

Gathering user requirements and assessing usability of a digital pain self-reporting tool among people living with chronic musculoskeletal pain in Pakistan: A qualitative study

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Abstract

Background: Chronic musculoskeletal pain is a global problem, management of which is sub-optimal in Pakistan. The traditional pain assessment tools often lack cultural relevance for culturally and linguistically diverse communities. Manikin-based digital pain self-reporting tools may support pain management but require cultural adaptation to ensure their accessibility and inclusivity.

Objective: This study aimed to gather user requirements and preferences for digital pain self-reports and assessing usability of a digital pain self-reporting tool, which would support digitally enabled pain assessment and management in future.

Methods: A qualitative study was conducted at Shalamar Hospital, Lahore, involving four gender-segregated group discussions with adults living with chronic pain and individual interviews with rheumatologists. User requirements of digital pain self-reporting tools were gathered using the table of specification approach. The clickable prototype of the digital pain self-reporting tool was presented, and its usability was assessed with the help of testing scenarios through the think-aloud technique and researchers' observations. To improve the tool's usability, the content was culturally adapted through pictograms and translating it into Urdu by employing an adapted FACIT methodology. Pictograms were designed to enhance communication of pain qualities and tested their relevance with participants. Focus groups and interviews were transcribed verbatim and analyzed descriptively.

Results: Twenty people living with chronic pain participated in focus groups and four rheumatologists participated in interviews. Majority of people living with chronic pain were middle-aged (35-54 years; 55%), employed (n=14; 70%), and diagnosed with rheumatoid arthritis (n=9; 45%). We found similarities between user requirements captured in the UK for digital pain self-reporting tools and for those collected in Pakistan. However, female participants did not prefer gender personalization of the manikin due to socio-cultural factors. Four different usability testing scenarios revealed that the digital pain reporting tool was easy to use. Participants confirmed Urdu translated tool's content and pictograms improved the tools' usability through iterative improvements. Rheumatologists found the tool to be capturing all important pain aspects and recognized its potential to improve

patient-provider communication, particularly for patients with low literacy.

Conclusions: The study demonstrated that manikin-based digital pain self-reporting tool is easy to use among Pakistanis living with chronic musculoskeletal pain. Preferences for manikin personalisation based on gender highlight the significance of cultural adaptations which are responsive to socio-cultural contexts. Accessible digital pain self-reporting tools have potential to improve pain outcomes through inclusive and digitally enabled pain assessment and management.

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Original Manuscript

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Authors

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Abstract

Background

Chronic musculoskeletal pain is a global problem, management of which is sub-optimal in Pakistan. The traditional pain assessment tools often lack cultural relevance for culturally and linguistically diverse communities. Manikin-based digital pain self-reporting tools may support pain management but require cultural adaptation to ensure their accessibility and inclusivity.

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Twenty people living with chronic pain participated in focus groups and four rheumatologists participated in interviews. Majority of people living with chronic pain were middle-aged (35-54 years; 55%), employed (n=14; 70%), and diagnosed with rheumatoid arthritis (n=9; 45%). We found similarities between user requirements captured in the UK for digital pain self-reporting tools and for those collected in Pakistan. However, female participants did not prefer gender personalization of the manikin due to socio-cultural factors. Four different usability testing scenarios revealed that the digital pain reporting tool was easy to use. Participants confirmed Urdu translated tool's content and pictograms improved the tools' usability through iterative improvements. Rheumatologists found the tool to be capturing all important pain aspects and recognized its potential to improve patient-provider communication, particularly for patients with low literacy.

Conclusion

The study demonstrated that manikin-based digital pain self-reporting tool is easy to use among Pakistanis living with chronic musculoskeletal pain. Preferences for manikin personalisation based on gender highlight the significance of cultural adaptations which are responsive to socio-cultural contexts. Accessible digital pain self-reporting tools have potential to improve pain outcomes through inclusive and digitally enabled pain assessment and management.

Keywords

Chronic musculoskeletal pain; digital pain drawings, digital pain manikins, user-centered design; cultural adaptation

Introduction

Chronic musculoskeletal pain has often been described as a silent epidemic, affecting nearly half of the global population and significantly reducing the quality of life for those affected (1–3). This disabling condition burdens the healthcare systems due to increased resource utilization, hospitalizations and surgical interventions (4). However, people living in lower- and middle-income countries are affected disproportionately, including in Pakistan. While national studies on its burden are lacking in Pakistan, a household survey revealed a prevalence of approximately 28% (5), affecting racially diverse groups, women, rural residents, and older people disproportionality (6–8).

