (20%) of the 25 web pages that featured this code. Discussions of postural correction were explicitly associated with physiotherapy or chiropractic treatment in only a few cases, such as 'The goal of physical therapy in children emphasises posture correction and core strengthening' (WP45). Only one posture-related statement concerned backpack wearing. The other backpack-related statements were more closely aligned with backpack fitting and loading. Such statements were coded as 'Fix the backpack' and were present in 17 (35%) of the 48 web pages.

3.1.3 | Reassurance

Reassurance was present in 48% of eligible web pages. This was the only code in the Top 5 that could be seen to facilitate patience, encourage self-management and/or challenge catastrophising or anxious thoughts before seeking diagnosis or treatment. One statement made clear that pain does not equate to damage: 'Often, back pain doesn't have one simple cause and it's important to remember that pain doesn't necessarily mean there's a serious problem' (WP44), but most instances of reassurance

were accompanied by an explanation that the child's pain is likely due to muscular strain or overuse and will heal on its own, or with some physiotherapy. However, some pages emphasized rest as a solution: 'That said, most causes of back pain in kids and teens will get better if they take it easy and rest' (WP47).

3.1.4 | Physiotherapy

Like reassurance, physiotherapy was present in 48% of eligible web pages. More than half of the 23 web pages which mentioned physical therapy or physiotherapy offered no further explanation of what this treatment might entail: 'If your child is experiencing back pain, it is important to consult with a physiotherapist' (WP10). Some pages, however, explained that physiotherapy would involve some kind of exercise: 'Many children and adolescents will benefit from a formal physical therapy program to teach them appropriate exercises' (WP17), but very few mentioned specific areas of the body that physiotherapy might target: 'These children seem to improve with a physical therapy program that stresses hamstring stretching, abdominal strengthening and posture correction' (WP16). See 'Other codes,' below, for more detail about our exercise-related codes and how those compared to the physiotherapy code.

3.1.5 | Non-prescription pharmaceuticals and supplements

This code was identified on 46% of web pages. Of the 26 web pages recommending non-prescription medications, four specifically mentioned brand name options for acetaminophen and ibuprofen. Eleven web pages used only vague terminology, such as 'pain medicine' or 'analgesia' with no further guidance, while most pages recommended 'anti-inflammatory' medications or the generic terms 'ibuprofen' and 'non-steroidal anti-inflammatories (NSAIDs)'. Only one web age (WP48) carried a warning that 'NSAIDs aren't suitable for everyone... Speak to a pharmacist if you're not sure', while two web pages indicated that medication use should be temporary (WP5 and WP36). One page mentioned some topical solutions:

> Menthol, which is the active ingredient in several topical pain-relieving creams, might help mask the pain for a short period by creating a cooling sensation. However, this does not treat the underlying cause. Topical non-steroidal anti-inflammatories, such as diclofenac, can be used for pain relief.
>
> (WP35)

3.1.6 | Other codes

Three separate codes were related to the common theme of reducing sedentary behaviour and doing exercise. If these three codes ('Specific exercises,' 'Unspecified exercise program,' 'Reduce sedentary behaviour/move more') were considered as one broad 'movement-related' category, the number of web pages mentioning at least one of them was 32, or 74% of web pages – 9 more web pages than those mentioning Physiotherapy, and 7 more than the number of pages featuring the Ergonomics/posture/biomechanics code that currently ranks second in our table. Of the 32 pages mentioning at least one of the three exercise-related codes, 16 (50%) also mentioned physiotherapy.

Change the focus (13%), Parental/caregiver behaviour (8%) and Stress management (8%) were the most frequent codes addressing phenomena that could be deemed 'psychosocial'. Three other psychologically informed treatments that have been studied in chronic pain populations – Meditation/mindfulness, Intensive or interdisciplinary pain treatment and Cognitive behavioural therapy (CBT) – were each mentioned on only one web page, albeit none of them on the same web page.

3.2 | Credibility

The total number of JAMA benchmark items met ranged from 0 to 4 across the 48 web pages: 2% of web pages met no criteria, 23% met one criterion, 31% met two criteria, 23% met three and 21% met all four criteria. Thus, a majority (56%) of web pages met two or fewer credibility criteria. Nineteen (40%) of the web pages listed one or more information sources or references, and 19 (40%) listed an author or credentialed medical reviewer. Of the 10 web pages meeting all four JAMA criteria, only three (30%) contained at least one high-quality source and four (40%) referenced at least one source published less than 5 years ago. See Table 2 for the proportion of web pages meeting each of the four JAMA benchmark criteria. Table S3 contains each individual web page's total number of credibility items met, along with details about the web pages' author credentials and number and type of sources.

