Research Paper

PAIN 00 (2026) 1–14

PAIN®

OPEN

Towards a tool to discriminate between pain mechanistic descriptors: expert ranking of clinical features and allocation of weights using a forced choice paradigm

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Abstract

Pain treatments have modest effects. Health outcomes might be improved if treatments are matched to mechanisms underlying the persistence and biopsychosocial impact of an individual's pain. The International Association for the Study of Pain (IASP) defines 3 mechanistic pain descriptors presumed to involve different mechanisms—nociceptive, neuropathic, and nociplastic. Although treatments to address each descriptor have been proposed, there is no consensus on how to assign descriptors to clinical presentations. A recent consensus identified candidate clinical features to discriminate between descriptors in clinical practice and research. These need refinement to progress towards a tool. This study aimed to determine the rank and relative weight of identified clinical features to aid discrimination between mechanistic pain descriptors. Candidate clinical features (n = 196) were refined by the IASP Terminology Task Force to converge similar and remove redundant features. The Task Force (n = 24) and an expert panel (n = 39) ranked features using 1000minds conjoint analysis software and assigned weights based on discrete pairwise choices. Participants nominated from pairs of scenarios, which most likely indicated that pain aligned predominantly to a descriptor. Highest ranked features for neuropathic and nociplastic pain were aligned with IASP Clinical Criteria. Criteria for nociceptive pain have not been established. A ranked list of features shared by 2 mechanisms (indicating mixed mechanisms) was also identified. This study identified expert consensus on the highest ranked clinical features with potential to discriminate between pain descriptors, reflective of different underlying mechanisms. This study extends current frameworks by identifying and refining key discriminators for future operationalisation and validation.

Keywords: Pain, Mechanism-based classification, Nociceptive, Neuropathic, Nociplastic, Consensus, IASP

1. Introduction

Responses to pain treatments, particularly chronic pain, are heterogenous and on average have modest and short-lived clinical benefits.[4,11,32,37] Better outcomes might be achieved if treatments are matched to underlying mechanisms.[5,6,12,31,35] The International Association for the Study of Pain (IASP) defines 3 pain descriptors with different presumed mechanisms—nociceptive, neuropathic, and nociplastic pain[16,25] (**Table 1**). Although treatments for each descriptor are proposed, a barrier to matching treatments to these descriptors is the lack of consensus and the limited empirical evidence to inform how the definitions are operationalised to discriminate between them in clinical practice and research.[21] This is a necessary step towards evaluating whether allocation of treatment to the predominant descriptor improves outcomes, and whether this approach yields better outcomes than other phenotype-based treatment matching.

International Association for the Study of Pain has clinical criteria for neuropathic[9] and nociplastic[20] pain (**Table 2**). These are designed to confirm whether a patient's features are consistent with a descriptor but not discriminate between them (eg, by definition, nociplastic pain must be present for 3 months, yet not all pain present for 3 months is nociplastic); the nociplastic criteria involve diagnosis by exclusion, requiring that nociceptive or neuropathic pain are not entirely responsible but without guidance to inform that decision. The neuropathic clinical criteria do not address co-occurrence of pain descriptors in an individual. They also do not address that the descriptor predominantly explaining an individual's pain might change over time. Moreover, recent work challenged the nociplastic criteria in various clinical contexts, underscoring the need for their further validation and refinement.[27] There is a need for a clinical and research tool focused on features that differ between descriptors to ascribe a probability to each to identify the predominant descriptor aligned to an individual's pain. There is not yet consensus or sufficient evidence to determine clinical features to be included.

Recent systematic literature synthesis identified features (ie, information from clinical or research assessments including patient-reported symptoms, examination findings, bedside tests, questionnaires, quantitative sensory testing, and routine diagnostics) that might discriminate between descriptors, in musculoskeletal conditions.[28,29] Expert consensus study informed that features are likely to be unique to a descriptor or shared between 2 but not among 3.[30] This included features from numerous

mechanism-based pain classifications systems (eg, Parkinson-related pain, cancer-related pain). This generated a large list of candidate clinical features (196 features)[30] that require refinement. Some features were overlapping, some cannot be applied as tests, and the tool's feasibility depends on reduction to the most important features.

This study aimed to (1) refine the candidate clinical features to aid discrimination between pain descriptors in musculoskeletal conditions; (2) determine the rank and relative weight of each; (3) evaluate repeatability of the ranking; and (4) evaluate alignment between the ranked clinical features and neuropathic and nociplastic clinical criteria to identify areas of convergence and divergence, noting that there are no nociceptive clinical criteria. Of note, these descriptors are evolving constructs that may be refined as empirical evidence accumulates. This study prioritised candidate clinical features for operationalisation and prospective validation in cohorts rather than treating descriptors as fixed categories.

2. Methods

2.1. Study design and overview

This study was undertaken in collaboration with the Terminology Task Force of the IASP and involved 2 parts: (1) a nominal group technique to refine the clinical features and methods (ie, measurement that had been proposed to evaluate a clinical feature) identified as candidate measures to discriminate between pain mechanistic descriptors in musculoskeletal conditions (note that we use the term features to refer to clinical features and methods throughout the text and that pain of unknown origin was not specifically explicitly considered but would be expected to be identified when a no or few candidate features are identified for any descriptor); and (2) an online survey employing choice-based conjoint analysis to determine the rank and relative weight of these clinical features and methods. This study was approved by the institutional Human Research Ethics Committee (#2023/HE001365) of The University of Queensland, and participants provided written informed consent. All materials were administered in English.

2.2. Steering committee and International Association for the Study of Pain terminology task force

A steering committee of 4 members of the IASP Terminology Task Force oversaw and facilitated the project. All members are physiotherapists with backgrounds in pain neurobiology, but each with different research expertise and clinical experience (years of clinical and/or research experience: M.A.S.: pain, neuroscience and 9 years; M.S.: pain, clinical research and 42 years; K.S.: basic neuroscience, translational and clinical pain science and 42 years; P.H.: pain, neuroscience and 37 years). The multidisciplinary and international IASP Terminology Task Force was engaged from the outset, and after commencement of the project, was increased from 12 to 25 members to include additional input from a greater diversity of disciplines, countries, experience, to achieve greater gender balance, and to expand beyond a primarily musculoskeletal focus by including experts in a wider range of pain conditions.

