



## Acceptability of self-administered acupressure for knee osteoarthritis in middle-aged and older adults: A mixed-method secondary analysis

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### ABSTRACT

**Objectives:** To evaluate the acceptability of self-administered acupressure for Knee osteoarthritis (KOA) among middle-aged and older adults.

**Methods:** This is a mixed-method acceptability evaluation was embedded in a randomized controlled trial on self-administered acupressure for KOA. Participants received two 2-h training sessions on self-administered acupressure and were instructed to practice twice daily for 12 weeks. Quantitative data were collected using an acceptability questionnaire ( $n = 153$ ) and acupressure logbooks ( $n = 157$ ). Qualitative data were obtained through semi-structured interviews, including post-training ( $n = 13$ ) and post-intervention focus groups ( $n = 13$ ), and individual interviews with participants who dropped out ( $n = 5$ ). Data were analysed using descriptive statistics and framework analysis based on the Theoretical Framework of Acceptability.

**Results:** The intervention had 91.7 % completion rate. Participants rated willingness to attend future sessions at 9.5/10 ( $SD=0.85$ ). 57.8 % found technique education "very helpful" and 81.5 % followed the prescribed routine. Participants reported high overall acceptability of the self-administered acupressure training program, citing its practicality and potential benefits on knee pain, thigh strength, inflammation, and swelling. The minimal time and financial investment required were also appreciated. However, challenges related to personal efforts, time management, pressure from research monitoring, possible adverse events, and uncertainties with acupressure techniques were noted, leading to adherence issues. Participants expressed a need for continuous professional guidance.

**Conclusion:** Self-administered acupressure is highly acceptable to middle-aged and older adults with KOA due to its potential benefits and merits of minimal time and cost. Future research should focus on optimizing intervention implementation by providing professional support and efficient monitoring to address identified challenges.

## 1. Introduction

### 1.1. Knee osteoarthritis

Osteoarthritis (OA) is a prevalent degenerative disease, affecting approximately seventeen million individuals globally.<sup>1</sup> The incidence of OA is projected to increase with the aging population, particularly among females.<sup>2</sup> Knee OA (KOA) accounts for 83 % of the total OA burden<sup>3</sup> and is strongly associated with overweight and obesity.<sup>4</sup> KOA results in pain, joint stiffness, decreased stability, and reduced range of motion,<sup>5</sup> leading to limitations in activities, particularly walking,<sup>6</sup> and

causing disability among the elderly.<sup>7</sup> As KOA progresses with age, it persistently diminishes mobility and the ability to perform activities of daily living.<sup>8</sup> Beyond the physical impact, KOA symptoms adversely affect mood,<sup>9</sup> sleep,<sup>10</sup> and social participation,<sup>11</sup> thereby reducing the quality of life.<sup>12</sup> Currently, there is no curative treatment for KOA, except for total joint arthroplasty in severe cases. The primary goals of managing KOA include encouraging self-management, preventing disease progression, managing acute symptoms, and maintaining quality of life.<sup>13</sup> Acupuncture was initially recommended only for individuals with chronic moderate or severe pain due to insufficient evidence supporting its effects.<sup>14</sup> However, recent meta-analyses have established the effects

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of acupuncture in alleviating symptoms such as pain,<sup>15,16</sup> joint stiffness,<sup>17</sup> improving knee function,<sup>17,18</sup> enhancing quality of life<sup>14</sup> for KOA patients, and reducing the risk of total knee replacement,<sup>19</sup> with few adverse effects.<sup>20</sup>

## 1.2. Acupressure

Acupressure, a variant of acupuncture, is a traditional Chinese medicine (TCM) technique that involves the application of pressure to specific points on the body, known as acupoints, to promote health and alleviate various ailments.<sup>21</sup> This method is based on the concept of meridians, which are channels through which vital energy, or "qi," flows.<sup>22</sup> By stimulating these acupoints, practitioners aim to restore balance and harmony within the body's energy flow, thus enhancing overall well-being.<sup>23</sup> Acupressure is often used as a complementary or alternative therapy for managing various symptoms, including cancer-related fatigue,<sup>24</sup> renal failure,<sup>25</sup> dysmenorrhea,<sup>26</sup> and pain.<sup>13</sup> Unlike acupuncture, which requires intensive training, acupressure is a non-invasive technique that is relatively easy to learn and can be practiced anywhere.<sup>27</sup> Acupressure is typically administered by practitioners, but several studies have adapted the intervention for administration by caregivers or for self-administration to enhance quality of life, psychosocial well-being, sleep quality, and relieve pain.<sup>28,29</sup> After adequate training, patients can perform self-administered acupressure to manage their symptoms conveniently and timely.