3.3 | Readability

Scores on the FKGL ranged from 3.5 to 12.9, with the mean = 8.6, median 9.0 and mode 9.2 (see Table S3). Thus, the text of 24 web pages (50%) was calculated to be written below the 9th-grade level. However, only nine of the 48 web pages (19%) contained text calculated at a grade level

TABLE 2 JAMA benchmark criteria and scoring for web pages containing treatment recommendations for adolescents with nonspecific back pain.

Present on web page?	Authors/credentials[a] *n* (%)	References/sources[b] *n* (%)	Ownership/funding *n* (%)	Page dated/updated[c] *n* (%)
Yes	19 (40)	19 (40)	47 (98)	29 (60)
No	29 (60)	29 (60)	1 (2)	19 (40)

Note: $N = 48$ web pages.

Abbreviation: JAMA, Journal of the American Medical Association.

[a]Five web pages listed no author but named credentialed providers as medical reviewers. In these cases, we awarded the web page a 'Yes' on this item.

[b]If a study was mentioned in the text but no link or complete reference was given, that study was not counted as a reference/source.

[c]This refers to the date the specific web page was posted or updated; the copyright of the website itself (typically found in the website footer) was not considered in this analysis.

within or below the 4th- to 6th-grade level range, which equates to the reading level of a child aged 9–12, as recommended by the Agency for Healthcare Research Quality (AHRQ; Bakerjian, 2023).

4 | DISCUSSION

Our results demonstrate the broad range of recommendations found online for treating adolescent back pain: 37 distinct codes were present on at least one of the 48 eligible web pages. The most frequently mentioned code was 'See the doctor/get a diagnosis' which may be because the majority of web pages analysed were affiliated with healthcare providers. Although this recommendation may be relevant to an adolescent with first-onset or acute pain, we had intentionally worded two of our three Google searches to find recommendations for 'lasting' or 'long-term' back pain, because we were interested in nonspecific pain that often defies a concrete biomedical diagnosis. Online information is not organized with a clear differentiation between persistent and acute back pain. This lack of differentiation may be detrimental, because continual healthcare visits for a child with chronic pain are known to increase parents' stress (Joslin et al., 2023).

In addition, web pages rarely mention the whole-person or biopsychosocial approaches currently recommended for assessing and treating back pain in children and adolescents (Frosch et al., 2022; Scottish Government, 2018; WHO, 2020) and adults (Lin et al., 2020). Also concerning is the frequency with which a profession (e.g. physiotherapy, chiropractic care, osteopathy) was recommended as a treatment without accompanying detail explaining what such professionals do to help alleviate back pain. This lack of specificity is apparent in the interdisciplinary treatment guidelines for unspecific back pain in children and adolescents by Frosch et al. (2022) as well. In their recommendation for physical therapy and physical activity, the authors explain that 'Only limited statements or recommendations can be made about the exact physiotherapeutic method and duration of application [necessary]' (p. 5).

Despite these areas of concern, there were some encouraging results. First, when collapsed into one 'movement-related' category, the three codes 'Specific exercises,' 'Unspecified exercise program' and 'Reduce sedentary behaviour/move more' would have ranked second in our list of 43 possible treatment codes. Frosch et al. (2022) prioritize both physical therapy (our fourth most frequently coded treatment) and 'home exercise and physical activity' (p. 5), as do the WHO (2020) and Scottish Government (2018) guidelines for the treatment of childhood chronic pain. As in those guidelines, web pages were largely unclear as to what type of exercise or physical activity was best. However, general recommendations for 'increased exercise' or 'more physical activity' should be seen as a positive.