2.3. Expert panel selection

A panel of experts, external to the Task Force, were selected with consideration of diversity of discipline, international location, career level, gender, and clinical experience to ensure a wide spectrum of input.[22,36] Although no method exists to calculate a sample size for

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.painjournalonline.com).

http://dx.doi.org/10.1097/j.pain.0000000000003979

consensus processes,[7] prior studies in a similar area have used a minimum sample size of 40 panellists.[2,30] The selection criteria for experts were identical to those used in the preceding consensus study[30] that generated the clinical features to be refined in this study. The Expert Panel comprised both individuals from the prior consensus study[30] and newly invited experts; no quotas were prespecified. The criteria were at least 2 of the following: (1) ≥3 publications related to pain in the preceding 3 years; (2) keynote or invited presentations at major pain conferences; (3) involvement in working groups/committees of pain organizations; (4) involvement in organization of major pain meetings/conferences; (5) contribution to pain textbooks; (6) involvement in clinical practice guidelines/systematic reviews related to pain; (7) membership of any international pain organization; or (8) postgraduate certification in pain or pain management. Although many panellists were active clinicians, clinical activity was not an explicit inclusion criterion. Potential experts were sent an invitation by email with a link to more detailed information and the consent form. Reminders were sent after 2 and 4 weeks if no response was received. Demographic information collected from participants included the following: age, gender, country, discipline, major topic area in the pain field, years working in the pain field, and number of publications related to pain.

2.4. Refinement of clinical features for discrimination between pain mechanism descriptors

The clinical features that reached expert consensus as candidates to discriminate between pain mechanism descriptors from the earlier study[30] were refined here. The refinement process used a modified nominal group technique,[18,36] including an online survey (Qualtrics, Seattle, WA) of the initial 12-member IASP Terminology Task Force. This consensus method was a highly structured meeting that involved 2 rounds of rating (asynchronous silent generation via online survey), structured round-robin discussion, clarification, and then rerating a series of questions.[18] This method allows for anonymity, opportunity for clarification of thought processes and suggestions, and time efficiency.[36] For the refinement process, the expert panel were presented with 6 separate lists of clinical features that are either unique to a single pain mechanistic descriptor (ie, nociceptive, neuropathic, or nociplastic) or had been identified in the previous consensus study as being shared by 2 pain mechanistic descriptors (ie, nociceptive + neuropathic, nociceptive + nociplastic, or neuropathic + nociplastic) (full list is presented in Supplementary Digital Content 1, http://links.lww.com/PAIN/C482). Task Force members nominated clinical features that could be: (1) combined because the features overlapped (ie, similar meaning or implying the same finding) or (2) removed because the feature was redundant or not possible to implement as a test, such as "positive response to surgery" as a feature indicative of nociceptive pain. Task Force members could also propose additional clinical features (ie, features not considered in the prior consensus process, those published after, or those in new data sets). In a second meeting, refinements were presented in a deidentified manner to confirm agreement amongst the group, to discuss whether further refinements were required, and to discuss inclusion of additional features.

Table 1

International Association for the Study of Pain definitions of nociceptive, neuropathic, and nociplastic pain.

Pain descriptor	Definition
Nociceptive pain	Pain that arises from actual or threatened damage to nonneural tissue and is due to the activation of nociceptors
Neuropathic pain	Pain caused by a lesion or disease of the somatosensory nervous system
Nociplastic pain	Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain

Definitions as proposed by the IASP.[16]
IASP, International Association for the Study of Pain.

2.5. Ranking of clinical features for discrimination between pain mechanism descriptors using choice-based conjoint analysis

The refined list of clinical features for discrimination between pain mechanism descriptors from the previous step was evaluated using decision analytic software (1000minds Ltd, Dunedin, New Zealand). Members of the expanded IASP Terminology Task Force (n = 25) and the Expert Panel (n = 61) were invited to complete this task. The decision analytic software applies choice-based conjoint analysis, which evaluates and quantifies the relative importance, or "weights," of each feature through a series of discrete pairwise choices.[8,24] A similar approach has been used to develop diagnostic methods in other conditions (eg, rheumatoid arthritis).[24] Each pair of features is compared, and the participant selects the option more indicative of a specific pain mechanistic descriptor. The relative importance of each feature is then calculated mathematically. To improve efficiency, the software omits comparisons between pairs where preferences can be logically inferred from previous responses to reduce redundancy and respondent burden.[13] Using the discrete choices, the relative importance of features is evaluated to generate weights for each. These weights can be used in a subsequent step to generate an algorithm to identify a predominant pain mechanistic descriptor, and low weighted features can be removed.

For each pain descriptor, pairs of scenarios were presented, each with information relevant to 2 features, and participants anonymously nominated which scenario they believed would be most likely to indicate pain explained predominantly by that pain descriptor (**Fig. 1**). Participants completed this task separately for 6 lists of candidate features: features that are unique to each of the 3 pain descriptors and features shared by 2 pain descriptors (3 combinations). Two values were derived from the 1000minds software: (1) relative weight of each item (where sum of all features is 100%) and (2) rank of each item with respect to its weight. To test the repeatability of findings, the task was repeated by a subgroup of the Expert Panel (n = 26) 10 months after the first completion. Item weight in each of the 6 lists of features was evaluated for reliability using intraclass coefficients[19] and Bland–Altman plots[1] using IBM SPSS Statistics 29 (SPSS - IBM Corp, Armonk, NY, USA).

As a final step, the rank order of features for neuropathic and nociplastic pain were mapped against the published clinical criteria to identify consistency or differences. This could not be done for nociceptive pain, as no clinical criteria are available.

3. Results

3.1. Participant demographics

Sixty-one potential panellists for the external expert group were identified and invited to participate in this study. Forty-one expert panellists accepted the invitation, and 39 of these (95%) fully

Table 2

International Association for the Study of Pain clinical criteria for neuropathic and nociplastic pain.

Neuropathic pain[9]	Nociplastic pain[20]
1. History of relevant neurological lesion or disease*	1. The pain is 1a. Chronic (3 mo); 1b. Regional (rather than discrete) in distribution; 1c. There is no evidence that nociceptive pain (a) is present or (b) if present, is entirely responsible for the pain; and 1d. There is no evidence that neuropathic pain (a) is present or (b) if present, is entirely responsible for the pain
2. Pain distribution neuroanatomically plausible†	2. There is a history of pain hypersensitivity in the region of pain. Any one of the following: Sensitivity to touch Sensitivity to pressure Sensitivity to movement Sensitivity to heat or cold
3. Pain is associated with sensory signs in the same neuroanatomically plausible distribution‡	3. Presence of comorbidities: Any one of the following: Increased sensitivity to sound and/or light and/or odors Sleep disturbance with frequent nocturnal awakenings Fatigue Cognitive problems such as difficulty to focus attention, memory disturbances, etc.
4. Diagnostic test confirming a lesion or disease of the somatosensory nervous system explaining the pain	4. Evoked pain hypersensitivity phenomena can be elicited clinically in the region of pain. Any one of the following: Static mechanical allodynia Dynamic mechanical allodynia Heat or cold allodynia Painful after-sensations reported following the assessment of any of the above alternatives

Criteria adapted from References 9, 20.

For neuropathic pain, possible neuropathic pain: criteria 1 and 2; probable neuropathic pain: criteria 1 to 3; definite neuropathic pain: all above criteria (1-4).

For nociplastic pain, possible nociplastic pain: criteria 1 and 4; probable nociplastic pain: all the above criteria (1-4).

