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Does interdisciplinary group care for the treatment of endometriosis improve pain interference: protocol for a pilot randomised controlled trial at an urban academic medical centre

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ABSTRACT

Introduction Endometriosis affects 10–15% of people assigned female at birth and can cause chronic pelvic pain and impair many domains of quality of life, such as fertility, mood and bladder, bowel and sexual function. Current treatments often fail, leading to recurrent pain and the need for reintervention. As endometriosis negatively affects many domains of life, a variety of non-pharmacological treatments modestly improve symptoms. To bundle these interventions into accessible packaging, our interdisciplinary team developed a novel endometriosis intervention titled 'Peer-Empowered Endometriosis Pain Support (PEEPS)', an 8-week integrative group care intervention. Here, we present the protocol for a pilot randomised controlled trial (RCT) to evaluate the effectiveness and implementation of PEEPS for people with endometriosis-associated pain refractory to surgical management. We hypothesise that patients who complete the PEEPS programme will show a greater decrease in pain interference in daily activities at intervention completion as compared with baseline than those in the education arm.

Methods and analysis This is a hybrid type 1 effectiveness-implementation mixed-methods RCT in which 60 participants will be randomised using computer-generated random numbers stratified by group in the ratio 1:1 to PEEPS plus usual versus educational handout plus usual care. The primary outcome is change in pain interference from baseline to intervention completion. Secondary outcomes include change in pain interference from baseline to 6 months and 12 months postintervention, as well as change in other quality-of-life measures as measured by nine validated questionnaires from baseline to completion, 6 months and 12 months. Proctor *et al*'s *Implementation Outcomes Framework* will be used to evaluate acceptability, appropriateness and feasibility of PEEPS implementation, and the Consolidated Framework for Implementation Research will be used to guide the evaluation of barriers and facilitators of PEEPS at the patient and provider levels. Primary data analyses will follow the intention-to-treat principle. Descriptive statistics and two-sample t-tests for normally distributed values and Wilcoxon Rank-Sum test were performed for non-normally distributed values. Frequency analysis and Fisher's exact or χ^2 tests will be used for categoric variables as appropriate. Longitudinal analysis of the primary and secondary outcomes will be conducted with a mixed-effects model to investigate the effect of PEEPS compared with education. Least square means (LSMs) and the corresponding 95% CIs at each timepoint, as well as LSM differences and 95% CIs between any post-baseline and baseline will be provided for the outcomes. ORs and 95% CIs will be calculated for categorical outcomes. Qualitative data will be collected in the form of open-ended feedback, focus groups with programme completers and semistructured interviews with participants who complete two or fewer sessions. The analysis will use an embedded design-experimental model in which quantitative and qualitative outcomes will occur concurrently with weight priority given to quantitative data.

Ethics and dissemination This trial was approved by the Washington University in St. Louis Institutional Review Board (protocol 202402082) on 27 March 2024 and has low risk of harm to participants. All deidentified data from this project will be shared via Digital Commons@Becker. The findings of this study will be disseminated via scientific meetings and peer-reviewed journals. The results and conclusions will be summarised for patients and the public in common language using infographics to make the findings accessible. This pilot RCT will yield the effect size for PEEPS and generate implementation context and outcomes data to guide PEEPS application to real-world

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Randomised controlled trial of a novel integrative group care approach to endometriosis
⇒ The protocol and delivery methods are informed by an implementation science and community-engaged approach.
⇒ Intention-to-treat principles and pragmatic inclusion/exclusion criteria are applied.
⇒ The pilot trial design may limit conclusions about effectiveness; however, the methods will provide precision of estimates that can be used to power the definitive trial.

practice. If PEEPS proves to be effective, this study will inform adaptation and scaling to improve the lives of people with endometriosis through a non-hormonal, fertility-preserving approach.

Trial registration number ClinicalTrials.gov; NCT06549985.