## 1.3. Research gap

Previous studies on the feasibility and effects of self-administered acupressure in postmenopausal women, middle-aged, and older adults<sup>30-35</sup> have shown satisfactory results in sample retention, fidelity, treatment adherence, and monitoring adverse effects. A feasibility study on explored the training and impact of self-administered acupressure exercise on KOA among 36 postmenopausal women, finding that the intervention was feasible and well-received.<sup>32</sup> A pilot randomized controlled trial (RCT) on 60 adults (30 in acupressure group) with KOA suggested the potential feasibility and acceptability of self-administered acupressure using self-designed questionnaire.<sup>31</sup> An RCT on 150 participants (50 in acupressure group) indicated successful participant retention and high fidelity in treatment adherence, though recruitment posed challenges and minor discomfort was reported, suggesting that larger-scale studies on acupressure's efficacy are feasible but may require strategies to enhance recruitment.<sup>33</sup> However, these studies mainly focused on examining the preliminary efficacy or feasibility of self-administered acupressure for relieving KOA thorough simple statistics on recruitment and follow up data on small sample size, without an in-depth and comprehensive exploration of participants' experience and perceptions. Therefore, there remains a significant gap in understanding the acceptability of this intervention from the participants' perspectives. Understanding the intervention implementation process by which participants learn and perform self-administered acupressure is crucial for the refinement of the complex intervention. Previous research has not adequately addressed how participants perceive and experience self-administered acupressure, nor has it systematically evaluated the factors that influence adherence and attrition rates from the participants' aspect. This gap highlights the need for a comprehensive evaluation on exploring the acceptability of self-administered acupressure for KOA from the participants' viewpoints, considering factors such as learning experiences, perceived benefits, and barriers to adherence. Therefore, we conducted this mixed-method study to address these research gaps by investigating the acceptability of self-administered acupressure for KOA in middle-aged and older adults, providing valuable insights to researchers and patients, as well as informing the design and implementation of more effective self-administered acupressure programs for KOA.

## 2. Methods

This study is an acceptability evaluation embedded in an RCT<sup>35</sup> and approved by the Hong Kong Polytechnic University Research Committee (HSEARS20190102002). The original RCT was conducted to examine the effectiveness of self-administered acupressure short training course in relieving knee pain in middle-aged and older age adults. The assessment of intervention acceptability was pre-specified in the original study protocol and mentioned in the trial registration (ClinicalTrials.gov: NCT04191837). As per the protocol, a mixed-method approach was used to comprehensively evaluate the acceptability of self-administered acupressure.

### 2.1. Aims

The primary aim was to evaluate the acceptability of a self-administered acupressure intervention among middle-aged and older adults with knee osteoarthritis. The secondary aims were: (1) to assess intervention adherence and implementation outcomes; (2) to explore participants' experiences, perceptions, and challenges in performing self-administered acupressure.

### 2.2. Self-administered acupressure intervention

Participants underwent two 2-h self-acupressure training sessions over two consecutive weeks. The training protocol was developed based on TCM theory.<sup>27</sup> The training content for the self-administered acupressure program was collaboratively developed by a multidisciplinary team in Hong Kong, led by the senior acupuncturists (WF Yeung and L Lao), who are experts in acupuncture trials. The curriculum, designed for middle-aged and older adults with KOA was facilitated by registered TCM professionals with over five years of clinical and teaching experience. The PI led the training to the instructors to ensure adherence to the study protocol and consistency. Quality assurance measures included random visits of training sessions by the principal investigator and adjustments based on participant feedback. Outcome measures focused on changes in the Numerical Rating Scale (NRS) pain score at 12 weeks, with secondary outcomes assessing improvements via the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the Timed Up and Go (TUG) test, selected for their relevance and established reliability in osteoarthritis research. The instructor, a registered TCM practitioner with over five years of clinical experience, led the sessions. In the first session, participants received a handout with illustrated steps of self-acupressure and a logbook. The instructor provided a 20-min introduction to acupressure, followed by group training on locating relevant acupoints (ST34, ST35, ST36, SP9, SP10, GB34, EX-LE2, and EX-LE4) and practicing the technique. The treatment protocol included four steps: warm-up, acupressure, rubbing the knee, and moving the knee, totaling approximately 15 min. Participants practiced self-acupressure under the instructor's supervision, utilizing a competency checklist for feedback. A Q&A session and additional training were provided for those needing further assistance. In the second session, the acupressure theory was revisited, and the instructor addressed participants' questions regarding their home practices. The intervention protocol specified twice-daily acupressure practice sessions of 15–20 min each over the 12 weeks. This dosing regimen was established based on traditional Chinese medicine clinical practice guidelines, previous clinical trials, and expert consensus. While specific practice times were not mandated, participants were advised to maintain consistent timing, preferably performing sessions after waking and before bedtime. The instructor conducted two phone follow-ups during the first week to provide reminders and address any issues. The logbooks were reviewed, and group practice with fidelity checks using the competency checklist was conducted. The session concluded with brief knee health education and a Q&A session. To ensure ongoing compliance, reminders were sent via WhatsApp by the research assistant

twice weekly until the end of the 12-week intervention. Instructional videos on acupoint location and acupressure techniques were also shared via WhatsApp, and a checklist in the logbook aided in maintaining fidelity and compliance. Key information on self-administered acupressure is shown in Fig. 1.