* History, including pain descriptors, the presence of nonpainful sensory symptoms, and aggravating and alleviating factors, suggestive of pain being related to a neurological lesion and not other causes such as inflammation or nonneural tissue damage. The suspected lesion or disease is reported to be associated with neuropathic pain, including a temporal and spatial relationship representative of the condition; includes paroxysmal pain in trigeminal neuralgia.

† The pain distribution reported by the patient is consistent with the suspected lesion or disease.

‡ The area of sensory changes may extend beyond, be within, or overlap with the area of pain. Sensory loss is generally required but touch-evoked or thermal allodynia may be the only finding at bedside examination. Trigger phenomena in trigeminal neuralgia may be counted as sensory signs. In some cases, sensory signs may be difficult to demonstrate, although the nature of the lesion or disease is confirmed; for these cases, the level "probable" continues to be appropriate, if a diagnostic test confirms, the lesion or disease of the somatosensory nervous system.

completed the forced choice experiment. Of the expanded Task Force members (n = 25), 24 (96%) completed the forced choice experiment (**Fig. 2**).

Characteristics of the respondents according to their identification as clinicians or researchers is presented in **Table 3**. The IASP Terminology Task Force (average [SD] age; 54 [11] years) included 14 men (57 [11] years) and 10 women (49 [10] years) from 13 countries. This group represented a total of 636 years working in the pain field (average 27 [9] years) and 4538 publications related to pain (average 189 [268], median 102

Table 3

Demographic and professional characteristics of respondents by role.

		Researchers (n = 53)	Clinicians (n = 16)
Age in years	Average (SD)	52 (13)	38 (30)
Gender	Male	31	6
	Female	21	4
Years working in field of pain	Total	1328	305
	Average (SD)	26 (9)	31 (6)
Publications in pain	Total	8944	561
	Average (SD)	169 (220)	35 (51)

The sum of respondents identifying as researchers and clinicians exceeds the total number of participants because some individuals identified as fulfilling both roles.

Table 4

Task force (n = 24) country, role designation and expertise.

Country (n, %)				
Region of the Americas (8, 32%)	European region (10, 40%)		Western Pacific region (6, 24%)	African region
United States (6, 24%)	Denmark (1, 4%)	Germany (3, 12%)	Australia (4, 16%)	South Africa (1, 4%)
Brazil (1, 4%)	United Kingdom (3, 12%)	Netherlands (1, 2%)	Japan (1, 4%)	
Canada (1, 4%)	Belgium (1, 4%)	Greece (1, 4%)	Singapore (1, 4%)	
	Sweden (1, 4%)			
Role designation (n, %)*				
Clinical scientist/researcher (19, 68%)	Basic scientist (4, 14%)	Clinician (2, 7%)	Clinical Academic/Educator (2, 7%)	Patient Advocate (1, 4%)
Discipline/major field (n, %)*				
Physiotherapy (10, 40%)	Basic science (4, 16%)	Rheumatology (2, 8%)	Psychology (1, 4%)	
Pain and rehabilitation medicine (4, 16%)	Neurology (2, 8%)	Anaesthesiology (1, 4%)	People with lived pain experience (1, 4%)	

* The sum of disciplines/major fields exceeds the number of participants as many nominated more than one.
n = number.

[range 3-1287]). The Expert Panel (average [SD] age; 55 [10] years) included 23 men (57 [10] years) and 16 women (53 [9] years) from 16 countries. This group represented a total of 1023 years working in the pain field (average 29 [10 years) and 4989 publications related to pain (average 128 [161], median 80 [range 5-700]). The country, role designation, and major discipline/research field related to pain are provided in **Tables 4 and 5**.

3.2. Refinement of clinical features for discrimination between pain mechanism descriptors

The refinement process undertaken by the IASP Terminology Task Force reduced the original candidate list of clinical features from 196 to 104 features (the original and refined list along with description of refinements are presented in Supplementary Digital Content 1, http://links.lww.com/PAIN/C482). For clinical features unique to one pain descriptor, features were reduced from 17 to 8 (nociceptive), 37 to 13 (neuropathic), and 22 to 19 (nociplastic) features. For clinical features shared between 2 pain mechanism descriptors, features were reduced from 27 to 19 (nociceptive + neuropathic), 19 to 15 (nociceptive + nociplastic), and 74 to 30 (neuropathic + nociplastic) features.

Two steering committee meetings were held to discuss the refinements and Task Force's feedback/suggestions. Some refinements were made to ensure that the terminology used in the candidate list was consistent with IASP clinical criteria for Neuropathic[9] and Nociplastic pain.[20] These refinements (presented in Supplementary Digital Content 1, http://links.lww.com/PAIN/C482) included the following: (1) wording changes to ensure consistency in terms used; (2) de-emphasis on the presence of motor signs of nervous system damage for neuropathic pain; (3) inclusion of additional features from the IASP Nociplastic criteria[20] that were not present in the original list that predated the publication of the criteria (ie, evoked pain hypersensitivity to touch/pressure/heat/cold in the region of pain, and pain present for >3 months); (4) removal of redundant features or those that are particularly difficult to implement clinically or in a research setting (eg, response to surgery, response to injections/blocks, response to pharmacological agents, response to tissue-based treatments).

3.3. Weight and rank of items unique to one pain mechanism descriptor

The ranking task was completed by n = 66 respondents (for nociceptive feature list), n = 61 respondents (for neuropathic feature list), and n = 64 respondents (for nociplastic feature list). For each pain descriptor, the percentage reflects the relative weight of each item as generated by the 1000minds algorithm, with all item weights summing to 100%. For nociceptive pain, the 3 highest weighted features were "pain consistently provoked by specific movement in a proportional manner" [15.5%], "clear, consistent, and proportional pattern of pain provocation by

Table 5

Expert panel (n = 39) country, role designation, and expertise.

Country (n, %)				
Region of the Americas (13, 33%)	European region (14, 36%)		Western Pacific region (11, 28%)	African region (1, 3%)
United States (10, 26%)	Denmark (3, 8%)	Netherlands (1, 3%)	Australia (8, 21%)	South Africa (1, 3%)
Canada (3, 8%)	United Kingdom (4, 10%)	Spain (1, 3%)	New Zealand (1, 3%)	
	Belgium (1, 3%)	Ireland (1, 3%)	Japan (1, 3%)	
	Sweden (1, 3%)	Israel (1, 3%)	Malaysia (1, 3%)	
	Germany (1, 3%)			
Gender (n, %)				
Male (23, 59%)	Female (16, 41%)			
Role designation (n, %)*				
Clinical scientist/researcher (28, 67%)	Basic scientist (2, 5%)	Clinician (11, 26%)	Clinical Academic/Educator (1, 2%)	
Discipline/major field (n, %)*				
Physiotherapy (14, 35%)	Neurology (3, 8%)	Dentistry (2, 5%)	Occupational therapy (1, 3%)	
Pain and rehabilitation medicine (9, 23%)	Anaesthesiology (3, 8%)	Orthopaedic surgery (1, 3%)	Chiropractic (1, 3%)	
Basic science (2, 5%)	Psychology (3, 8%)	Nursing (1, 3%)		

* The sum of disciplines/major fields exceeds the number of participants as many nominated more than one.
n = number.