INTRODUCTION

Endometriosis affects 10–15% of people assigned female at birth, causing musculoskeletal pain, bowel and bladder problems, mood disorders and infertility.[1–7] Female chronic pelvic pain (CPP) is the most common symptom—affecting 57.2% of patients.[8] The disease impairs overall quality of life, directly affects many domains of physical and emotional functioning and can be a tremendous economic burden. Endometriosis is responsible for an estimated US$69.4 billion per year in excess health expenditures and costs US$12 118 per patient per year in the USA.[9 10] Additionally, endometriosis is responsible for 6.3 hours of lost workplace productivity and 4.9 hours of lost household productivity on average per week.[11]

The current mainstays of treatment are symptom control with analgesic pain medication, medications to stop ovulation and menstruation and surgery. These treatments often fail, with up to 59% of people still experiencing pain despite medical management and 8–50% requiring repeat surgery by 7 years (reoperation rate dependent on procedure type performed).[12 13] Traditional treatments are aimed at endometriosis lesions, whereas treatments aimed at pain management and overlapping pain conditions approach the patient holistically. These non-pharmacological interventions have modest efficacy but are not broadly used or accessible. Physical therapy improves the pelvic floor and musculoskeletal components of pain, leading to decreased pain intensity and pain-related fear of movements.[14 15] Mindfulness interventions are beneficial in improving anxiety, depression and overall quality of life.[16–18] Yoga is effective in improving pelvic pain, emotional well-being and sexual function in patients with CPP.[19–21] In order to bundle these interventions into an accessible package, our interdisciplinary team adapted Chao *et al*'s *Centering* CPP to a novel endometriosis intervention Peer-Empowered Endometriosis Pain Support (PEEPS) that includes these evidence-based interventions.[22 23] *Centering CPP* is a 10-session group care intervention delivered once monthly over 10 months. We chose to adapt this intervention to focus more narrowly on endometriosis-associated pain, with added focus on pelvic floor physical therapy and the addition of yoga. Condensing the intervention to eight weekly sessions allows for more effective group bonding and building a pain management toolkit more rapidly.

A single-arm observational study of PEEPS is currently being conducted. This ongoing trial has demonstrated feasibility of the intervention and recruitment plan as well as retention of participants. As a next step, we will conduct an RCT to evaluate the effectiveness and implementation of PEEPS for people with endometriosis-associated pain refractory to surgical management.

Aim 1: measure preliminary effectiveness of PEEPS

To assess intervention effects on pain interference and quality of life, validated surveys will be used to measure patient-reported outcomes. We hypothesise that patients randomised to PEEPS will show a greater decrease in pain interference in daily activities at intervention completion as compared with baseline than those in the education arm.

Aim 2: assess PEEPS implementation factors

Aim 2a: assess implementation outcomes of PEEPS: Proctor *et al*'s *Implementation Outcomes Framework* will be used to evaluate acceptability, appropriateness and feasibility of PEEPS implementation.[24 25]

Aim 2b: evaluate barriers and facilitators to PEEPS success: The Consolidated Framework for Implementation Research (CFIR) will be used to guide the evaluation of barriers and facilitators of PEEPS. Innovation characteristics (relative advantage, design quality and packaging), inner setting (tension for change) and characteristics of individuals (knowledge and beliefs about the intervention, self-efficacy) domains at the patient and provider levels will be evaluated in a hybrid type 1 effectiveness-implementation mixed-methods RCT.

METHODS AND ANALYSIS

Trial design

This pilot superiority RCT will be run through the Department of Obstetrics and Gynaecology (OB/GYN) at Washington University in St. Louis. The preliminary effectiveness of PEEPS compared with education will be evaluated in a hybrid type 1 effectiveness-implementation mixed-methods RCT. This trial design was selected given the primary focus on determining intervention effectiveness while seeking to understand the implementation context. The qualitative data will be used to explain the quantitative factors measured and explore implementation outcomes. Additionally, a qualitative approach will refine our understanding of the implementation context and keep us open for identifying both anticipated and yet-to-be identified factors.[26] Eliciting the barriers and facilitators to PEEPS participation from those who engaged with PEEPS thoroughly, partially and not at all will help us broadly understand the patient-level implementation context.