Another encouraging result was the fact that 'Surgery' was only mentioned in one web page and 'Prescription medication' in only four. Those two treatments should only be used in rare circumstances, if ever, for adolescent nonspecific back pain (Frosch et al., 2022; Scottish Government, 2018; WHO, 2020). It may initially seem that 'Reassurance' ranking in our Top 5 codes would be a positive. However, the impact of reassurance has not been studied with this population and is not included in Frosch et al.'s (2022) recommendations. Reassurance for adults with nonspecific back pain may be helpful for patients with a low psychological risk profile (Holt et al., 2018), but Braeuninger-Weimer et al. (2019) showed that adult patients with back pain can feel unheard and dismissed by clinicians if offered reassurance and discharged without treatment.

Psychosocial codes such as 'Parental/caregiver behaviour' and 'Social connection' were represented in only six (13%) or fewer of the eligible web pages. This is low, when compared to the 29% of highly trafficked lower back pain-related web pages found to mention psychosocial factors in Peterson et al.'s (2022) systematic review. A common assumption across web pages in

the present study is that back pain among adolescents is a local 'back' issue and is likely due to muscular strain. Only a small minority of web pages mentioned that parents' behaviour can affect their child's stress or their child's assessments of their own pain, which in turn can impact their experience of pain (Timmers et al., 2019) and pain-related disability (Donnelly et al., 2020). Despite the growing literature advancing both psychological therapies and interdisciplinary care for adolescent chronic pain, only four of our eligible web pages recommended psychological care of any kind, and only one page recommended a multidisciplinary approach. Overall, these results are similar to Santos et al.'s (2022) review of lower back pain information for adults on Brazilian official websites: psychosocial aspects of pain were largely ignored.

4.1 | Credibility

The fact that more than half of the web pages met 2 or fewer JAMA benchmark items speaks to the general low credibility of back pain-related information on the internet (see Ferreira et al., 2019; Santos et al., 2022). None of the randomized trials of adolescent back pain treatment interventions reviewed in a recent scoping review (Hauber, Robinson, Kirby, et al., 2023) or systematic review (Michaleff et al., 2014) were cited as sources in any of the web pages. More than half of the web pages contained no sources/references, and only five sources across all eligible web pages were systematic reviews or clinical guidelines from any year. This lack of quality or credibility of health information websites has been consistently reported across numerous health conditions (Grose et al., 2022; Guo et al., 2019; Moore et al., 2021). The evidence-based website launched by the Dutch College of General Practitioners in 2012 may be one to emulate: Its content covers more than 600 healthcare topics, is based on clinical practice guidelines and has been shown to be associated with decreased healthcare consultations since its launch (Spoelman et al., 2016).

4.2 | Readability

Analysed web pages were often written at too high a reading level, compared to the latest recommendation of 4th to 6th grade (age 9–12) reading level recommended by the AHRQ Patient Safety Network (Bakerjian, 2023). These results are consistent with Basnet et al.'s (2023) assessment of online chronic pain information, in which the reading level was too high (age 15–17), but contrasts with the Brazilian official websites on lower back pain assessed by Santos et al. (2022), where the reading level was considered 'easy' or 'very easy'. Because online health information has the potential to be used by every member of society with an internet or mobile data connection, greater effort must be made to write in plain language that is easily understandable (European Pain Federation, n.d.; National Institutes of Health, 2017; WHO, n.d.-b). Web page authors must be encouraged to heed the advice of these resources, because if information is too complex or difficult to understand, web page visitors may only recall the information that is easiest to understand (Office of Disease Prevention and Health Promotion, 2016).

4.3 | Implications for clinical practice

This study shows that the most recent, rigorous research on treatment for adolescent nonspecific back pain is not being referenced when web page authors are preparing information about this topic for public consumption. In addition, 37 distinct treatment recommendations were identified across the 48 web pages, with very few of them describing psychosocial aspects of care. Thus, parents may be surprised if clinicians recommend psychologically informed care for their adolescents. Training in how to talk with adolescents and their parents about the mind–body nature of pain may be needed. Recent research has demonstrated that both the timing (Jordan et al., 2023) and the wording (Gonzalez et al., 2022) of these conversations matter to patients.

In addition, the identity and qualifications of the authors of web pages recommending treatments for this population are largely unreported. Parents often doubt the quality of the information they read online (Yardi et al., 2018), and clinicians need to be prepared to help patients and their parents understand the variety of recommendations and the lack of credibility presented on these web pages (Thapa et al., 2021; Yardi et al., 2018). Patients want clinicians to direct them to reliable, credible online sources (El Sherif et al., 2018; Jaks et al., 2019). Taking the time to address the issues parents raise related to treatment advice found online could also increase trust in the clinician–patient–parent relationship (Peng et al., 2020).