Assessing chronic pain, including pain self-reporting remains a challenge, due to the lack of a single comprehensive assessment tool (9). There are commonly used unidimensional (e.g., Numerical Rating Scale, Visual Rating Scale, and Visual Analogue Scale) and multidimensional tools (e.g., McGill Pain Questionnaire and Brief Pain Inventory) (10–13). While these tools offer valuable insights, they have notable limitations. Unidimensional tools may oversimplify the pain experience, and multidimensional tools such as the McGill Pain Questionnaire can be time consuming and cognitively demanding for patients to complete (14,15). Moreover, these tools do not enable capturing spatiotemporal changes in pain experience, which can potentially be addressed by manikin-based digital self-reporting tools (16,17). There is also a lack of evidence on the validation and use of these pain assessment tools in Pakistan for assessing and self-reporting pain. This suggests a need for developing and validating pain self-reporting tools, which are addressing the target population's requirements.

Digital pain self-reporting tools enable real-time data collection in the patient's own environment, which significantly improves the accuracy of pain self-assessments compared to traditional methods (18). These tools minimize recall bias by capturing pain experiences as they occur and allow for multiple assessments over time. Digitized pain manikins and pain drawings offer similar advantages (19). Pain manikins – graphical representations of the human body – are valid and reliable for pain self-reporting, and their digital versions present a novel opportunity for patients to self-report and communicate their pain experiences in real-time. In a low resourced setting and short consultation time, summarising pain information may in turn aid healthcare providers in making more informed and better pain management decisions (20,21).

Systematic reviews of digital pain manikins have shown that none of the available pain manikins is developed in lower- and middle-income countries and is suitable for use among racially diverse communities living in high income countries (16,22). Although manikin-based digital pain self-reporting tools could help overcome language barriers and unmet needs in groups

disproportionately affected by pain, their development and use have not been studied in culturally and linguistically diverse communities of Pakistan, where healthcare needs are high and access is limited. Therefore, the aim of this study was to gather user requirements and preferences for digital pain self-reporting tools and assessing the usability of a digital pain self-reporting tool among Pakistanis living with chronic musculoskeletal pain.

Methods

Study Design

This qualitative study employed focus group discussions with people living with chronic musculoskeletal pain and individual interviews with rheumatologists. The focus group discussions were conducted in two phases, with two group discussions in each phase, at the Shalamar Hospital, Lahore, Pakistan. In the first phase, requirements for the content and design of a digital pain self-reporting app were gathered to guide prototype refinement, which was then retested in the second phase.

Ethics Approval

Ethical approval was taken from Institutional Review board (IRB) of Shalamar Medical & Dental College, Lahore, Pakistan (SMDC-IRB/AL/2024-059)

Eligibility and recruitment of participants

Adults (aged 18 and above), living with chronic pain with any underlying rheumatic condition, who could speak and understand Urdu or English, own and use smartphones, and provide informed written consent were considered eligible for participating in focus group discussions. Individuals with acute pain conditions (e.g., trauma) or with underlying cancerous conditions or infections were excluded from the study. Using a convenience sampling approach, a researcher (IMC) approached and introduced the study to potentially eligible participants sitting in a waiting area of the outpatient rheumatology department at the Shalamar Hospital, Lahore. The eligibility of interested people was assessed against the inclusion and exclusion criteria. Participants were then invited to attend one of the four group discussions based on their gender and availability.

On the day of focus group discussion, the agenda was explained to participants, and the participant information sheet was shared and explained to them. They were given the opportunity to ask questions, and then written informed consent was obtained from all participants. All participants were compensated for their time and travel.

Rheumatologists, currently working in Pakistan and willing to provide written consent for an audio-recorded interview, were considered eligible for the study. Rheumatologists were invited from researchers' own professional networks for a face-to-face interview. The rest of the recruitment

process (i.e., determining eligibility, sharing participant information sheets and taking informed consent from the participants) was the same as that of recruiting people living with chronic pain.