Trial arms

60 participants will be randomised using computer-generated random numbers stratified by class delivery timing in the ratio of 1:1 to participate in the 8-week PEEPS intervention (n=30) versus education (n=30). Participants will continue to receive usual care as recommended by their treating clinician without restriction. Based on the pilot trial findings, we will use a pragmatic approach for recruitment in order to improve trial access for people historically excluded from research. Prior PEEPS participants will be encouraged to refer friends

and clinicians of all specialties to refer their patients. Additionally, participants will be recruited through online postings and word of mouth.

PEEPS arm: PEEPS is an 8-week group care intervention in which an interdisciplinary and integrative approach is taken for delivering group care. Each session is composed of time for facilitated discussion and participant sharing, education on topics related to living and coping with endometriosis and 50 min of yoga and mindfulness delivered through a pelvic floor physical therapy approach. We propose that PEEPS will lead to decreased pain interference and improved quality of life through the following five mechanisms: (1) Providing peer support and a forum to share life experiences thereby decreasing social isolation; (2) building positive relationships with knowledgeable clinicians leading to decreased feelings of institutional betrayal; (3) packaging evidence-based interventions and educating on healthcare resources, leading to increased capacity to effectively access healthcare; (4) education and facilitation of healthy movement leading to decreased fear-avoidance of activity/movement; (5) improved participant self-efficacy through the coalescence of points 1–4.

PEEPS sessions will be delivered at Washington University by a gynaecologist/endometriosis specialist and a research coordinator trained in group facilitation. A women's health physical therapist and clinical pain psychologist will facilitate the physical therapy and psychology sessions, and a certified yoga instructor with physical therapy background trained in the study protocol and intervention will teach the yoga sessions. At the first session, each participant receives a participant manual containing the materials delivered during the sessions and supporting handouts. Additionally, the yoga moves applied in the yoga sessions will be explained in a way that participants can reference and integrate yoga practice at home. Participants in this arm will also receive usual care, which includes office visits with a gynaecologist for medication titration, surgical counselling and referrals to physical therapy and clinical psychology through shared decision-making with the treating gynaecologist. If patients elect to undergo surgery during the 8-week PEEPS curriculum period, they will be offered the option to discontinue participation in PEEPS, and their data will be analysed in an intention-to-treat fashion. If they desire to continue participation, a letter regarding activity restrictions must be provided from their surgeon so that the yoga and activity component can be modified according to their physical restrictions. Participants may discontinue participation at any point on request. They are encouraged to engage in whatever parts of the yoga sessions that are comfortable for them and are taught to modify movements to what is comfortable for their body.

Education arm: Participants in this arm will be provided with an educational handout at baseline electronically and offered participation in a meet and greet with other people with endometriosis in the region. The handout will include the information typically provided at an endometriosis consult to ensure that participants in this arm have access to standard-of-care endometriosis knowledge.

Patient and public involvement

Patients and clinicians were first engaged during PEEPS intervention development and feasibility study planning. Outcome measures, survey burden, inclusion and exclusion criteria and recruitment methods were revised based on collaboration with the Community Advisory Board in the Department of OB/GYN at Washington University in St. Louis. Next, community engagement studios were conducted with patients with endometriosis and local clinicians from different contexts. A patient representative, who is part of the research team, will participate in all adaptation and implementation decisions. Publications resulting from the trial will be disseminated to the study participants and community members involved in the development process along with a summary of results in infographic format.

SCREENING

A research coordinator will screen the minimally invasive gynaecologic surgery clinic schedules, clinician referrals and self-referral for potential participants. People who self-refer to the study from outside health systems will be asked to complete a record release form in order to verify trial eligibility. The coordinator will abstract the patient's name and phone number from the chart and confirm trial eligibility by determining if there is a surgical diagnosis of endometriosis in the electronic health record and ensure no documented exclusion criteria. The research coordinator will then contact potential participants to screen for eligibility by phone.