4.4 | Limitations

The main limitation of this study is that the restrictive inclusion criteria we applied obviously left out many web pages parents may access. Second, although we systematically and rigorously searched for results in five different countries, our searches were limited to the English language. Third, we tried to search for pages related to

adolescent 'persistent' back pain, but online health information is not organized by type and duration of pain. Furthermore, the dataset for online health information analysis is constantly changing. Information we found and analysed here may not be available in the future.

4.5 | Conclusions

This cross-sectional analysis of 48 web pages in five countries revealed some positive findings, with frequent recommendations to increase exercise or physical activity and few mentions of surgery or prescription medication. However, the most common recommendation was to 'See the doctor/get a diagnosis'. The reviewed web pages made few recommendations for psychologically informed or interdisciplinary interventions. The reading level of half of the web pages may be too high, while the credibility of most of the web pages may be questionable.

AUTHOR CONTRIBUTIONS

SDH and KOS developed the study topic, SDH, KOS, KR, RF and JP wrote and edited the protocol, SDH and RF completed website screening, SDH and KR completed data extraction, SDH completed data analysis, SDH, KOS, KR, RF and JP discussed the results of the analysis, SDH, KOS, KR, RF and JP edited and commented on drafts of the manuscript and SDH, KOS, KR, RF and JP approved the final draft.

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CONFLICT OF INTEREST STATEMENT

JWP has received speaker fees for presentations on pain and rehabilitation. He receives royalties for books on pain-related education. KOS provides continuing education workshops for healthcare professionals on the assessment and management of persistent back pain. No other conflicts are declared.

ORCID

S. D. Hauber https://orcid.org/0000-0002-7250-1678
K. Robinson https://orcid.org/0000-0003-1008-9857
R. Fechner https://orcid.org/0000-0001-6594-6065
J. W. Pate https://orcid.org/0000-0002-1049-3916
K. O'Sullivan https://orcid.org/0000-0002-7137-3125

REFERENCES

Bakerjian, D. (2023, August). *Personal health literacy*. PSNet: Patient Safety Network, Agency for Healthcare Research and Quality. https://psnet.ahrq.gov/primer/personal-health-literacy

Basnet, R., Mendez, D. R., Lugo-González, I., O'Hagan, E., O'Keeffe, M., Sharma, S., Pate, J. W., & Kennedy, D. S. (2023). Online information on chronic pain in 3 countries: An assessment of readability, credibility, and accuracy. *PAIN Reports*, *8*, e1078. https://doi.org/10.1097/PR9.0000000000001078

Benedicta, B., Caldwell, P. H., & Scott, K. M. (2020). How parents use, search for and appraise online health information on their child's medical condition: A pilot study. *Journal of Paediatrics and Child Health*, *56*, 252–258. https://doi.org/10.1111/jpc.14575

Braeuninger-Weimer, K., Anjarwalla, N., & Pincus, T. (2019). Discharged and dismissed: A qualitative study with back pain patients discharged without treatment from orthopaedic consultations. *European Journal of Pain*, *23*(8), 1464–1474. https://doi.org/10.1002/ejp.1412

Calvano, C., & Warschburger, P. (2016). Chronic abdominal pain in children and adolescents: Parental threat perception plays a major role in seeking medical consultations. *Pain Research and Management*, *2016*, 1–10. https://doi.org/10.1155/2016/3183562

Donnelly, T. J., Palermo, T. M., & Newton-John, T. R. O. (2020). Parent cognitive, behavioural, and affective factors and their relation to child pain and functioning in pediatric chronic pain: A systematic review and meta-analysis. *Pain*, *161*, 1401–1419. https://doi.org/10.1097/j.pain.0000000000001833

El Sherif, R., Pluye, P., Thoër, C., & Rodriguez, C. (2018). Reducing negative outcomes of online consumer health information: Qualitative interpretive study with clinicians, librarians, and consumers. *Journal of Medical Internet Research*, *20*, e169. https://doi.org/10.2196/jmir.9326

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*, 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

European Pain Federation. (n.d.). *EFIC plain talking*. Retrieved 29 October 2023 from https://europeanpainfederation.eu/efic-plain-talking/