Data collection and analysis

For each data collection step, supporting materials and methods are outlined in table 1. After providing consent, all participants, including patients and rheumatologists completed a baseline questionnaire to capture demographics and experience (appendix 1). Participants' characteristics were summarised descriptively and presented in a tabular form.

A topic guide was developed by reviewing the relevant literature and guided the focus group discussions with patients (appendix 2) (23–25). Task-based, pre-specified usability testing scenarios (given in table 1) were performed with participants. The discussion moderator (SKI) presented four different scenarios to participants. A modified version of the topic guide was used in the latter two group discussions to gather feedback on the updated versions of design and contents (appendix 2).

For collecting user requirements, researchers adapted the table of specification approach (26). The think-aloud technique was used for assessing the usability of a digital pain self-reporting tool and observation was made by research team members (IMC, FN and SM) using a observation checklist (appendix 3) to elaborate user experience further (27,28). We adapted the FACIT methodology for translating app content into Urdu (29). Moreover, as guided by our previous research (24), pictograms were co-designed iteratively to reflect common pain quality descriptors (appendix 4 – additional findings).

A topic guide was drafted for semi-structured interviews with rheumatologists by reviewing the relevant literature (20,30,31). Requirements of digital pain self-reporting were also captured from rheumatologists (appendix 2).

Table 1: Data collections steps and associated materials and methods

Data collection steps	Supporting materials	Description
(a) Characteristics of participants	Baseline questionnaire for patients (appendix 1)	Questionnaire collected age, gender, education, income, and employment status, pain experience and diagnosed musculoskeletal conditions from people living with chronic pain
	Baseline questionnaire for rheumatologists	From rheumatologists, information about their qualification and experience in managing chronic pain were captured.
(b) User requirements for pain self-reporting tool	The user requirement table from previously published work (24)	In discussion with people living with chronic pain, the user requirement table was used as a prompt to gather or validate user requirements for pain self-reporting.
	Topic guide (appendix 2)	Rheumatologists were asked about: (1) the use of pictograms as descriptors of pain quality; (2) important aspects of chronic pain; and (3) any biases or barriers that could affect the use of the tool.

(c) Usability testing of a clickable prototype	Task-based, pre-specified usability testing scenarios (appendix 2)	Testing scenarios were: (a) set-up or personalise pain manikin; (b) report pain intensity and pain quality by drawing on a manikin; (c) add and report pain triggers; and (d) report weekly clinical outcomes. For each scenario, the moderator provided a list of tasks to all participants to complete. The participants were asked to 'think-aloud' while performing those usability tasks. Their responses were audio-recorded.
	Observation checklist (appendix 3)	At least two researchers (IMC, SM and FN) observed their behaviour by completing an observation checklist. Follow-up questions were asked to clarify tasks and understand user behaviour and suggestions were gathered regarding how to improve their pain reporting experience.
(d) Urdu translation of the content	Translation of the content was done by outlining the content in a word document	Two forward translations were done, a reconciled version was then back translated, and a finalized version of the translation was tested during the focus group for understanding by the target population, as cognitive debriefing.
(e) Visual representation of the pain quality descriptors	Pictograms of pain quality descriptors (appendix 4 – additional findings)	Pictograms were designed by a graphic designer, and two iterations were done based on the participants' and research team's feedback. Pictograms were designed for the selected pain qualities identified from the McGill pain questionnaire (32) by two rheumatologists based on the commonly reported pain qualities by target patient groups.

All focus groups and interviews were audio-recorded and transcribed verbatim by a third party. The transcripts were anonymised by a researcher (SKI) and were analysed descriptively by researchers (SKI, IMC and SM). Researchers' notes and observation checklists were reviewed to triangulate data and add rigour to data analysis and interpretation (33).

Results

(a) Characteristics of participants

Twenty participants took part in four group discussions, including ten male and ten females. Majority of the participants were middle aged (i.e., between 35 and 54; n=11; 55%), employed (n=14; 70%), diagnosed with rheumatoid arthritis (n=9; 45%), completed education up to high school (n=12; 60%) and had a family income between 100 USD and 250 USD per month.

Four rheumatologists, having experience of managing pain for more than 4 years, participated in interviews. Characteristics of group discussion and interview participants are presented in Table 2.