TRIAL ELIGIBILITY

Recruitment of patients will begin in March 2025 of ages 18–48 with surgically confirmed endometriosis or definitive evidence of endometriosis on imaging. Participants must have chronic pelvic pain (defined as pain perceived to originate from the pelvis, not exclusively during menses, and lasting ≥6 months) and no plan to have surgery in the 6 weeks prior to or during the PEEPS delivery time (figure 1). Participants must be able to attend eight 2-hour weekly sessions at the Washington University Medicine campus and be comfortable with reading and speaking English. We will exclude patients who are currently pregnant and have severe physical impairment, history of hip or back surgery, current or prior psychiatric disorder with psychosis, opioid use ≥5 days in the past 3 months (other than for the 6-week postoperative period) and/or vulvodynia/vaginismus. We will allow candidate participants to defer enrolment to a later time if they know in advance they would be unable to attend ≥3 sessions (if randomised to PEEPS).

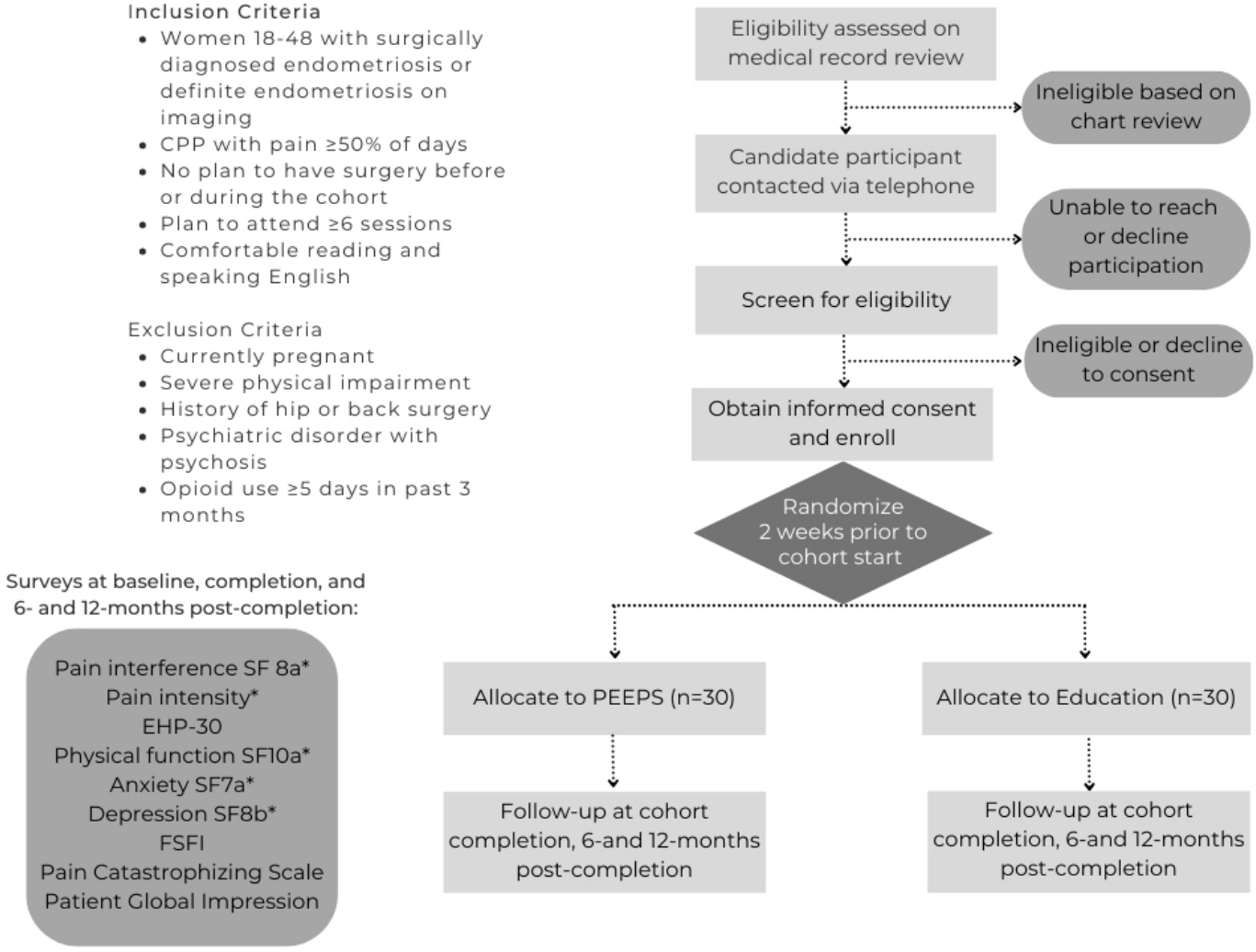

Figure 1 Study flow diagram: study inclusion and exclusion criteria and recruitment flow diagram. *Denotes a Patient Reported Outcomes Measurement Information System instrument. CPP, chronic pelvic pain; EHP, endometriosis health profile; FSFI, Female Sexual Function Index; PEEPS, peer-empowered endometriosis pain support.

RANDOMISATION

Patients will be recruited for sequential 8-week PEEPS classes with a goal of 6–10 participants per class. 2–4 weeks prior to the first PEEPS session, candidate participants will be contacted, and their willingness and availability to participate if randomised to PEEPS is confirmed. Informed consent will be discussed over the phone by a trained research coordinator, and the consent form will be signed electronically by those who express willingness to participate (see online supplemental appendix for example document). Randomisation will be performed using computer-generated random numbers and will occur in the ratio of 1:1 stratified by delivery time. Recruitment will continue until 30 subjects participate in at least one PEEPS session. Randomisation sequencing will be programmed in Research Electronic Database Capture (REDCap) by the study statistician. A trained research coordinator will enrol participants and notify them of the assigned trial arms based on the REDCap randomisation output.

Given the behavioural nature of this intervention, blinding of the treatment allocation to participants, facilitators and clinicians is not possible. To minimise facilitators changing delivery of the intervention based on results, facilitators and investigators will be blinded to participant outcomes until completion of the trial delivery. The data analysts will be blinded to participant group allocation by REDCap intervention coding.

DATA COLLECTION