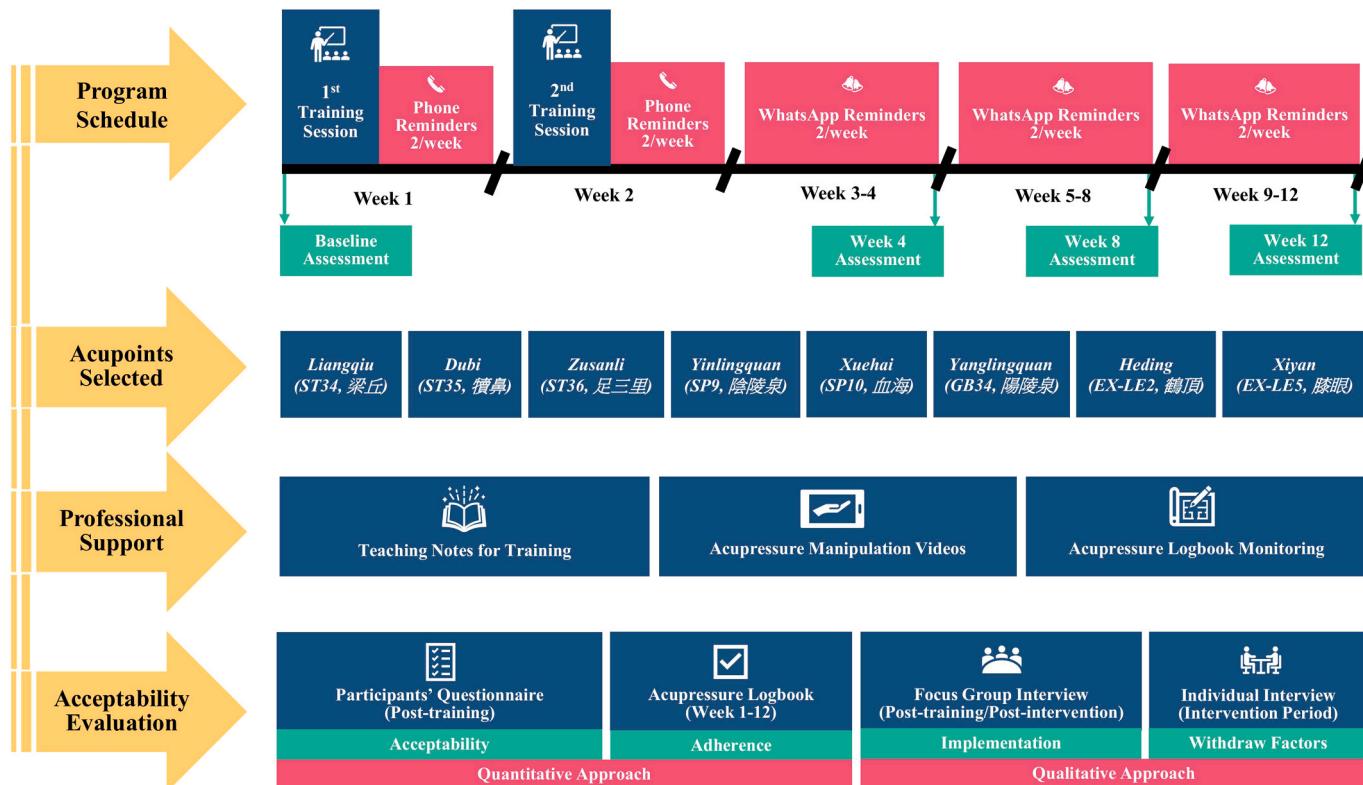
### 2.3. Participants

The participants were the subjects in the RCT who had received and finished the self-administered acupressure intervention. Participants were recruitment from September 2019 to May 2022 via posters in the Hong Kong Polytechnic University campus, community centres, and social media platforms. Potentially eligible participants were face-to-face screened and then randomized to the self-administered acupressure group or comparison group. For the quantitative acceptability evaluation, all participants in the self-administered acupressure group were included. For the qualitative interview, participants were recruited from those in the quantitative assessment participants via purposive sampling for sufficient experience of intervention implementation, enriching the interpretation of the quantitative data. Eligible participants were: (1) aged 50 years or older; (2) able to comprehend Chinese; (3) fulfilled any 3 of the following criteria: morning stiffness for 30 min or less; crepitus on active joint motion; bone tenderness; bone enlargement; or no palpable joint warmth; (4) had knee pain for at least 3 months<sup>36</sup> and rated their pain levels as 3 or greater on the NRS; and (5) agreed to participate and were willing to share their experience in applying this intervention. The exclusion criteria were (1) knee pain related to other conditions (e.g., cancer, fracture, rheumatoid arthritis, and rheumatism) according to the red flags for further investigation or referral in the National Institute for Health and Care Excellence Guidelines for Osteoarthritis of the knee<sup>37</sup>; (2) history of acupressure, acupuncture, or steroid injection for knee pain in the past 6 months; (3) previous knee replacement surgery; (4) medical diagnoses or conditions that precluded individuals from active participation (e.g., bleeding

disorders, alcohol or drug abuse); (5) pregnancy; (6) a body mass index greater than 30<sup>38</sup>; (7) a score of less than 22 in the Hong Kong Montreal Cognitive Assessment; and (8) presence of skin lesions or infections at the treatment sites. Written informed consent to participate in this study was obtained from the participants. The sample size was determined by a power analysis aiming for a statistical power of 0.80 and an alpha level of 0.05 to detect an effect size of 0.49 from our pilot study. Assessment of training materials and outcomes was conducted using blind assessors and standardized methods to minimize biases, with assessors unaware of participants' group assignments.

### 2.4. Setting

The acceptability of self-administered acupressure was evaluated using a mixed-method approach. Quantitative data were collected through a participants' acceptability questionnaire and an acupressure logbook. The questionnaire assessed participants' opinions on the training materials and course structure, as well as their learning outcomes, including structure of knee, causes of KOA, treatment of KOA, method on preserving the knees, Chinese medicine towards KOA, acupressure technique, and theory of acupoints. Each content area was rated on a scale from "totally not helpful" to "very helpful," with an option for "missing." The logbook recorded the duration of participants' self-administered acupressure practice at home. Qualitative data were gathered from two semi-structured focus group interviews and a series of individual phone interviews with dropout participants. The post-training focus group interview, conducted immediately after the second training session, aimed to evaluate the effects and implementation of training components. The post-intervention focus group interview, held after the 12-week intervention period, explored enablers and barriers to practicing acupressure at home. Both focus group interviews took place on the campus of the Hong Kong Polytechnic University to facilitate in-depth exploration of participant perceptions and responses to the intervention. Individual in-depth telephone interviews were



**Fig. 1.** Self-administered Acupressure Program: The program schedule, acupoints selected, professional support and acceptability evaluation are described.

conducted with participants who withdrew from the study to understand their reasons for dropout and their perceptions of the self-administered acupressure training course. This research methodology provides flexibility for participant involvement and ensures comprehensive data collection on the intervention's acceptability.