Table 2: Characteristics of people living with chronic pain and rheumatologists

Patient characteristics	Number(percentage)
Age	
18-34	6(30)
35-54	11(55)
>55	3(15)

Education level	
Up to high school	12(60)
Graduation or post-graduation	8(40)
Family income (in USD)	
<110	4(20)
111-250	12(60)
>250	4(20)
Employment status	
Employed	14(70)
Unemployed (including students, retired)	6(30)
Diagnosed Musculoskeletal Condition	
Mechanical/Degenerative Conditions*	8(40)
Rheumatoid Arthritis	9(45)
Seronegative Arthritis (Psoriatic)	1(5)
Connective Tissue Disease (SLE)	2(10)
How long have you been experiencing pain?	
<1 year	3(15)
1-3 year	8(40)
4-10 year	3(15)
>10 year	6(30)
Rheumatologist characteristics	
	Number(percentage)
Gender	
Male	2(50)
Female	2(50)
Experience of managing chronic pain	
4-10 years	2(50)
>10 years	2(50)
* Examples include chronic back pain, osteoarthritis, regional pain syndrome, sciatica SLE; Systemic lupus erythematosus	

(b) User requirements for pain self-reports

In total, 21 user requirements across four categories emerged from the four focus group discussions (Table 3). Except for one requirement i.e., gender-specific manikin personalization, all requirements were consistent across both genders. Females expressed discomfort with female manikin appearance for pain self-reporting. However, they agreed to self-report their pain on a gender-specific manikin if it would have a clinical value.

Majority of the location and non-location specific pain aspects were brought up by the participants while only pain layers or depth, semi-structured diary field and reasons for not reporting pain required prompting in both gender-segregated group discussions (Table 1 in supplementary materials). Contrary to the pain aspects, the app features required prompting for most requirements

across the group discussions except the manikin zoom-in function.

Table 3: Table of specification for a digital pain self-reporting app

Pain aspects or app features	Requirement		Remarks
	Male	Female	
Location-specific pain aspects			
Pain quality (e.g., stabbing, throbbing)	Yes	Yes	Helps clinicians understand disease progression and offer relevant treatment and management options.
Location-specific pain intensity	Yes	Yes	Differences in intensities at various painful sites may allow for targeted interventions.
Pain radiation	Yes	Yes	Allows differentiation of different causes of pain, pain’s progression and spread.
Pain layers or depth	Yes	Yes	Differentiate the various parts of the musculoskeletal system (skin, joint, muscle or bone) that may be affected and guide management.
New pain	Yes	Yes	Helps assessing if it is a change in existing pain or new pain.
Non-location-specific pain aspects			
Pain causes and aggravating factors (i.e., factors that cause or increase)	Yes	Yes	Track the day-to-day activities and perceived external factors that cause or aggravate pain.
Pain impact (i.e., interference with other activities or consequences)	Yes	Yes	To let a clinician know about the effect of pain on daily life.
Pain management strategies	Yes	Yes	To note and evaluate treatment and management strategies that may help in managing pain.
Pain timing/duration	Yes	Yes	Assessing the time of pain flare and duration can determine effectiveness of pain treatment.
Semi-structured diary field (with headings as suggestions for what to record in this field)	Yes	Yes	To capture additional aspects of pain that may be helpful for clinicians.
Reasons for not reporting pain	Yes	Yes	Giving reason for pain self-reporting gaps may not trigger change in treatment plan.
App features: Feedback and output			
Feedback of previous pain reports	Yes	Yes	Learning from our own pain self-reports to guide our day-to-day activities.
Pain management guidance based on pain	Yes	Yes	Clinicians may consider pain self-reports to guide their clinical decision-making.

reports			
App features: Look and feel			
Available for any digital device	Yes	Yes	Smartphones and tablets are the commonly used and preferred digital devices.
Flexible reporting frequency	Yes	Yes	Should be customizable to meet personal needs based on disease activity or progression.
Multiple languages	Yes	Yes	To improve understanding of the questions and instructions related to pain reports.
Intuitive colour scheme linked to pain intensity scores	Yes	Yes	Contrasting colour scheme to allow pain rating according to intensity.
Manikin zoom-in function (by finger pinch)	Yes	Yes	Zoom feature is required especially to report pain in small joints of hands and feet.
Manikin body sides (minimum front, back, lateral sides)	Yes	Yes	Allows accurate reporting of pain.
Manikin detail	Yes	Yes	Facial features, umbilicus, and musculature act as important anchoring points.
Manikin personalization (e.g., gender-specific)	Yes	No	Because of social and cultural reasons females did not prefer to have the gender specific manikin.