Participant demographics and clinical history will be abstracted from the electronic medical record by a trained research coordinator with 10% of entries validated by a second trained analyst. Data on medical and psychosocial history, prior and current treatments for endometriosis (medications, physical therapy, surgery, counselling, yoga, mindfulness, alternative therapies) and patient experience with and impression of the intervention components of PEEPS will also be collected.

Participants will complete questionnaires at baseline in REDCap prior to the first session of PEEPS (or the corresponding 8 weeks of education), at PEEPS completion and at 6 months and 12 months postcompletion. Surveys will be timed for both arms relative to session 1 of the corresponding PEEPS class.

The trial primary outcome is change in Patient-Reported Outcomes Measurement Information System (PROMIS) pain interference short form (SF) 8a from baseline to intervention completion. We will also evaluate change in pain inference from baseline to 6 months and 12 months postintervention. Additional secondary outcomes at completion of intervention (8 weeks) and 6 months and 12 months postcompletion as compared with baseline are as follows:

- *PROMIS pain intensity* is a 3-question validated survey measuring pain intensity on a 1–5 scale over the past 7 days.[27]
- *Endometriosis Health Profile-30* is a 30-question validated survey measuring endometriosis-related quality of life on five subscales: pain, control and powerlessness, social support, emotional well-being and self-image.[28]
- *PROMIS Physical Function SF10a* is a 10-question validated survey measuring physical function such as walking, carrying groceries and other activities of daily living.[29]
- *PROMIS Anxiety SF7a* is a 7-question validated survey measuring emotional distress from anxiety and fear in the past 7 days.[30]
- *PROMIS Depression SF8b* is an 8-question validated survey measuring emotional distress from depression in the past 7 days.[31]
- *Female Sexual Function Index* is a 19-question validated measure for sexually active women that assesses six domains of sexual function: sexual desire (two items), arousal (four items), lubrication (four items), orgasm (three items), satisfaction (three items) and pain (three items).[32]
- *Pain Catastrophising Scale* is a 13-question validated survey of individuals' pain experience that assesses pain rumination, magnification and helplessness.[33]
- *Patient Global Impression of Change* is a 1-question validated survey on a 0–10 continuous scale that assesses improvement or decline in clinical status after an intervention.[34]

Additionally, participants will be asked to identify three personal goals related to quality of life that they hope to achieve by participating in the trial, such as 'Be able to go on a hike without pain limiting my activity' or 'Be able to sit and watch a movie,' and determine if they were able to meet these goals at each timepoint.