### 2.5. Data collection

Participants' questionnaires gathering participants' feedback on self-administered acupressure were collected after the end of the second training day. Data from the acupressure logbook, which was delivered to all the participants of the intervention group of the trial, and collected at week 4, week 8, and week 12. A semi-structured interview guide was created and refined based on previous relevant studies and comments from experts, including a TCM practitioner (WY) and a qualitative researcher (HC). Interview guides were pilot-tested under supervision. Details of the open-ended questions of the three interviews were presented in [Table 1](#). The interviews were moderated by a researcher (NNL), with an assistant moderator (BY) responsible for note-taking and operating the recording equipment. Both moderators received a training from the corresponding author (WY). Participation in the study was entirely voluntary, and no individuals other than the participants and researchers were present during the interviews. Participants were reassured that, although the sessions were audiotaped, their names would not be recorded. To acknowledge their participation, each participant received an incentive of HK\$200 cash.

### 2.6. Data analysis

Quantitative and qualitative data were analyzed separately and then integrated during the final analysis. Sociodemographic, clinical data, acceptability, and compliance were presented using descriptive statistics. Participants who completed the 12-week intervention were classified by their percentage of adherence into three groups: completers ( $\geq 80\%$  adherence), semi-completers (50 %–79 % adherence), and non-completers ( $< 50\%$  adherence). All individual interviews and focus groups were audio-recorded and transcribed verbatim. To ensure confidentiality, each participant was assigned a randomly generated

code. Study documents and transcripts were de-identified, and audio files were destroyed post-transcription. The transcripts were analyzed using the Theoretical Framework of Acceptability (TFA),<sup>39</sup> which provides a structured approach to evaluate acceptability and has not been previously applied in this context. This framework comprises seven component constructs: (1) affective attitude (how participants feel about the intervention), (2) burden (perceived effort required to participate), (3) ethicality (fit with participant values), (4) intervention coherence (participant understanding of the intervention), (5) opportunity costs (benefits and values that must be given up), (6) perceived effectiveness (perceived likelihood of achieving purpose), and (7) self-efficacy (participant confidence in performing intervention behaviors). These constructs provided a systematic structure for coding and analyzing participants' responses regarding their acceptance of self-administered acupressure. The second author (NL) conducted the transcription and initial coding, which were reviewed for accuracy and consistency by another researcher (HC). Discrepancies in coding were resolved through consultation with the principal investigator (WY). MS Word software was used to manage the coding process.<sup>40,41</sup> The first author (SC) reviewed the transcripts to ensure all data were categorized into meaningful themes. The results section presents a summary of these themes, supported by participant quotes, with only participant codes provided for anonymity. The qualitative study participants retained their original identification codes (Participant 1–314) to ensure accurate linkage with the main trial data.

## 3. Result

Data collection was conducted between September 2019 to May 2022. A total of 157 participants were included in the quantitative data collection. Three interview sessions were conducted for the post-training and post-intervention interviews, respectively, with 13 participants in each. For each set of interviews, three focus groups were conducted with 4–6 participants per group. Five participants who dropped out during the intervention period attended the individual interview. Data saturation was applied to guide the data collection.<sup>42</sup>

**Table 1**  
Questions for the semi-structured focus group and individual interviews.

Post-training interview (focus group)

1. Why did you want to participate in the "Self-Acupressure Course"?
2. Which parts of the "Self-Acupressure Course" could help you to understand self-acupressure?
3. What content should be added to the "Self-Acupressure Course"?
4. Which parts of the "Self-Acupressure Course" are most difficult?
5. What kind of help would make it easier for you to master self-acupressure?
6. Do you have any comments on the arrangement of this course process?
7. Do you think there are any improvements in the course that would help you master self-acupressure?
8. Do you have any additional comments or suggestions?
9. Why did you want to participate in the "Self-Acupressure Course"?

Post-intervention interview (focus group)

1. How do you feel about practicing self-acupressure at home over the past twelve weeks?
2. What changes have you noticed after taking the "Self-Acupressure Course"?
3. What challenges did you face while practicing self-acupressure during these twelve weeks?
4. What factors helped you maintain a regular self-acupressure routine during this period?
5. What factors made it difficult for you to continue practicing self-acupressure regularly?
6. How well did the course content meet your expectations?
7. Will you continue practicing self-acupressure after the twelve weeks are over?
8. Overall, how do you feel the "Self-Acupressure Course" has helped you master self-acupressure?
9. Do you have any additional comments or suggestions?

Individual interview for dropout reasons

1. What are the main reasons for discontinuing your participation in the study?
2. How do you feel about practicing self-acupressure at home?
3. What factors would prevent you from continuing with self-acupressure?
4. What could help you continue practicing self-acupressure at home?
5. What opinions do you have about the "Self-Acupressure Course"?
6. Do you have any other comments or suggestions?

Questions for post-training interview, post-intervention interview and individual interview for dropout reasons are listed.

### 3.1. Sample profile

The mean age of participants for quantitative questionnaires and logbooks were 62.60 (SD=4.72) and 62.61 (SD=4.65). The average age of participants for post-training focus group interviews, post-intervention interviews, and dropout individual interviews were 63.62 (SD=4.19), 60.08 (SD=3.90), and 66.20 (SD=2.59), respectively. The education level pre-intervention group was higher than post-intervention group. The mean duration of pain of 12-week participants was 9.60 (SD=7.81) and that of second lesson participants was 7.77 (SD=5.90). The details characteristics of participants were shown in Table 2.