The rheumatologists described general difficulties in communicating pain effectively during clinical consultations. They attributed these difficulties not only to patients' recall bias, but also in the use of different terminologies to describe their pain, particularly related to location-specific pain intensity and pain quality, and how it changed over time. Rheumatologists viewed manikin-based pain self-reporting tool as an enhancement to traditional pain assessment methods, which is typically asking patients to verbally rate their pain intensity on a scale of 0 to 10, where 0 corresponds to no pain and 10 corresponds to worst imaginable pain. They appreciated the visual nature of digital pain manikins and use of pictograms to describe pain quality, which would be particularly useful for people with low literacy. Such information collected longitudinally can help clinicians in guiding their clinical assessments, which may influence their decisions related to referrals, diagnosis and evaluating treatment response.

Rheumatologists thought that the digital pain self-reporting tool would support self-management as well by accounting for factors such as perceived pain triggers and relievers, which are captured by the app. They also thought that use of the tool may increase patient satisfaction by developing a feeling that they are being seen or heard, but they would like to explore further how it impacts clinical outcomes. Particularly, they perceived that the use of this tool would be less effective for guiding the management of acute conditions.

Lastly, the digital pain self-reporting tool was viewed as a tool to be used as an adjunct to clinical consultations, with the understanding that patients would need time to embrace the technology, especially considering the socio-cultural context of individuals and clinical care.

(c) Usability testing of a clickable prototype of the digital pain self-reporting app

A clickable prototype was used for usability testing (figure 1). Participants agreed that all tasks were intuitive and easy to perform. However, a video tutorial could be a useful addition to improve user experience by highlighted key features of the tool and how to use them for pain self-reporting.

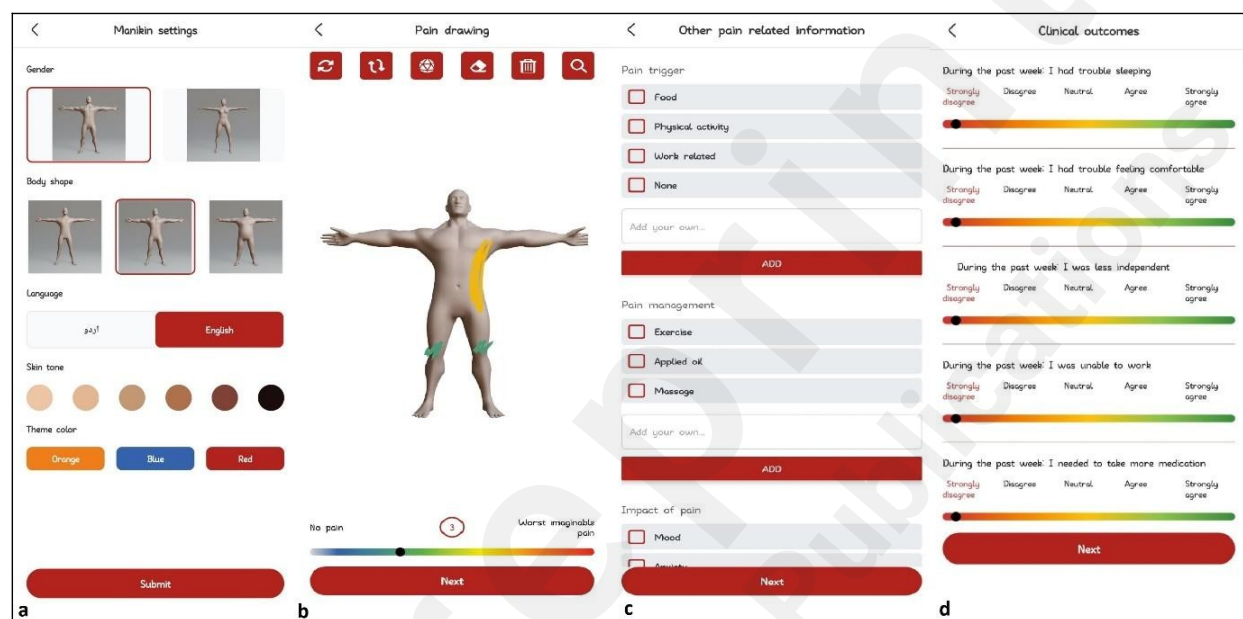


Figure 1: App screenshots which were used for testing usability tasks (Copyrights University of Manchester)

Fig. 1(a) shows the manikin settings screen; 1(b) shows the screen for pain drawing; 1(c) shows the screen for reporting perceived pain triggers, pain management strategies and impact of pain; and 1(d) shows the screen to report clinical outcomes.