Implementation outcomes and context data collection

Implementation data for the PEEPS arm will be obtained through four modalities (table 1):

Clinical data: To understand barriers to enrolment and retention, reasons for declining participation will be noted and numerical data regarding recruitment and retention (*feasibility*) will be collected. These will include patient demographics and the percentage of participants who complete each PEEPS session.

Surveys: To better understand participant context, we will administer the following surveys:

- Modified Everyday Discrimination Scale (as part of the baseline survey battery) to assess past experiences of discrimination in healthcare. This is a validated 10-question survey.[35]
- Childhood and Recent Traumatic Events Scale to assess history of trauma. This is a validated 13-question survey.[36 37]

Additionally, we will administer a survey to PEEPS participants and facilitators weekly during session 'closing' time. These surveys contain 14 questions for participants and 16 questions for facilitators including: 3-question Acceptability of Intervention Measure (AIM), 3-question Intervention Appropriateness Measure (IAM), 3-question Feasibility of Intervention Measure (FIM) and open-ended satisfaction and feedback questions. In the ongoing pilot observational study, the session wrap-up surveys required less than 5 min to complete. Participants will also complete a 26-question summative survey at intervention completion delivered via REDCap, which will include: AIM, IAM and FIM surveys on the PEEPS intervention globally (12 questions), questions regarding the helpfulness of the intervention components (psychology, physical therapy, yoga, nutrition, handouts and homework activities; seven questions), open-ended questions from the CFIR Guide tool on relative advantage and quality of intervention packaging (three questions), general recommendations for improving the intervention (two questions) and most and least helpful parts of the intervention (two questions).

Focus groups: As information garnered in surveys is limited by health literacy, question structure and question writers' anticipated responses, we will conduct two focus groups with participants who complete five or more sessions (completers). These focus groups will use open-ended questions from the CFIR Guide and will explore barriers and facilitators to PEEPS implementation, intervention relative advantage, intervention packaging, beliefs about the intervention and self-efficacy to continue use of the intervention independently. The discussions will also explore the components of the intervention the patients identify as important (or not important), and which they anticipate they will continue using. In the 6 months and 12 months post-completion surveys, we will explore longer-term utilisation of PEEPS components and identify the most and least helpful aspects of PEEPS.

Interviews: For patients who completed one to three PEEPS sessions (non-completers), a trained non-clinician interviewer will conduct semistructured virtual interviews at a time of the person's choosing. Interviews will explore barriers to continued participation, experience with participating in the intervention, intervention relative advantage, intervention packaging and beliefs about the intervention. The guide for these interviews will be

Table 1 How factors in the Implementation Outcomes Framework (IOF) and Consolidated Framework for Implementation Research (CFIR) will be operationalised