### 3.2. Quantitative findings

#### 3.2.1. Participants' acceptability questionnaire

Of the 157 randomized participants, 144 (91.7 %) completed the two self-administered acupressure training sessions. Twelve (7.6 %) participants withdrew from the study before the 12-week follow-up assessment. The ratings on degree of willingness to attend similar training courses in the self-administered acupressure training were 9.5 (SD = 0.85) on a 10-point scale.

The bar chart presents the perceived helpfulness of various educational topics related to KOA among respondents (Fig. 2). The highest percentage of respondents found the "Acupressure technique" very helpful at 57.8 %, followed closely by "Methods on preserving the knees" at 54.6 %. "Structure of knee joint" and "Theory of acupoints" also had significant percentages of very helpful responses at 53.3 % and 46.8 %, respectively. Besides, the "Cause of KOA" was predominantly rated as helpful (55.8 %) and very helpful (36.4 %). The "Treatment of KOA" was found to be helpful by 52.6 % of respondents, with 36.4 % rating it as very helpful. The "Chinese medicine towards KOA" showed a more balanced distribution between helpful (42.2 %) and very helpful (44.8 %), while 10.4 % of respondents found it neutral.

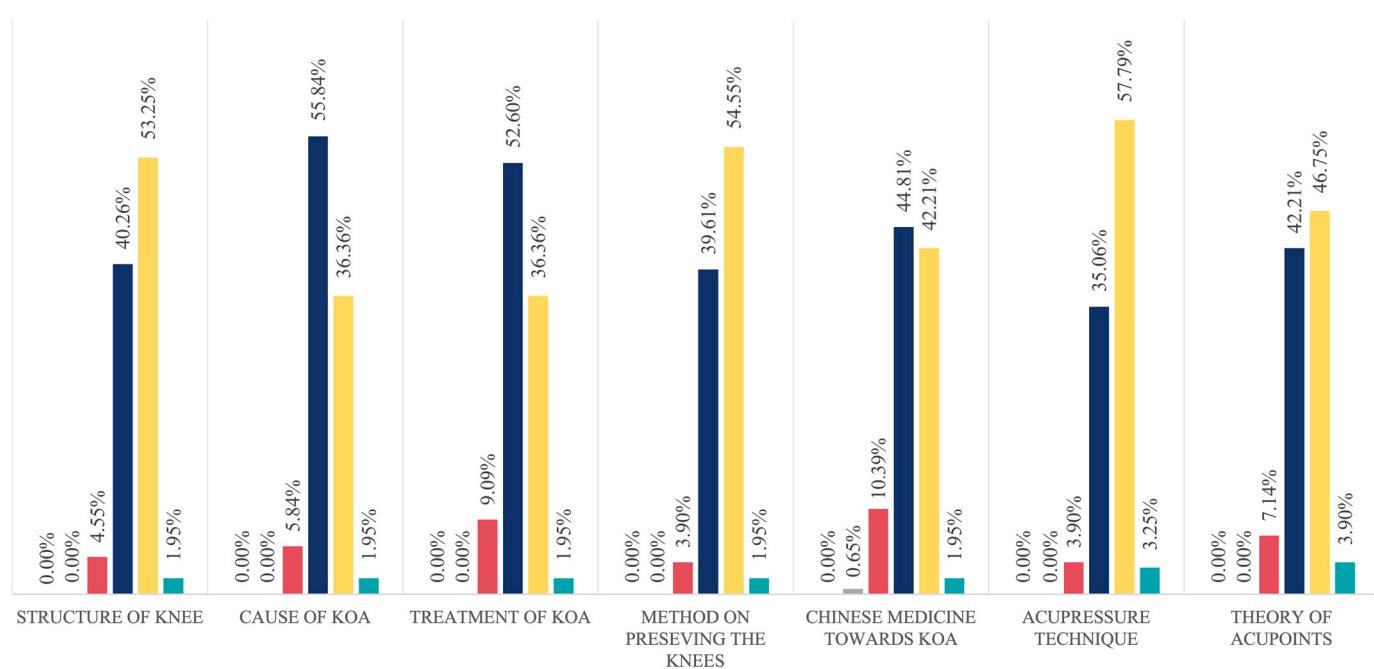
#### 3.2.2. Acupressure logbook

Of the 146 participants who had returned all their acupressure logbooks, 116 (79.5 %) of them conducted the self-administered acupressure at least 4 days per week during the 12-week intervention period. The self-practice duration was 16.5 min per day on average. Out of the total participants, 128 (81.5 %) were regarded as completers, while 12 participants (7.6 %) were classified as semi-completed participants, and six participant (3.8 %) was categorized as non-completers. The average duration of practice for completers was 17.67 min, with a range from 6 to 56 min. Semi-completers had an average practice duration of 15 min, ranging from 6 to 24 min. The non-completers reported a consistent practice duration of 3–24 min, with the average practice duration of 14.83 min (Table 3).