Table 6

Nociceptive pain: weight and rank of items.

Rank	Item	Relative weight			Ranking		
		Mean	SD	Median	Mean	SD	Median
1	Pain is consistently provoked/aggravated by specific movements and postures in a proportional manner (not exaggerated)	15.5%	5.1%	16.7%	3.3	2.0	2.5
2	Clear, consistent, and proportional pattern of pain or symptom provocation by specific mechanical or movement testing	15.1%	5.2%	16.7%	3.5	2.0	3
3	Localised distribution of pain	14.4%	4.5%	14.8%	3.7	1.8	3.5
4	Signs of inflammation (redness, heat/warmth, tenderness, swelling) in area of pain	13.0%	5.9%	14.1%	4.2	2.3	4
5	No generalised hypersensitivity	11.8%	5.0%	11.6%	4.9	1.9	5
6	Scores on modified PainDETECT questionnaire below cut off (≤12)	10.5%	5.5%	10.2%	5.3	2.1	5.5
7	*Absence* of autonomic symptoms and/or signs the painful area such as swelling, changes in skin temperature/ colour/texture, or changes in hair and nail growth	10.4%	5.4%	9.1%	5.4	2.0	6
8	Findings from imaging of body regions of potential relevance to the pain experience	9.4%	5.0%	8.6%	5.7	2.0	6

Relative weight values represent the relative importance, or weight, of the feature/assessment finding. The sum of weightings is 100%.
Ranking represents the feature's rank with respect to their relative importance or weight. The mean rank represents the average of the individual ranking (from 1 to the number of items), the overall rank will never be 1 unless it ranked as 1 by all participants.

mechanical testing" [15.1%], and "localised distribution of pain" [14.4%], whereas the lowest weighted item was "findings from imaging of body regions of potential relevance to the pain experience" [9.4%] (**Table 6**). For neuropathic pain, the 3 highest weighted features were "diagnostic tests confirming evidence of lesion or disease of the somatosensory nervous system explaining the pain" [10.9%], "pain associated with sensory signs (examination) of lesion or disease in the same neuroanatomically plausible distribution of pain" [10.4%], and "pain descriptors [note that in this context the word "descriptor" refers to a word used to describe the pain rather than a mechanistic descriptor] suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain" [9.8%]; however, the lowest weighted item was the "presence of muscle spasticity in a neuroanatomically plausible distribution" [3.6%] (**Table 7**). For nociplastic pain, the 3 highest weighted features were "diffuse, widespread, regional, poorly localised, or varying distribution of pain" [7.7%], "generalised hypersensitivity" [7.1%], and "multisite pain (3 or more regions; not in the same body part)" [6.8%], whereas, the lowest weighted item was "more concern for bodily function" [2.8%] (**Table 8**).

3.4. Weight and rank of items shared between 2 pain mechanism descriptors

The ranking task for shared clinical features was completed by n = 57 respondents for nociceptive and neuropathic, n = 58 respondents for nociceptive and nociplastic, and n = 55 respondents for neuropathic and nociplastic. For nociceptive and neuropathic pain, the 3 highest weighted shared features were "pain is consistently relieved by movements and postures that decompress the relevant neural or nonneural tissue" [7.5%], "presence of localised muscle atrophy in region of pain or suggestive of pain being related to neurological lesion or disease in the same neuroanatomically plausible distribution of the pain" [7.1%], and "absence of hyperalgesia in areas remote to the area of primary pain" [6.1%]; however, the lowest weighted item was "normal two-point discrimination threshold" [3.6%] (Supplementary Digital Content 2, http://links.lww.com/PAIN/C482). For nociceptive and nociplastic pain, the 3 highest weighted shared features were "absence of nonpainful sensory symptoms suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain" [8.3%], "absence of motor signs suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain" [8.2%], and "presence of arthralgic (joint) pain" [7.9%]; the lowest weighted item was "high Waddell score" [4.6%] (Supplementary Digital Content 2, http://links.lww.com/PAIN/C482). For neuropathic and nociplastic pain, the 3 highest weighted shared features were "pain/symptoms are disproportionate or exhibit a nonlinear relationship exceeding the nature and extent of pathology or inciting injury" [4.3%], "sensory deficits in a nonneuroanatomically plausible distribution" [4.3%], and "hypersensitivity (allodynia/hyperalgesia) to mechanical stimuli remote to the region of pain" [4.2%]; however, the lowest weighted item was "pain described as tight, numb, drawing, squeezing, tearing, wretched, blinding" [2.2%] (Supplementary Digital Content 2, http://links.lww.com/PAIN/C482).

3.5. Repeatability of item rank and weighting

Ranking of clinical features was repeated by 26 respondents for the "unique" and 25 respondents for the "shared by 2" features. Detailed results are presented in Supplementary Digital Content 3, http://links.lww.com/PAIN/C482. Intraclass coefficients calculated for criteria weighting ranged between 0.96 and 0.98 (95% CI: 0.92-0.99) for unique features and 0.85 to 0.97 (95% CI: 0.69-0.99) for features shared by 2 descriptors. The lowest repeatability and widest confidence interval were identified for features shared by nociceptive and nociplastic pain. Unique features were either ranked the same or differed by 1 rank in all but 2 cases that differed by 2 ranks for nociceptive (1 feature) and neuropathic (1 feature) pain. Unique features for nociplastic pain were ranked the same (4 features), differed by 1 (7 features),

Table 7

Neuropathic pain: weight and rank of items and mapping to clinical criteria.