Factor (framework)	Definition	Level	Measure	Data source
Acceptability (IOF)	Stakeholder perception if PEEPS is agreeable/satisfactory.	Patient/clinician	► AIM ► Likelihood of recommending to peer/ patient ► Areas for improvement	Quantitative and qualitative survey questions
Appropriateness (IOF)	Perceived fit, relevance and compatibility of PEEPS Perceived appropriateness of PEEPS	Patient/clinician	► IAM ► Session flow ► Participant engagement ► Group dynamics	Quantitative and qualitative survey questions
Feasibility (IOF)	Extent to which PEEPS can be successfully carried out	Patient/clinician	► Recruitment, enrolment, retention ► FIM	Administrative data and quantitative survey questions
Innovation characteristics				
Relative advantage (CFIR)	Advantage/disadvantage relative to existing treatments	Patient/clinician	Completion time point ► Focus groups with 10 programme completers ► Semistructured interviews with four programme non-completers 6- and 12-month Timepoints ► Survey questions on: – Most and least helpful intervention components – Likelihood to recommend PEEPS to a friend – Components of PEEPS used in the past month	CFIR Guide and open-ended semistructured interview questions Quantitative and qualitative survey questions
Complexity (CFIR)	Perceived difficulty of the intervention and disruptiveness to daily life	Patient/clinician		
Design quality (CFIR)	Perceived excellence of intervention, format and content	Patient/clinician		
Characteristics of Individuals				
Knowledge and beliefs about the intervention (CFIR)	Attitudes toward and value placed on the intervention	Patient/clinician	► Awareness, prior utilisation, and attitudes toward PEEPS components. ► Perceived self-efficacy to achieve goals through PEEPS ► Modified Everyday Discrimination Scale to assess experiences of discrimination in healthcare ► Childhood Traumatic Events Scale and Recent Traumatic Events Scale to assess past trauma[36]	Quantitative and qualitative survey questions
Self-efficacy (CFIR)	Individuals belief in their own capabilities to execute courses of action to achieve implementation goals	Patient/clinician		

AIM, Acceptability of Intervention Measure; FIM, Feasibility of Intervention Measure; IAM, Intervention Appropriateness Measure; PEEPS, Peer-Empowered Endometriosis Pain Support.

developed by using the CFIR Guide, open-ended feedback questions and recommendations for an intervention that would better meet their needs.

In order to improve adherence, participants randomised to PEEPS will be sent a weekly reminder about the upcoming session and be given a travel stipend for each study session attended. Participants in both arms will be compensated for each survey battery completed. Participants in the focus groups and interviews will be compensated for their time.

Data management

Physical data forms will be stored in a locked office in a locked cabinet. Electronic data will be stored in a password-protected REDCap database and in a secure institutional network folder with role-restricted access.

DATA ANALYSIS

Sample size

The primary outcome is the change from baseline of PROMIS pain inference SF8a at programme completion. A standardised score (T-score) rescaled from the raw score will be used for the change from baseline of PROMIS pain inference in the sample size calculation. The US general population has a mean T-score of 50 and SD of 10. The null hypothesis is that there is no difference in change from baseline of T-score between PEEPS and education. Here, the effect size is defined as the difference of change from baseline T-score between two groups divided by its SD. Recommendations for pilot clinical trials suggest using 12–70 participants.[38] Enrolling 60, with 1:1 randomisation to PEEPS versus education, will reduce imprecision around the SD estimate and allow for sufficient participants in PEEPS to assess implementation context and implementation outcomes. This sample size will provide 90% power to test a T-score difference of 8 (effect size=0.8) with an alpha of 0.05. Given the effect sizes for the evidence-based components in PEEPS (up to 0.8) and the fact that components will likely synergise, finding this effect size is anticipated.

ANALYSIS PLAN

Primary data analyses will follow the intention-to-treat principle, so all patients who are randomised will be included. To assess the effectiveness of randomisation, the demographic and baseline characteristics were compared between participants in PEEPS and education arms. Descriptive statistics and two-sample t-tests for normally distributed values and Wilcoxon Rank-Sum test for non-normally distributed values will be performed. Frequency analysis and Fisher's exact or χ^2 tests will be used for categoric variables as appropriate. Longitudinal analysis of the primary outcome and secondary outcomes (scores on the other nine validated surveys described above and whether patients achieved their personal goals) will be conducted with a mixed-effects model to investigate the effect of PEEPS compared with education. Least square means (LSMs) and the corresponding 95% CIs at each time point, as well as LSM differences and 95% CIs between any post-baseline and baseline will be provided for the outcomes. ORs and 95% CIs will be calculated for categorical outcomes. If groups are not balanced with regards to important baseline characteristics (eg, race, age), adjusted analysis with logistic regression for categorical outcomes and analysis of covariance for continuous outcomes will be conducted.