**Table 2**  
Demographic characteristics of participants.

Characteristics	Participants' questionnaire (post-training) (N = 153)	Acupressure logbook (week 1–12) (N = 157)	Focus group interview (post-training) (N = 13)	Focus group interview (post-intervention) (N = 13)	Individual interview (dropout) (N = 5)
Age, year, mean (SD)	62.61 (4.65)	62.60 (4.72)	63.62 (4.19)	60.08 (3.90)	66.20 (2.59)
Gender, n (%)					
Male	34 (22.2 %)	34 (21.7 %)	2 (15.4 %)	5 (38.5 %)	0 (0 %)
Female	119 (77.8 %)	123 (78.3 %)	11 (84.6 %)	8 (61.5 %)	5 (100 %)
Level of education, n (%)					
Primary education or below	12 (7.8 %)	14 (8.9 %)	4 (30.8 %)	1 (7.7 %)	1 (20 %)
Secondary education	94 (61.5 %)	95 (60.5 %)	6 (46.1 %)	8 (61.5 %)	3 (60 %)
College or above	47 (30.7 %)	48 (30.6 %)	3 (23.1 %)	4 (30.8 %)	1 (20 %)
BMI, mean (SD)	23.39 (2.94)	23.42 (2.91)	23.92 (2.71)	22.92 (3.22)	23.37 (3.98)
Duration of pain, year, mean (SD)	7.58 (6.98)	7.53 (7.02)	9.60 (7.81)	7.77 (5.90)	4.40 (4.34)
Baseline NRS pain score, mean (SD)	5.35 (1.53)	5.37 (1.52)	5.08 (1.06)	5.08 (2.02)	4.00 (1.22)

Abbreviations: SD: standard deviation; BMI: body mass index. Demographic characteristics of participants are listed.



**Fig. 2.** Acceptability of Contents in Self-administered Acupressure Training Course: Perceived helpfulness of various educational topics is presented.

**Table 3**  
Level of completeness of self-administered acupressure at home (N = 157).

	Completed participants	Semi-completed participants	Non-completed participants	Dropout
Number of participants	127	12	6	12
Percentage	80.89 %	7.64 %	3.83 %	7.64 %
Average duration of practice (mins)	17.67	15.00	14.83	NA
Range of duration of practice (mins)	6–56	6–24	3–25	NA

About 90 % of participants completed or semi-completed self-administered acupressure at home.

videos, "If you can post the video or send us the video directly, it would be easier to watch with the phone for home reference" (Participant 23, aged 61), and additional assistance during training, "...Except the instructor, if one more assistance is added into a 4-participants class... can provide extra time for better instruction on acupressure technique individually" (Participant 15, aged 60). There was also a call for regular follow-up sessions, "Actually, it would be better if you can provide an optional follow-up every two to three weeks to reconfirm the accuracy of acupoints" (Participant 24, aged 65).

### 3.3.5. Opportunity cost

The intervention was perceived to require minimal time and monetary cost, which was appreciated by the participants. One participant observed, "I will probably keep on doing it, as it is min; if it takes for an hour, I will not do this" (Participant 13, aged 58). Another noted the convenience of integrating the practice into daily routines, "...When I was sitting there watching TV, I thought that I was sitting down now anyway why didn't I administer acupressure" (Participant 10, aged 67). The financial

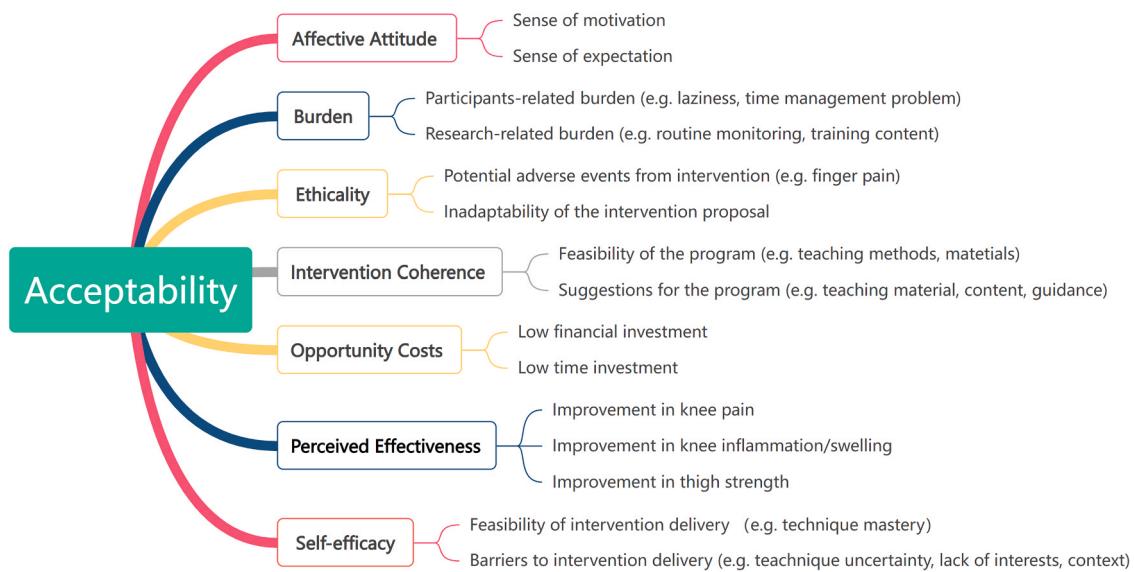
aspect was also minimal, as one participant stated, "When I did acupressure on acupoints, I only need to use a small chair to lift-up my leg" (Participant 19, aged 60).

### 3.3.6. Perceived effectiveness

Participants reported significant improvements in their conditions, including knee pain, thigh strength, and knee inflammation/swelling. One participant shared, "I could walk upstairs and slopes after the intervention...Although I did not practice acupressure after 12 weeks, I didn't feel pain when I walked 39 stairs..." (Participant 4, aged 65). Another noted, "My thighs were feeling less shaking when walked downstairs and I didn't need rail now" (Participant 9, aged 65). Additionally, a participant highlighted the reduction in inflammation, "I had no inflammation and knees swelling now. I was surprised by the effect...I stopped using analgesia after the intervention and my mobility was improved" (Participant 6, aged 57).