Rank	Item	Clinical criterion	Relative weight			Ranking		
			Mean	SD	Median	Mean	SD	Median
1	Diagnostic tests confirming evidence of lesion or disease of the somatosensory nervous system explaining the pain (eg, abnormal nerve conduction test, skin biopsy demonstrates reduced intraepidermal nerve fiber density)	DEFINITE 4: Diagnostic tests confirming a lesion or disease of the somatosensory nervous system explaining the pain. (The term "definite" in this context means "probable neuropathic pain with confirmatory tests" because the location and nature of the lesion or disease have been confirmed to be able to explain the pain)	10.9%	3.3%	11.3%	4.0	3.2	3
2	Pain associated with sensory signs (examination) of lesion or disease (eg, negative numbness; and/or positive hyperesthesia) in the same neuroanatomically plausible distribution of pain (can extend beyond, be within, or overlap with area of pain)	PROBABLE 3: Pain is associated with sensory signs in the same neuroanatomically plausible distribution (The area of sensory changes may extend beyond, be within, or overlap with the area of pain. Sensory loss is generally required but touch-evoked or thermal allodynia may be the only finding at bedside examination. Trigger phenomena in trigeminal neuralgia may be counted as sensory signs. In some cases, sensory signs may be difficult to demonstrate, although the nature of the lesion or disease is confirmed; for these cases, the level "probable" continues to be appropriate, if a diagnostic test confirms the lesion or disease of the somatosensory nervous system)	10.4%	2.4%	11.0%	4.4	2.1	4
3	Pain mechanism descriptors suggestive of pain being related to neurological lesion (eg, electric shock-like, lightning, stinging, shooting, jumping, flashing pain) in the same neuroanatomically plausible distribution of the pain	POSSIBLE 1: History of relevant neurological lesion or disease (history, including pain quality descriptors, the presence of nonpainful sensory symptoms, and aggravating and alleviating factors, suggestive of pain being related to a neurological lesion and not other causes such as inflammation or nonneural tissue damage. The suspected lesion or disease is reported to be associated with neuropathic pain, including a temporal and spatial relationship representative of the condition; includes paroxysmal pain in trigeminal neuralgia)	9.8%	2.5%	10.0%	4.5	2.4	4.5
4	Pain in a neuroanatomically plausible distribution (eg, dermatomal, peripheral nerve distribution, etc.)	POSSIBLE 2: Pain distribution neuroanatomically plausible (The pain distribution reported by the patient is consistent with the suspected lesion or disease.)	9.5%	3.5%	9.6%	5.2	3.4	5
5	Presence of nonpainful sensory symptoms (reported) (eg, negative—numbness; and/or positive—pins and needles, crawling) suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain	POSSIBLE 1: History of relevant neurological lesion or disease	8.8%	2.5%	8.3%	5.9	2.6	6.5
6	Presence of heat-related sensory symptoms (eg, fire-like, hot, burning, scalding, searing sensations) suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain	POSSIBLE 1: History of relevant neurological lesion or disease	8.1%	2.3%	8.0%	6.7	2.2	6.5
7	Presence of cold-related sensory symptoms (eg, cool, cold, freezing sensations) suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain	POSSIBLE 1: History of relevant neurological lesion or disease	7.8%	2.6%	7.7%	6.9	2.6	7
8	Scores on "Douleur Neuropathique 4" above cut off (≥4)		7.0%	3.3%	6.7%	7.8	3.3	8.5
9	Presence of motor symptoms/signs (eg, reduced/absent deep tendon reflexes; muscle weakness; muscle atrophy) suggestive of pain being related to neurological lesion in the same neuroanatomically plausible distribution of the pain		7.0%	3.5%	6.5%	7.6	3.5	8
10	Scores on "Neuropathic Pain Questionnaire" above cut off (≥0)		6.0%	2.8%	5.8%	8.8	2.8	9.5

(*continued on next page*)

Table 7 (*continued*)

Rank	Item	Clinical criterion	Relative weight			Ranking		
			Mean	SD	Median	Mean	SD	Median
11	Pain aggravated by movements that load or compress neural tissue suggestive of pain being related to neurological lesion or disease		5.9%	3.2%	5.4%	8.7	3.2	9.5
12	Presence of phantom pain		5.3%	3.4%	4.7%	9.4	3.5	10.5
13	Presence of muscle spasticity in a neuroanatomically plausible distribution		3.6%	2.7%	2.5%	11.1	2.7	12

Relative weight values represent the relative importance, or weight, of the feature/assessment finding. The sum of weightings is 100%.
Ranking represents the feature's rank with respect to their relative importance or weight. The mean rank represents the average of the individual ranking (from 1 to the number of items), the overall rank will never be 1 unless it ranked as 1 by all participants.

differed by 2 (5 features), differed by 3 (1 feature), and one feature changed from ranking 12th to 7th (absent/inconsistent sensory/motor signs). Ranking was less consistent between sessions for the features "shared by 2," with ranking changed by a mean (max) of 3.3 (9), 3.3 (9), 2.8 (7) for nociceptive and neuropathic, nociceptive and nociplastic, and neuropathic and nociplastic pain, respectively.

3.6. Mapping of items against published clinical criteria

Mapping of features against published clinical criteria for neuropathic and nociplastic pain are presented in **Tables 7 and 8**, respectively. For Neuropathic pain, the highest weighted item ("diagnostic tests confirming evidence of lesion or disease of the somatosensory nervous system explaining the pain") was consistent with the previously established criterion for "definite" diagnosis from IASP clinical criteria.[9] The top 7 ranked features were all aligned with clinical criteria and ranked in the expected order with features aligned to "probable" ranked higher than those for "possible" neuropathic pain. The remaining lower ranked features did not map to the published clinical criteria and represent potential additional items to further investigate for potential to discriminate between pain descriptors.

For nociplastic pain, the highest ranked item ("diffuse, widespread, regional, poorly localised, or varying distribution of pain") was consistent with previously established "obligatory" criteria from the IASP clinical criteria.[20] There was less agreement with ranking of other features. Notable exceptions are the obligatory clinical criterion of "chronic pain lasting longer than 3 months," which was ranked 18th, and "evoked pain hypersensitivity in the region of pain," which was ranked 10th. This indicates a divergence between this tool and the established clinical criteria—for instance, although pain lasting longer than 3 months might be necessary to be convinced that pain is nociplastic, it would not help discriminate between pain types. Furthermore, evoked pain hypersensitivity in the region of pain might be expected in all 3 pain types. Although this was included in the criteria for nociplastic pain to distinguish nociplastic pain from pain of unknown origin,[20,21] it would not aid discrimination between pain descriptors. For features related to hypersensitivity, the lack of clarity about whether the feature was identified through subjective report (eg, patient description) or semiobjective assessment (eg, quantitative sensory testing) created ambiguity. As a result, the item could potentially align with clinical criteria for either subjective symptom reporting or objective examination findings. Some highly ranked features are not found in the clinical criteria (eg, the fifth ranked feature—"mechanical testing shows a disproportionate, inconsistent, nonmechanical pattern of pain or symptom provocation" and sixth ranked feature "Pain experienced in a nonneuroanatomically plausible distribution") and might add additional value for identification of nociplastic pain.

As highlighted above, there are no clinical criteria for nociceptive pain. The items identified in this study could provide a foundation for their development.

4. Discussion

This consensus process (n = 63) involving the IASP Terminology Task Force and an external Expert Panel refined a candidate list of 196 clinical features purported to discriminate between the 3 pain descriptors (nociceptive, neuropathic, and nociplastic) and ranked features based on relative weight/importance. The list was reduced to 104 features (40 "unique to 1" and 64 "shared between 2" descriptors). The highest weighted features for neuropathic and nociplastic pain aligned with IASP Clinical Criteria.[9,20] This consensus-based weighted list provides a preliminary foundation to develop a tool and algorithm to discriminate between pain descriptors in clinical practice and research. This does not validate the constructs or demonstrate separable biological mechanisms. That will be interrogated in future work (**Fig. 3**). Final selection of items and weightings will be driven by data from cohort studies and clinical trial. The decision algorithm can then be tested against other algorithms to determine performance in improving health outcomes.