MISSING VALUES

Every attempt will be made to minimise loss to follow-up and skipped questions during data collection and management. For a skipped question, the Health Measures Scoring Service will be used to generate a final score. For participants lost to follow-up, the distribution of missing data will be analysed and appropriate methods to remove participant data from the analysis or multiple imputation, as appropriate, will be used.

MIXED-METHODS ANALYSIS PLAN

Quantitative and qualitative data will be simultaneously collected and analysed for the purpose of hypothesis testing.[39] The analysis will be conducted using an embedded design-experimental model in which quantitative and qualitative outcomes will occur concurrently with weight priority given to quantitative data. Through triangulation, qualitative data will be used to explain the benefit (or lack thereof), understand participants' experiences with the intervention, determine why participants continued (or discontinued) PEEPS, learn their impression of intervention implementation and understand how participants apply PEEPS to their lives in the immediate and medium term. After completion of all PEEPS sessions and focus groups, a mixed methods approach that includes descriptive statistics and content analysis will be used. Categorical survey outcome data will be analysed with χ^2 or Fisher's exact tests as appropriate. Ordinal survey outcome data will be analysed with the Mann-Whitney U test and p value <0.05 will be considered significant. Qualitative data from focus groups and interviews will be transcribed verbatim and analysed in NVivo V.12 (QSR International, 2019) to identify a priori and emerging themes.[40] Satisfaction will be examined by using the sentiment analysis of major and subthemes. The quantitative and qualitative data will then be triangulated to gain insight on the constructs measured in table 1. These findings will be used to optimise PEEPS in preparation for the multisite RCT. Adaptations of PEEPS and the implementation strategies will be tracked using the updated FRAME, a framework for reporting adaptations

and modifications to interventions.[41] Here, protocol version alpha dated 29 November 2024, is reported.

Ethics and dissemination

This trial was registered with ClinicalTrials.gov (NCT06549985) and was approved by the Washington University in St. Louis Institutional Review Board (IRB) (protocol 202402082) on 27 March 2024 and has low risk of harm to participants. The study will be conducted in compliance with the Good Clinical Practice guidelines. Any protocol modifications will be approved by the IRB prior to implementation. Given the low risk of harm to participants, a data monitoring committee is not planned. If safety concerns arise, the study team will immediately discuss the events with DK and GC, senior study mentors, and determine course of action by consensus. Participants are encouraged at each session to report any health concerns to their primary clinician as well as a study team member. Any mental health crises will immediately be addressed by SB according to the action plan outlined in the IRB protocol. Participant medical records are reviewed to assess for adverse health outcomes every 3 months after study completion for 1 year. Any injuries, emergency room visits, mental health sequalae and unplanned surgeries are documented by two study team members. Adverse events potentially attributable to the study will be documented and discussed with DK and GAC, and any adverse event reported to the IRB and funder.

The findings of this study will be disseminated via abstracts presented at national and international scientific meetings and published as manuscripts in peer-reviewed journals. All deidentified data from this project will be shared via Digital Commons@Becker of sufficient quality to validate and replicate research findings. It will be made available via controlled access through a Data Use Agreement to ensure the requesters have a legitimate reason for access, agree not to attempt reidentification of human participants and do not distribute data to unauthorised users. The results and conclusions will be summarised for patients and the public in common language using infographics to make the findings accessible. Additionally, results will be shared through social media and press releases to news sources.

This pilot RCT will yield the effect size for PEEPS and generate implementation context and outcomes data to guide PEEPS application to real-world practice. If PEEPS proves effective, this study will inform adaptation and scaling in order to improve the lives of people with endometriosis through a non-hormonal, fertility-preserving approach.

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Contributors WTR is the guarantor. Author contribution statement: WTR. WTR was involved in conceptualisation, methodology, resources, project administration, writing the original draft. SB: conceptualisation, writing: review and editing. EY: conceptualisation and writing: review and editing. SA-S: conceptualisation, methodology and writing: review and editing. DK: writing: review and editing, supervision and resources. GC: conceptualisation, methodology, writing: review and editing and supervision. JB-B: conceptualisation, methodology, writing: review and editing and supervision. AAB: conceptualisation, methodology, writing original draft and supervision.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

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