Researchers' observations helped prompt participants in exploring approaches through which their experience of using the tool could be improved. The tasks performed by participants and the specific feedback we received are outlined in table 3. Participants suggested adding a voice feature to allow hearing questions and a resizing toggle for accessibility. Participants supported all personalisation features except for personalising the manikin based on gender. This was particularly mentioned by female participants because of cultural reasons (might be because of how the female manikin appears physically).

Table 4: Summary of usability testing task performance

Task 1: To set-up or personalise pain manikin, Fig. 1(a)		
Sub-task:	Think aloud:	Observations:
Select gender, body	Participants were able to select gender, body shape	No additional

shape and skin tone of the manikin.	and language options, while some participants were not able to understand the reason for selecting skin tone.	observations were made by the observers.
Select the language of the app and its colour scheme.	Most participants did not show strong preference for app personalization features.	No additional observations were made by the observers.
Participant suggestions: - Personalization based on gender and body shape were not considered necessary for pain self-reporting, but these details should be included in the pain self-report for clinicians' benefit. - Skin tone should be neutral for easy discrimination of pain intensity colours - The app should have a high contrast appearance for improved accessibility for people with visual impairment.		
Task 2: To report pain intensity and pain quality by drawing on a manikin, Fig. 1(b)		
Sub-task: Use pain slider to select pain intensity.	Think aloud: Most participants were able to select a specific pain intensity, but a few had difficulty for selecting the mid-range (5-7) of pain.	Observations: Observers noted some participants had trouble selecting the slider toggle.
Draw pain on manikin.	Problems identified were: (1) pain lines were moving outside of the manikin, and (2) the participants had difficulty in selecting pain for right and left sides on manikin as the manikin is not a mirror image.	No additional observations.
Rotate or flip manikin.	Participants were easily able to flip or rotate the manikin after using the app buttons a few times.	Participants may require a video tutorial to know the app flow.
Zoom in on the manikin	It was intuitive to zoom in on the manikin for locating pain in small joints of the hands and feet. Zoom icon can be changed.	No additional observations.
Selecting pain quality descriptors	Participants found it difficult to access the drop-down menu for pain characteristics.	Participants had difficulty finding the order of doing the tasks.
Participant Suggestions: - Suggestions were made to increase the size of the slider handle to improve accessibility. - Limit pain drawing action online inside manikin's body outline - Label the sides of the manikin to enable user orientation with their own body. - A guide or tutorial can improve understanding the app flow, where the pain quality needs to be selected after pain intensity and then pain drawing should be allowed.		
Task 3: To add and report pain triggers, Fig. 1(c)		
Sub-task: Addition of new triggers.	Think aloud: Participants were not able to add new triggers because of lack of clear distinction between 'adding new' and pre-existing list of triggers.	Observations: No additional observations.
Input (typing) new triggers.	This was easy for all participants to perform.	No additional observations.
Selection of triggers from the menu.	Participants assumed only one trigger can be selected.	No additional observations.
Participant Suggestions:		

- Video tutorial to demonstrate the app flow. - Option for reporting or adding pain trigger with voice input.		
Task 4: To report on weekly clinical outcomes, Fig.1(d)		
Sub-task: Selection of slider options	Think aloud: This was easy for all participants to perform.	Observations: No additional observations.
Participant Suggestions: - No suggestions		

(d) Urdu translation of the content

The app content including the pain related questions or instructions and questions related to clinical outcomes (adopted from the global pain scale) was translated into Urdu. The translated content was discussed one-by-one by the focus group participants, and they confirmed that the translations effectively conveyed the intended meaning of the pain questions or instructions. No item required further revision and participants agreed to the translated materials. However, participants suggested to add voice feature to hear questions or instructions instead of reading the content (appendix 4 – additional findings).