Ferreira, G., Traeger, A. C., Machado, G., O'Keeffe, M., & Maher, C. G. (2019). Credibility, accuracy, and comprehensiveness of internet-based information about low back pain: A systematic review. *Journal of Medical Internet Research*, *21*, e13357. https://doi.org/10.2196/13357

Frosch, M., Leinwather, S., Bielack, S., Blödt, S., Dirksen, U., Dobe, M., Geiger, F., Häfner, R., Höfel, L., Hübner-Möhler, B., von Kalle, T., Lawrenz, B., Leutner, A., Mecher, F., Mladenov, K., Norda, H., Stahlschmidt, L., Steinborn, M., Stücker, R., … Zernikow, B. (2022). Treatment of unspecific back pain in children and adolescents: Results of an evidence-based interdisciplinary guideline. *Children*, *9*, 417. https://doi.org/10.3390/children9030417

Gobina, I., Villberg, J., Välimaa, R., Tynjälä, J., Whitehead, R., Cosma, A., Brooks, F., Cavallo, F., Ng, K., de Matos, M. G., & Villerusa, A. (2019). Prevalence of self-reported chronic pain among adolescents: Evidence from 42 countries and regions. *European Journal of Pain*, *23*, 316–326. https://doi.org/10.1002/ejp.1306

Gonzalez, A. I., Ramtin, S., Ring, D., Donthula, D., & Queralt, M. (2022). People have mixed reactions to both physiological and psychological explanations of disproportionate pain. *Clinical Orthopaedics and Related Research*, *480*, 1387–1398. https://doi.org/10.1097/CORR.0000000000002163

Google. (n.d.). *How search works: Ranking results*. Google Search. https://www.google.com/search/howsearchworks/how-search-works/ranking-results/#:~:text=To%20give%20you%20the%20most,the%20nature%20of%20your%20query

Groenewald, C. B., Giles, M., & Palermo, T. M. (2019). School absence associated with childhood pain in the United States. *The Clinical Journal of Pain*, *35*, 525–531. https://doi.org/10.1097/AJP.0000000000000701

Grose, E. M., Cheng, E. Y., Levin, M., Philteos, J., Lee, J. W., & Monteiro, E. A. (2022). Critical quality and readability analysis of online patient education materials on parotidectomy: A cross-sectional study. *The Annals of Otology, Rhinology, and Laryngology*, *131*, 1317–1324. https://doi.org/10.1177/00034894211066670

Guo, W., Wang, W., Xu, D., Qiao, Z., Shi, Y., & Luo, P. (2019). Evaluating the quality, content, and readability of online resources for failed back spinal surgery. *Spine*, *44*, 494–502. https://doi.org/10.1097/BRS.0000000000002870

Hauber, S. D., Robinson, K., Fechner, R., Pate, J. W., & O'Sullivan, K. (2023). Treatment recommendations for adolescents with nonspecific back pain published on consumer websites: Protocol for a cross-sectional content analysis. *Open Science Framework*. https://doi.org/10.17605/OSF.IO/8X7KU

Hauber, S. D., Robinson, K., Kirby, E., Kamper, S., Lennox, N. N., & O'Sullivan, K. (2023). Describing the nonsurgical, nonpharmacological interventions offered to adolescents with persistent back pain in randomized trials: A scoping review. *European Journal of Pain*, *27*, 459–475. https://doi.org/10.1002/ejp.2073

Holt, N., Mansell, G., Hill, J. C., & Pincus, T. (2018). Testing a model of consultation-based reassurance and back pain outcomes with psychological risk as moderator. *The Clinical Journal of Pain*, *34*(4), 339–348. https://doi.org/10.1097/AJP.0000000000000541

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*, 1277–1288. https://doi.org/10.1177/1049732305276687

Jaks, R., Baumann, I., Juvalta, S., & Dratva, J. (2019). Parental digital health information seeking behavior in Switzerland: A cross-sectional study. *BMC Public Health*, *19*, 225. https://doi.org/10.1186/s12889-019-6524-8

Janicke, D. M., Finney, J. W., & Riley, A. W. (2001). Children's health care use: A prospective investigation of factors related to care-seeking. *Medical Care*, *39*, 990–1001. https://www.jstor.org/stable/3767778