4.1. Clinical features unique to one pain descriptor and alignment to clinical criteria

Ranking of clinical features unique to pain descriptors was repeatable, with most retaining their rank. For nociceptive pain, the 4 top-ranked features were positive diagnostic findings (eg, "pain provoked by movement"), which commonly reflect nociceptive musculoskeletal pain.[28] The 3 lower-ranked features excluded other descriptors, such as "PainDETECT scores below the cutoff" and "absence of autonomic symptoms." Although valuable for ruling out other mechanisms, exclusion-based features were considered less important for identifying nociceptive pain. Imaging findings ranked lowest (eighth), reflecting mismatch between imaging and clinical pain.[34] Inflammation-related features suggestive of acute injury (redness, swelling, warmth) might require expansion to reflect chronic inflammatory pain presentations, such as stiffness and time-dependent pain variation.[10] Absence of autonomic symptoms needs further evaluation, as they overlap with features of inflammation.

For neuropathic pain, feature ranking aligned with clinical criteria[9]: highest-weighted features aligned with "definite," followed by "probable" and "possible" criteria, suggesting confidence in these hierarchical categories. This alignment likely reflects respondents' familiarity with and involvement in (2/25 task

Table 8

Nociplastic pain: weight and rank of items and mapping to clinical criteria.

Rank	Item	Clinical criterion	Relative weight			Ranking		
			Mean	SD	Median	Mean	SD	Median
1	Diffuse, widespread, regional (rather than discrete), poorly localised, or varying distribution of pain	1b. Regional (rather than discrete) in distribution	7.7%	2.0%	7.9%	5.1	3.9	4
2	Generalised hypersensitivity	2. There is a history of pain hypersensitivity in the region of pain Any one of the following: Sensitivity to touch; sensitivity to pressure; sensitivity to movement; sensitivity to heat or cold 4. Evoked pain hypersensitivity phenomena can be elicited clinically in the region of pain Any one of the following: Static mechanical allodynia; dynamic mechanical allodynia; heat or cold allodynia; painful after-sensations reported following the assessment of any of the above alternatives	7.1%	2.2%	7.2%	6.4	4.4	5.5
3	Multisite pain (3 or more regions; not in the same body part) or spread of pain over time to new body sites/areas	1b. Regional (rather than discrete) in distribution	6.8%	2.6%	7.0%	7.1	5.1	6
4	Presence of multiple somatic symptoms (any of fatigue, sleep disturbances with frequent nocturnal awakenings, mood disturbances, cognitive problems such as memory disturbances and concentration/attention difficulties)	3. Presence of comorbidities: Any one of the following: Increased sensitivity to sound and/or light and/or odors Sleep disturbance with frequent nocturnal awakenings Fatigue Cognitive problems such as difficulty to focus attention, memory disturbances, etc.	6.1%	2.6%	6.7%	8.2	5.4	7
5	Mechanical testing shows a disproportionate, inconsistent, nonmechanical pattern of pain, or symptom provocation		6.1%	2.3%	6.1%	8.3	4.6	8
6	Pain experienced in a nonneuroanatomically plausible distribution		6.1%	2.2%	6.1%	8.2	4.5	8
7	Scores on 'Central Sensitization Inventory' questionnaire above cut off (≥40)		5.4%	2.8%	5.7%	9.7	5.7	8.5
8	Presence of hypersensitivity to stimuli in the region of pain (eg, touch, pressure, movement, temperature)	4. Evoked pain hypersensitivity phenomena can be elicited clinically in the region of pain Any one of the following: Static mechanical allodynia; dynamic mechanical allodynia; heat or cold allodynia; painful after-sensations reported following the assessment of any of the above alternatives 2. There is a history of pain hypersensitivity in the region of pain Any one of the following: Sensitivity to touch; sensitivity to pressure; sensitivity to movement; sensitivity to heat or cold	5.3%	2.4%	5.5%	9.9	5.1	10
9	Presence of hypersensitivity to stimuli (eg, sound, light, odor, taste)	3. Presence of comorbidities (as above)	5.3%	2.3%	5.0%	9.9	4.9	10.5
10	Evoked pain hypersensitivity to touch/pressure can be elicited clinically in the region of pain	4. Evoked pain hypersensitivity phenomena can be elicited clinically in the region of pain	5.3%	2.4%	5.1%	9.8	5.1	10.25
11	High scores on Revised Fibromyalgia Impact Questionnaire (RFIQ); no cutoff proposed		5.0%	2.3%	5.1%	10.6	4.9	10
12	High scores on Fibromyalgia Criteria and Severity Scales (FCSS); no cutoff proposed		5.0%	2.3%	4.8%	10.7	4.9	10.5
13	Inconsistent, confusing, and ambiguous responses and findings to clinical tests		4.8%	2.4%	4.7%	11.1	4.8	11
14	Absent or inconsistent (not neuroanatomically plausible) sensory and/or motor signs of nervous system lesion or disease		4.6%	2.1%	4.8%	11.3	4.4	10.5

(*continued on next page*)

Table 8 (*continued*)

Rank	Item	Clinical criterion	Relative weight			Ranking		
			Mean	SD	Median	Mean	SD	Median
15	Evoked pain hypersensitivity to heat/cold can be elicited clinically in the region of pain	4. Evoked pain hypersensitivity phenomena can be elicited clinically in the region of pain	4.4%	2.5%	4.0%	11.3	5.5	12.25
16	Variability or no consistency in pain quality descriptors		4.2%	2.4%	4.1%	12.2	4.8	13.5
17	No findings from imaging of body regions of potential relevance to the pain experience		4.1%	2.3%	3.8%	12.5	4.8	13.75
18	Pain present for more than 3 mo	1a. Chronic (>3 mo)	4.0%	2.6%	2.9%	12.6	5.5	14.75
19	More concern for bodily function		2.8%	1.7%	2.7%	15.1	3.6	16

Relative weight values represent the relative importance, or weight, of the feature/assessment finding. The sum of weightings is 100%.
Ranking represents the feature's rank with respect to their relative importance or weight. The mean rank represents the average of the individual ranking (from 1 to the number of items), the overall rank will never be 1 unless it ranked as 1 by all participants.

force members developed the neuropathic clinical criteria) developing those criteria.[9] Neuropathic questionnaires (eg, PainDETECT) were not highly ranking, which might be explained by potential overlap between nociplastic and neuropathic pain (eg, individuals with high pain sensitivity might obtain high scores, making it difficult to distinguish between nociplastic and neuropathic pain). Motor signs were flagged by the Task Force as potentially unnecessary; they are excluded from criteria for neuropathic pain, as they occur without neuropathic pain.[17] Phantom pain was included as an example of a diagnostic "test," providing direct evidence of somatosensory system damage.[9] Features referencing "neuroanatomically plausible" distributions were deemed essential yet operationally challenging owing to variability.[33]

For nociplastic pain, feature ranking broadly aligned with clinical criteria,[20] with notable differences. Some bias is possible, as 8/25 task force members developed the nociplastic clinical criteria. Because the primary aim is to discriminate between pain types, criteria such as "pain duration (>3 months)" and "presence of hypersensitivity to stimuli in the region of pain" ranked lower than for clinical criteria, as they are unlikely to discriminate between descriptors. Nociplastic clinical criteria include local hypersensitivity to distinguish nociplastic pain from pain of unknown origin,[20] which was not assessed here.