(e) Visual representation of the pain quality descriptors

Eleven common pain quality descriptors were selected by two practising rheumatologists based on their experience of patient interactions. For visually representing these pain quality descriptors, pictograms were designed and presented to take feedback. All participants confirmed that these eleven pain quality descriptors cover their pain experience comprehensively. Initial designs of eleven pictograms were presented to participants, out of which six pictograms required no change as they conveyed the same meaning as that of the pain quality descriptors in all group discussions. However, pictograms of pain quality descriptors, such as throbbing, cramping, radiating, dull, and numbness lacked participants' consensus. Based on participants' feedback, a professional graphic designer re-rendered designs of pictograms to enhance clarity and achieve consensus among participants., hence went through two design iterations. Figure 2 presents final pictograms, however, design iterations and participants' feedback are presented in table 2 of supplementary materials.

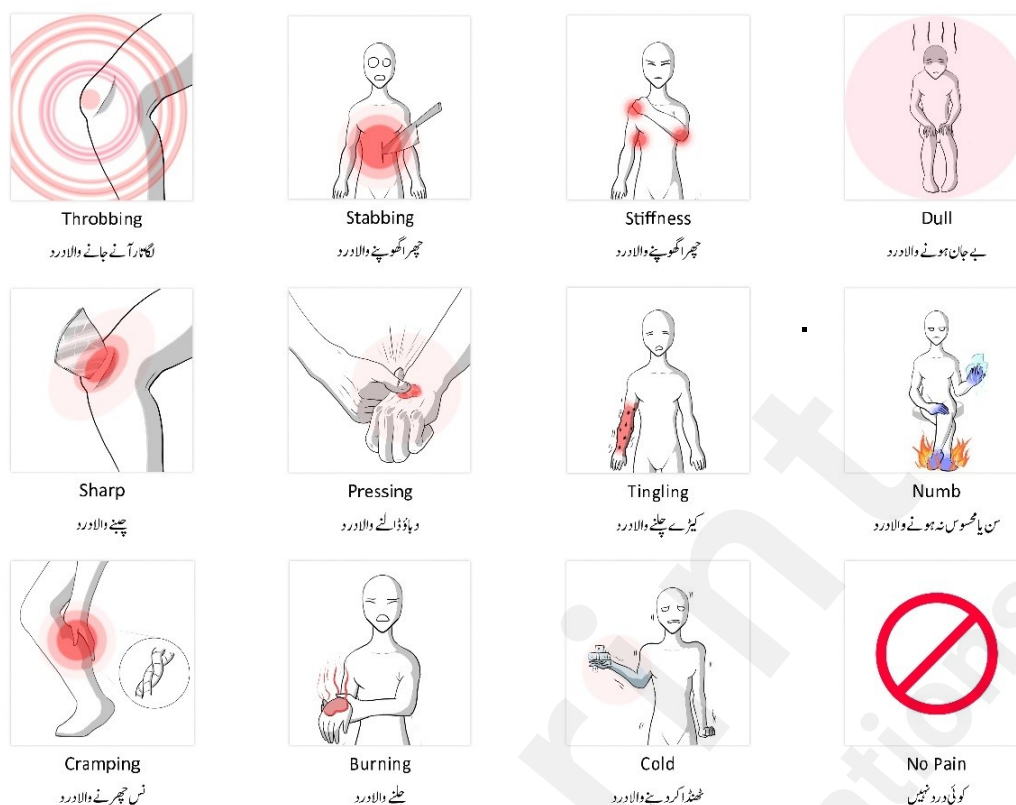


Figure 2: Pictograms for selected pain quality descriptors

Discussion:

Our study demonstrated that the smartphone-based digital pain self-reporting tool was easy to use among Pakistanis living with chronic musculoskeletal pain and was effective in capturing comprehensive pain-related information. However, the user experience highlighted the need for improving accessibility features, particularly incorporating voice capabilities as an alternate to reading text, and larger slider handles. Participants also suggested streamlining app flow (selecting pain intensity and pain quality before drawing action) and using a video tutorial to support correct use of the app. User requirements for pain self-reporting were largely consistent across South Asians in the UK and Pakistanis living in Pakistan, with the only notable difference in manikin personalization based on gender. Rheumatologists appreciated the visual nature of pain self-reporting and confirmed that important aspects of pain are captured in the tool. Both people living with chronic pain and rheumatologists valued the use of co-designed pictograms to effectively communicate pain quality descriptors. Participants also confirmed that the Urdu translation of the app's content was well-understood and retained its original meaning.