Jordan, A., Williams, M., Jones, A., Noel, M., Neville, A., Clinch, J., Pincus, T., Gauntlett-Gilbert, J., & Leake, H. (2023). Pediatrician explanations of pediatric pain in clinical settings: A delicate craft. *The Journal of Pain*, *24*, 1396–1405. https://doi.org/10.1016/j.jpain.2023.03.002

Joslin, R., Donovan-Hall, M., & Roberts, L. (2023). "You just want someone to help": Outcomes that matter to parents when their child is treated for chronic pain. *Paediatric and Neonatal Pain*, *5*, 38–48. https://doi.org/10.1002/pne2.12098

Kleinheksel, A. J., Rockich-Winston, N., Tawfik, H., & Wyatt, T. R. (2020). Demystifying content analysis. *American Journal of Pharmaceutical Education*, *84*, 7113. https://doi.org/10.5688/ajpe7113

Kubb, C., & Foran, H. M. (2020). Online health information seeking by parents for their children: Systematic review and agenda for further research. *Journal of Medical Internet Research*, *22*, e19985. https://doi.org/10.2196/19985

Lin, I., Wiles, L., Waller, R., Goucke, R., Nagree, Y., Gibberd, M., Straker, L., Maher, C. G., & O'Sullivan, P. P. B. (2020). What does best practice care for musculoskeletal pain look like? Eleven consistent recommendations from high-quality clinical practice guidelines: Systematic review. *British Journal of Sports Medicine*, *54*, 79–86. https://doi.org/10.1136/bjsports-2018-099878

Masiero, S., Sarto, F., Cattelan, M., Sarto, D., Del Felice, A., Agostini, F., & Scanu, A. (2021). Lifetime prevalence of nonspecific low back pain in adolescents: A cross-sectional epidemiologic survey. *American Journal of Physical Medicine & Rehabilitation*, *100*, 1170–1175. https://doi.org/10.1097/PHM.0000000000001720

Michaleff, Z. A., Kamper, S. J., Maher, C. G., Evans, R., Broderick, C., & Henschke, N. (2014). Low back pain in children and adolescents: A systematic review and meta-analysis evaluating the effectiveness of conservative interventions. *European Spine Journal*, *23*, 2046–2058. https://doi.org/10.1007/s00586-014-3461-1

Moore, E., Stanton, T. R., Traeger, A., Moseley, G. L., & Berryman, C. (2021). Determining the credibility, accuracy and comprehensiveness of websites educating consumers on complex regional pain syndrome accessible in Australia: A systematic review. *Australian Journal of Primary Health*, *27*, 485–495. https://doi.org/10.1071/PY21066

Murray, C. B., Groenewald, C. B., de la Vega, R., & Palermo, T. M. (2020). Long-term impact of adolescent chronic pain on young adult educational, vocational, and social outcomes. *Pain*, *161*, 439–445. https://doi.org/10.1097/j.pain.0000000000001732

National Institutes of Health. (2017, March 27). *Plain language: Presenting your information*. https://www.nih.gov/institutes-nih/nih-office-director/office-communications-public-liaison/clear-communication/plain-language/presenting-your-information

Office of Disease Prevention and Health Promotion. (2016, June 8). *What we know about users with limited literacy skills: Reading and cognitive processing challenges*. Health Literacy Online. https://health.gov/healthliteracyonline/what-we-know/section-1-1/

Organisation for Economic Co-operation and Development. (2016). *PF 1.8: Legal age thresholds regarding the transition from child-to adulthood*. https://www.oecd.org/els/family/PF_1_8_Age_threshold_Childhood_to_Adulthood.pdf

Park, E., Kim, H., & Steinhoff, A. (2016). Health-related internet use by informal caregivers of children and adolescents: An integrative literature review. *Journal of Medical Internet Research*, *18*, e57. https://doi.org/10.2196/jmir.4124

Peng, Y., Yin, P., Deng, Z., & Wang, R. (2020). Patient–physician interaction and trust in online health community: The role of perceived usefulness of health information and services. *International Journal of Environmental Research and Public Health*, *17*, 139. https://doi.org/10.3390/ijerph17010139

Peterson, S., Rainey, N., & Weible, K. (2022). Who writes this stuff? Musculoskeletal information quality and authorship of popular health websites: A systematic review. *Musculoskeletal Science & Practice*, *60*, 102563. https://doi.org/10.1016/j.msksp.2022.102563