The redefinition of neuropathic pain from somatosensory "dysfunction" to "disease or injury"[17] prompted development of the nociplastic descriptor.[21] Some features such as "nonneuroanatomical distribution" are not included in the clinical criteria but was ranked highly. This infers a mismatch between peripheral inputs and pain and inconsistent with neuropathic pain. Although potentially useful, operationalisation would be challenging because of neuroanatomical map variation.[3]

The Central Sensitization Inventory[23] and fibromyalgia-related questionnaires[38] include features that are identified to be characteristic of nociplastic pain, but work is needed to test their discriminative value. Imaging findings were not prioritised, highlighting that imaging does not always correlate with pain.[3,26] Finally, some features, such as "concern for bodily function," were ambiguously interpreted by respondents. Clinical criteria for nociplastic pain should not yet be considered as gold standard, as they have not undergone validation. Concordance with established criteria provides some support for face validity, whereas divergences identify priorities for operationalisation and testing. The outcomes of the present project, which were based

Figure 1. Pairwise decision making using 1000minds. 1000minds is a multicriteria decision-making tool that applies the PAPRIKA method (Potentially All Pairwise RanKings of all possible Alternatives), which involves comparing each alternative against every other in pairs, deciding which is higher ranked or if they are equal. This process helps produce an overall ranking of all alternatives. Pairwise ranking simplifies decision making by breaking down complex comparisons into simpler, more manageable parts. For each pain descriptor, pairs of scenarios (alternatives) were presented to participants, each involving information about to 2 features for discrimination. Participants were asked to select the scenario that most likely indicates pain related to that descriptor.

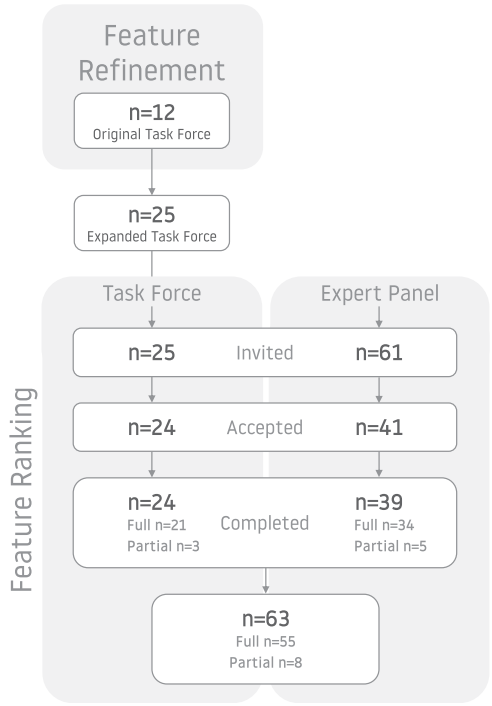

Figure 2. Recruitment flow of Task-Force members and external Expert Panel members. Respondent flow across the 2-stage consensus process: (1) feature refinement and (2) feature ranking. The Task Force was expanded from 12 to 25 members after the feature refinement process, of whom 24 (96%) contributed. Sixty-one external experts were invited and 39 (64%) contributed. Altogether, 63 respondents (55 full and 8 partial data sets) informed the final feature rankings.

on independent extensive systematic reviews[28,29] and iterations of expert consensus,[30] might refine the clinical criteria. It is important to acknowledge that nociplastic pain is best understood as a mechanism inferred from observations in specific syndromes rather than directly demonstrable mechanisms comparable to nociceptive/neuropathic pain. Furthermore, nociplastic criteria are preliminary, relate only to musculoskeletal pain and not yet definitive. The new discrimination tool should enable progress.

Notably, there are no published clinical criteria for nociceptive pain. The clinical features identified in this study are a starting point for their development.

4.2. Clinical features shared between 2 pain mechanism descriptors

Clinical features shared between 2 pain descriptors showed less consistency in ranking between sessions, reflecting challenges in defining "mixed" mechanisms. These features might be less robust for tool development than those unique to a descriptor. Features shared by 2 pain descriptors represent clinical characteristics that should be absent in the third.

Many features overlap with exclusion criteria in the unique feature rankings. Among features shared between neuropathic and nociplastic pain, there was some convergence, with several features reflecting nociplastic pain. This pattern aligns with pain amplification or "sensitisation," which may develop in neuropathic pain conditions, supporting the concept of co-occurring pain descriptors.[14,39] Many of these features had questionable utility for discrimination. Overall, although shared features offer insight into the interplay of mechanisms, their questionable utility and lower consistency question their contribution to a discriminative tool. Refinement of these features might focus on identifying those most indicative of co-occurring pain descriptors.

4.3. Next steps: development of a tool to discriminate between pain descriptors

Developing a multimodal tool to discriminate between pain descriptors requires an algorithm that recognises that items have unequal importance. The weights from this study are preliminary. The algorithm would generate probability scores for each mechanism, identifying the predominant pain descriptor for an individual's pain (**Fig. 3A**). This should enable selection of treatments matched to pain descriptors, as a step towards personalised medicine. Further steps are required (**Fig. 3B**). First, operationalisation of items is critical for successful implementation. Clear definitions and practical testing methods must be established to ensure consistent application across settings. Ambiguities in shared or overlapping features need to be addressed for reliability. Second, data from clinical cohorts will inform final selection of items and weightings for discrimination between descriptors. Third, validation is necessary. Preliminary evidence suggests potential utility for a tool,[15] but robust validation is essential to confirm its discriminative performance and identify redundant features. These studies should assess the tool's accuracy, feasibility (research tools [eg, quantitative sensory testing] vs clinical bedside versions of tools), repeatability, and impact on clinical decision making. Moreover, testing across diverse patient populations will ensure generalisability.

4.4. Strengths and limitations

A strength of this study is the comprehensive and transparent process for feature selection and weighting, involving diverse international experts. Additionally, 1000minds software provided a rigorous framework for quantifying expert consensus and weighting. Of note, rankings represent overall group mean results but not each respondent's views.

Several limitations require consideration. First, participants included a high proportion of physiotherapists and from English-speaking countries in only 4 of 6 WHO regions (Americas, Europe, Western Pacific, Africa). English-only administration may limit participation and nuance for nonnative speakers. Codesign with frontline clinicians and people with lived experience will be embedded in the operationalisation and validation phases. Second, we did not balance the expert panel by prior involvement; however, high repeatability of rankings supports robustness at the group level. Third, by excluding features deemed impractical, the refinement process may have omitted potentially useful discriminative features. Fourth, one participant with lived experience contributed, limiting the breadth of patient perspectives. Fifth, the IASP Task Force's familiarity with IASP clinical criteria might have biased responses towards currently accepted constructs. Sixth, variability in shared feature rankings highlights the complexity of mixed mechanisms and suggests the need for iterative tool development. Finally, this study, and the tool under development, focus primarily on musculoskeletal pain, and findings may not translate to other pain populations (eg, visceral pain, headache). Work is underway to consider such conditions (**Fig. 3**).