### 3.3.7. Self-efficacy

Participants' confidence in performing the intervention varied, with some expressing uncertainties and others feeling adept. One participant said, "I feel unsure about this acupoint (pointed at EX-LE4). As when I stimulate these two acupoints (pointed at ST34 & SP10) I feel soreness but EX-LE4 is difficult...I am thinking if I add greater strength..." (Participant 7, aged 59). Another expressed frustration with the routine nature of the practice, "...when I consistently practiced self-acupressure, I think the intervention is too routine and boring" (Participant 13, aged 58). However, some participants reported ease with the technique, "I have no difficulty in handling self-acupressure as I know acupressure before" (Participant 1, aged 58), and "It is easier for me as I had joined a self-acupressure course for insomnia before" (Participant 2, aged 65).



**Fig. 3.** Coding Tree of Semi-structured Interviews using The Theoretical Framework of Acceptability: The Theoretical Framework of Acceptability defines seven aspects. *Affective Attitude*: how participants feel about the intervention; *Burden*: the effort required to participate; *Ethicality*: alignment with individual values and potential adverse events; *Intervention Coherence*: understanding of the intervention and its feasibility; *Opportunity Cost*: benefits or values forgone to participate; *Perceived Effectiveness*: whether the intervention achieves its intended outcomes; *Self-Efficacy*: confidence in performing the intervention and overcoming barriers.

## 4. Discussion

### 4.1. Main findings

This study represents an effort to evaluate the acceptability of self-administered acupressure for KOA in middle-aged and older adults using a mixed-method approach from the participants' perspectives, which has not been extensively applied in previous studies. The study utilized quantitative data from acceptability questionnaires and acupressure logbooks, alongside qualitative data from semi-structured focus group and individual interviews, allowing for a thorough assessment. Key findings revealed high perceived acceptability of the self-administered acupressure training content, particularly regarding knee preservation and the application of Chinese medicine. The logbook data demonstrated good adherence, with over 80 % of participants completing the intervention. In-depth qualitative interviews found participants generally had a positive affective attitude towards the intervention, feeling motivated and expecting improvements. However, burdens related to personal efforts and research demands were noted, as well as ethical considerations regarding alignment with personal values and potential adverse events. The intervention was found to be coherent and feasible, though participants suggested improvements in instructional materials and follow-up support. Minimal time and financial investment were appreciated, and significant improvements in knee pain, thigh strength, and knee inflammation/swelling were reported, highlighting the intervention's perceived effectiveness. However, participants' confidence in performing the intervention varied, suggesting a need for additional support for some individuals. By applying the TFA in a self-administered TCM intervention for the first time, this study provides a structured understanding of the factors influencing the acceptability of self-administered acupressure for KOA, thereby addressing a significant gap in this context.

### 4.2. Comparisons with previous studies

The findings of this study align well with those observed in earlier research regarding the acceptability, feasibility, and effectiveness of acupressure. The significant improvements in knee pain reported by our participants are consistent with the outcomes observed in traditional acupressure or treatments for OA documented in earlier studies.<sup>43</sup> These

improvements reinforce the established effects of acupressure in enhancing physical function and reducing pain and inflammation in KOA patients. The perceived effects of self-administered acupressure are also consistent with previous studies that have demonstrated the effectiveness of acupressure in managing symptoms related to pain and fatigue.<sup>31,44-46</sup> Our findings are also in accord with recent studies that highlight the feasibility of self-administered acupressure. Research by Yeung et al. reported satisfactory results in terms of fidelity and treatment adherence, which is mirrored by our findings of good adherence and successful completion rates for the intervention.<sup>29</sup> Additionally, participants in our study appreciated the low cost and time efficiency of the intervention, echoing the sentiments found in earlier studies that praised the practicality and accessibility of acupressure as a self-care technique.<sup>31,47</sup> The feasibility of the use of self-administered TCM interventions was also reflected in previous studies, especially during special periods such as the COVID-19 pandemic.<sup>48,49</sup> Moreover, the feasibility of self-administered acupressure training sessions, as reported by our participants, align with prior findings.<sup>31,50</sup>

In contrast to earlier studies that often focus on the study design and researchers' intervention implementation,<sup>46,51,52</sup> our findings highlighted the potential issues related to the adherence of intervention from the perspective of participants. There was a relatively high proportion of dropped and missing entries, as well as non-completers for logbook fulfilling in this project, which might be related to burdens identified through qualitative interviews, including those associated with personal circumstances and the research monitoring pressure. Issues such as the pressure of daily logbook entries, time constraints, scheduling difficulties, participants' inertia, and the complexity of learning acupressure techniques were put forward, especially in interviews with dropout participants. Some adverse events raised by participants, such as hand fatigue, might also have contributed to the incomplete logbook entries and dropout rate. Additionally, in some cases, the specific acupressure points may not have been suitable for the participants' particular conditions, further complicating adherence to the intervention. The issues above may have always existed in the previous research on self-administered acupressure but were overlooked because few studies used qualitative methods to explore participants' perspectives in depth.<sup>53</sup> The findings highlight areas for improvement in the acceptability of self-administered acupressure programs in the future.