Roaché, D. J. (2017). Intercoder reliability techniques: Percent agreement. In *The SAGE encyclopedia of communication research*

methods. SAGE Publications, Inc. https://doi.org/10.4135/9781483381411

Santos, R. P., Alonso, T. P., Correia, I. M. T., Nogueira, L. C., Meziat-Filho, N., & Reis, F. J. J. (2022). Patients should not rely on low back pain information from Brazilian official websites: A mixed-methods review. *Brazilian Journal of Physical Therapy*, *26*, 100389. https://doi.org/10.1016/j.bjpt.2022.100389

Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet Child & Adolescent Health*, *2*(3), 223–228. https://doi.org/10.1016/S2352-4642(18)30022-1

Scottish Government. (2018). Management of Chronic Pain in Children and Young People: A National Clinical Guideline. https://www.gov.scot/publications/management-chronic-pain-children-young-people/documents/

Shaygan, M., Bostanian, P., Zarmehr, M., Hassanipour, H., & Mollaie, M. (2021). Understanding the relationship between parenting style and chronic pain in adolescents: A structural equation modelling approach. *BMC Psychology*, *9*, 201. https://doi.org/10.1186/s40359-021-00704-5

Shibata, M., Ninomiya, T., Anno, K., Kawata, H., Iwaki, R., Sawamoto, R., Kubo, C., Kiyohara, Y., Sudo, N., & Hosoi, M. (2020). Parenting style during childhood is associated with the development of chronic pain and a patient's need for psychosomatic treatment in adulthood: A case-control study. *Medicine*, *99*, e21230. https://doi.org/10.1097/MD.0000000000021230

Silberg, W. M. (1997). Assessing, controlling, and assuring the quality of medical information on the internet: Caveant lector et viewor—let the reader and viewer beware. *JAMA: The Journal of the American Medical Association*, *277*, 1244–1245. https://doi.org/10.1001/jama.277.15.1244

Spoelman, W. A., Bonten, T. N., De Waal, M. W. M., Drenthen, T., Smeele, I. J. M., Nielen, M. M. J., & Chavannes, N. H. (2016). Effect of an evidence-based website on healthcare usage: An interrupted time-series study. *BMJ Open*, *6*, e013166. https://doi.org/10.1136/bmjopen-2016-013166

Thapa, D. K., Visentin, D. C., Kornhaber, R., West, S., & Cleary, M. (2021). The influence of online health information on health decisions: A systematic review. *Patient Education and Counseling*, *104*, 770–784. https://doi.org/10.1016/j.pec.2020.11.016

Timmers, I., Simons, L. E., Hernandez, J. M., McCracken, L. M., & Wallace, D. P. (2019). Parent psychological flexibility in the context of pediatric pain: Brief assessment and associations with parent behaviour and child functioning. *European Journal of Pain*, *23*, 1340–1350. https://doi.org/10.1002/ejp.1403

Treadgold, B. M., Teasdale, E., Muller, I., Roberts, A., Coulson, N., & Santer, M. (2020). Parents and carers' experiences of seeking health information and support online for long-term physical childhood conditions: A systematic review and thematic synthesis of qualitative research. *BMJ Open*, *10*, e042139. https://doi.org/10.1136/bmjopen-2020-042139

Tsao, J. C. I., Evans, S., Seidman, L. C., & Zeltzer, L. K. (2011). Healthcare utilization for pain in children and adolescents: A prospective study of laboratory and non-laboratory predictors of care-seeking. *International Journal of Adolescent Medicine and Health*, *23*, 287–292. https://doi.org/10.1515/ijamh.2011.057

World Health Organization. (2020). Guidelines on the management of chronic pain in children. https://apps.who.int/iris/handle/10665/337999

World Health Organization. (n.d.-a). *Adolescent health*. https://www.who.int/health-topics/adolescent-health#tab=tab_1

World Health Organization. (n.d.-b). *Use plain language*. https://www.who.int/about/communications/understandable/plain-language

Yardi, S., Caldwell, P. H., Barnes, E. H., & Scott, K. M. (2018). Determining parents' patterns of behaviour when searching for online information on their child's health. *Journal of Paediatrics and Child Health*, *54*, 1246–1254. https://doi.org/10.1111/jpc.14068

SUPPORTING INFORMATION

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

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