Language is a key accessibility requirement of digital health tools serving culturally and linguistically diverse communities (34), and this study strengthened its importance. While digital

health technologies have the potential to address language barriers in health-related communication (35), our findings suggest that translating written content into a local language may not be sufficient. Instead, participants valued questions or prompts in audio format and the use of pictograms, both of which showed promise in improving pain-related communications (36). In addition to language barriers, people with chronic pain may have varying physical and cognitive abilities, as individuals with disabilities often engage less with digital health services and report more usability issues (37,38). In this study, key accessible requirement included adjustable font sizes, voice or audio-format questions, and larger slider handles. Incorporating these user-centred features may improve engagement with digital health tools among diverse populations (36,39). Future research should therefore focus on developing and evaluating digital pain self-reporting tools across diverse subgroups, incorporating their accessibility requirements and validating them in larger samples to enable wider adoption of digital pain self-reporting tools.

The study has highlighted the significance of considering social context in co-design approaches, as accessibility requirements may vary among people with shared cultural backgrounds, but living in different social contexts. Although user requirements for digital pain reporting tools were largely similar between a South Asian cohort in the UK (24) and the Pakistani cohort in this study, preferences for manikin personalisation based on gender differed. Pakistani women in the UK cohort preferred gender-specific manikins for pain reporting and gender-neutral ones for sharing with clinicians. On the contrary, Pakistani women in Pakistani preferred gender-neutral manikins for pain reporting, but gender-specific ones for sharing with clinician, when required. This difference may reflect socio-cultural norms in Pakistan, where women may face constraints in accessing gender-sensitive healthcare, contrasting with preference of gendered pain manikins seen by Egsgaard et al. (2016) for accurate pain reporting (30). Offering personalisation features that align with social contexts, may improve the scalability of digital pain self-reporting tools across populations (with shared cultural backgrounds) living in different countries. Future research should focus on exploring user requirements among Pakistanis living in varied social contexts to support the development of effective pain assessment and management interventions and address global pain disparities faced by Pakistanis living across multiple countries.

This study is among the first to gather requirements and assess the usability of a digital pain reporting tool within a Pakistani context, addressing a significant gap in digital health research in the country. A key strength was the co-design process, which engaged both rheumatologists and individuals from low socio-economic backgrounds to ensure cultural relevance of digital pain self-reporting tools. Despite its strengths, the study also has a limitation. The sample size, while

representative of the target population in urban Punjab, may not have captured the full diversity of Pakistan's ethnically diverse population.

Conclusion:

The study demonstrated that manikin-based digital pain self-reporting tool is easy to use among Pakistanis living with chronic musculoskeletal pain. It also demonstrates that the use of translated content in audio-format and pain quality pictograms can effectively enhance the accessibility of digital pain self-reporting tools among culturally and linguistically diverse communities, such as in Pakistan. These inclusive approaches will support pain self-reporting and pain-related communication. It highlights the significance of cultural adaptations which are responsive to socio-cultural contexts to meet the diverse needs of users. The findings suggest that the accessible digital pain self-reporting tools have potential to significantly improve clinical consultations and facilitate shared decision-making between patients and healthcare providers, which should be the focus of future research into inclusive and digitally enabled pain assessment and management.

Overall, the findings underscore the importance of integrating accessibility features, cultural context, and user-centred design in the development of digital health tools to ensure their broader adoption and effectiveness.

Conflict of Interest

Authors declare no conflict of interest.

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Supplementary Files

Multimedia Appendixes

Baseline questionnaire.

URL: <http://asset.jmir.pub/assets/18a1d68da84634abe90ae5470c68b02b.doc>

Topic guide.

URL: <http://asset.jmir.pub/assets/d3947c77375f98b8c9381acb3a5f59ef.doc>

Observation checklist.

URL: <http://asset.jmir.pub/assets/452175d0a83887756fd59a03d9069366.doc>

Additional findings.

URL: <http://asset.jmir.pub/assets/d121f79b206d6471fba79e16934912e5.doc>