This study yielded notable outcomes, with participants reporting

improvements in thigh strength and reductions in knee inflammation and swelling. While improvements in knee pain were anticipated based on previous studies of acupressure,<sup>46,54–56</sup> the enhancements in thigh strength, knee inflammation, and swelling were unexpected. These benefits might be attributed to the specific acupressure points used in this study, which may have targeted not only pain relief but also muscle activation and anti-inflammatory pathways.<sup>57</sup> The frequency of the intervention likely amplified these effects, suggesting that consistent practice enhances acupressure's effects. Moreover, these findings may be related to the holistic nature of TCM interventions, which aim to enhance the overall constitution of individuals, thereby improving overall physical function.<sup>58</sup> Another significant finding was the variation in participants' confidence levels in performing the acupressure techniques correctly. Participants generally felt unsure about their ability to accurately locate and manipulate the acupoints. This lack of confidence could stem from the techniques' complexity, the precision required in acupoint location, or individual anatomical differences. This highlights the need for more comprehensive training and continuous professional support throughout the intervention period to ensure participants' confidence to improve the effects and acceptability of self-administered acupressure programs.

#### 4.3. Implications for future research

This study highlights several key areas for enhancing the acceptability of self-administered acupressure research in the future. Firstly, hand-filled logbooks may impose a burden and reduce compliance among participants. Transitioning to digital logs or automated reminders could alleviate this burden and improve adherence.<sup>59</sup> Secondly, the observed improvements in thigh strength, knee inflammation, and swelling underscore the need for further quantitative research to validate these broader benefits. Thirdly, refining the intervention protocol to better meet the diverse needs of participants is essential. Ensuring the suitability of selected acupoints for all individuals and reducing the risk of adverse events could involve adopting more personalized and flexible intervention designs. Continuous professional guidance, such as regular follow-up consultations and booster sessions, throughout the intervention period is also crucial to provide participants with timely support, ensure correct technique application, and enhance both the intervention's effects and participants' confidence. Additionally, the observed variation in practice duration among participants warrants consideration in interpreting our findings. While the protocol demonstrated effectiveness across various practice durations, the wide range (3–56 h total) suggests individual adaptation of the recommended regimen. This variation reflects implementation challenges but also highlights the need to better understand the dose-response relationship in self-administered acupressure. Future research should investigate whether increased practice duration correlates with enhanced therapeutic benefits and the potential impact of practice timing on treatment outcomes. Furthermore, qualitative approaches offer a deeper understanding of the implementation process and help uncover unanticipated issues. Therefore, integrating both qualitative and quantitative methods is essential for evaluating complex interventions like self-administered acupressure.<sup>60</sup>

#### 4.4. Strengths and limitations

The study possesses several notable strengths. First, its comprehensive mixed-method design provided a robust framework for assessing the acceptability of the intervention, with the application of the TFA ensuring a structured evaluation based on participants' experiences. Second, the in-depth exploration of dropout participants through individual interviews offered valuable insights into the negative aspects of the intervention for exploring barriers to its implementation. Third, the wide range of educational levels among participants, from primary school to higher education, indicates the generalizability of the findings

across diverse educational backgrounds.

This study has several limitations as well. First, the reliance on self-reported questionnaires, logbooks, and interviews introduces potential biases and inaccuracies, which might affect the objectivity of the data. Second, the interruption of data collection due to the COVID-19 pandemic and academic year hindered the achievement of data saturation in the post-training interviews. Third, the interviews were conducted at an early stage of the RCT during the pandemic, which may influence participants' adherence and pose significant challenges for follow-up, thereby limiting the generalizability of the qualitative findings of intervention acceptability in different study contexts. Finally, the substantial variation in participant practice duration may have influenced individual outcomes and limits our ability to determine optimal dosing recommendations for self-administered acupressure in KOA management.

#### 5. Conclusions

Self-administered acupressure has high perceived acceptability in middle-aged and older adults with KOA, with high intervention adherence. Qualitative findings reveal key facilitators to intervention adherence, including personal motivation and perceived benefits, while barriers involve perceived burden, potential adverse events, difficulties in techniques, and lack of ongoing guidance. Future research should enhance monitoring methods, provide continuous support, tailor interventions to individual needs, and quantify the effects on broader outcomes of KOA.

#### Ethics approval and consent to participate

This study was approved by the Hong Kong Polytechnic University Research Committee (HSEARS20190102002). Written informed consents were obtained from the participants.

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#### CRediT authorship contribution statement

**Hui-Lin Cheng:** Writing – review & editing, Methodology. **Nicole Nok Leung:** Writing – original draft, Investigation, Formal analysis. **Shu-Cheng Chen:** Writing – original draft, Investigation, Formal analysis, Data curation. **Wing Fai Yeung:** Writing – review & editing, Investigation, Funding acquisition, Conceptualization. **Ge Ren:** Writing – review & editing, Formal analysis. **Jing Qin:** Writing – review & editing, Investigation. **Jia-Yin Ruan:** Writing – review & editing, Formal analysis. **Denise Shuk-Ting Cheung:** Writing – review & editing, Conceptualization. **Min-Ru Wu:** Writing – review & editing, Formal analysis.

#### Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Wing-Fai YEUNG reports financial support was provided by Food and Health Bureau, Hong Kong SAR. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Not applicable.

## Consent for publication

Not applicable.

## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.ctim.2025.103130](https://doi.org/10.1016/j.ctim.2025.103130).

## Data availability

The datasets generated and/or analysed during the current study are not publicly available due to privacy but are available from the corresponding author on reasonable request.

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## Glossary

KOA: Knee osteoarthritis

NRS: Numerical Rating Scale

OA: Osteoarthritis

RCT: randomized controlled trial

TCM: traditional Chinese medicine

TFA: Theoretical Framework of Acceptability