5. Conclusion

This study represents a foundational step towards the development of a tool to discriminate between predominant pain

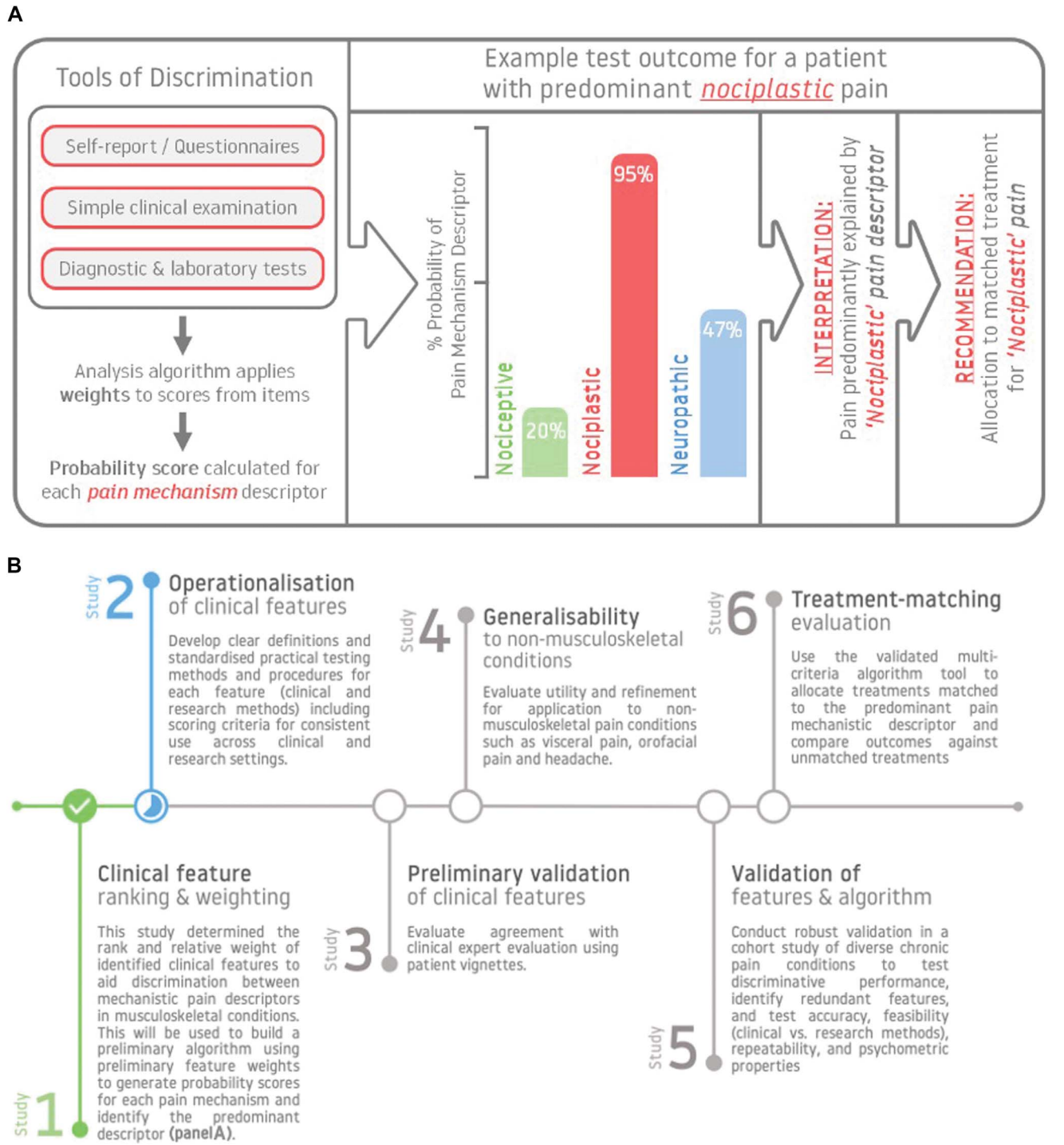

Figure 3. Roadmap from clinical feature weighting to validated implementation of a multicriteria decision algorithm for discriminating pain mechanistic descriptors. (A) Conceptual example of the planned multicriteria decision algorithm: multiple candidate features "tools of discrimination" (self-report, simple clinical examination, diagnostic/laboratory tests) are weighted according to their relative importance. The combination of features presenting in an individual will yield a probability score for each pain mechanism descriptor, and the descriptor with the highest probability score is considered the predominant driver of the pain experience in that individual at that time. This will guide the allocation of treatment(s) that are targeted at that particular pain mechanism descriptor. (B) Sequential roadmap from feature ranking/weighting to operationalisation, validation, generalisability testing, and treatment-matching evaluation. Each stage builds towards a practical tool that can be applied to various persistent pain conditions across clinical and research settings.

descriptors. Through a structured and transparent process, clinical features that may aid discrimination were ranked and weighted based on expert input using choice-based conjoint analysis. Alignment with IASP clinical criteria is promising, but this does not assure validity, and the recent work can be viewed as an advance of some aspects of the criteria. The resulting ranking and weights provide a prioritised set of candidate clinical features that can inform operationalisation, refinement through a data-driven approach, and development of a multimodal decision algorithm.

Conflict of interest statement

AR is the President of the IASP. LJ is an elected member of the IASP Council. PH is the Chair of the Terminology Task Force for

IASP. The Vrije Universiteit Brussel and JN received lecturing/teaching fees from various professional associations and educational organisations. JN authored books on pain science education and pain management, but the royalties are collected by the Vrije Universiteit Brussel, Brussels, Belgium. All other authors have no conflict of interest to declare.

Acknowledgements

The authors thank the IASP Terminology Task Force and all the expert panellists for their valuable time and expertise they provided to this project. Detailed summary data are available within the text and supplementary files, http://links.lww.com/PAIN/C482. Complete data are available from the corresponding author.

This study was supported by Program/Synergy Grants (1091302; 2027473) from the National Health and Medical Research Council (NHMRC) of Australia. P.H. and M.S. were supported by Fellowships (1102905/1194937; 2017405) from the NHMRC. M.S. was supported by an unrestricted grant from the Motor Accident Insurance Commission of Queensland. K.S. was supported by National Institutes of Health Grants R01 AR073187, U24 NS112873, and UH3 AR076387.

Supplemental digital content

Supplemental digital content associated with this article can be found online at http://links.lww.com/PAIN/C482.

Article history:
Received 23 October 2025
Received in revised form 19 February 2026
Accepted 22 February 2026
Available online 29 April 2026

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