

Mobile Phone Application for Menopause Symptom Management: Protocol for a Randomized Controlled Trial

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Abstract

Background: Menopause symptoms are common but often inadequately addressed by primary care clinicians due to limited time for discussions and resources. Mobile health applications can play a crucial role in symptom identification and management, yet many existing menopause-focused apps lack evidence-based content and medical expertise.

Objective: To describe the protocol study design and methodology of a randomized controlled trial (RCT) to evaluate the effectiveness of the emmii mobile app for improving menopause-related knowledge, and shared decision-making compared to a traditional menopause education pamphlet.

Methods: This RCT will recruit women aged 45–55 years with upcoming primary care appointments at Mayo Clinic within 3 weeks of the date of initial outreach. Eligible participants must be English-speaking, able to provide informed consent, and report a Menopause Rating Scale (MRS) score ≥ 5 , which indicates that they are experiencing significant menopause-related symptoms. Eligible participants will be randomized to have access to either the emmii app (intervention, n=200) or an evidence-based menopause education pamphlet (control, n=200). The emmii app is developed with direct input from primary care clinicians certified by The Menopause Society and offers symptom tracking, personalized treatment recommendations based on a protocol, and a discussion guide to support communication between patients and their primary care clinicians. Outcomes will include a post visit survey sent to the participants and their primary care clinicians within 3 days of the appointment, and assessment of patient knowledge, clinical treatment plans and both patients and clinicians experience. The study will also compare prescribing rates of hormonal and nonhormonal therapies for menopause symptoms between the emmii intervention and control groups to assess the app's influence on treatment patterns. Data will be analyzed using descriptive statistics, including Chi-square tests, Wilcoxon rank sum tests and multivariable modeling.

Results: Data collection is scheduled to begin in April 2025.

Conclusions: This protocol outlines the design and methodology of a RCT that aims to assess the impact of the emmii app in facilitating menopause care through primary care clinician-patient communication and shared decision-making. Clinical Trial: NCT06919887

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Original Manuscript

Mobile Phone Application for Menopause Symptom Management: Protocol for a Randomized Controlled Trial

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Background: Menopause symptoms are common but often inadequately addressed by primary care clinicians due to limited time for discussions and resources. Mobile health applications can play a crucial role in symptom identification and management, yet many existing menopause-focused apps lack evidence-based content and medical expertise.

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Results: Data collection is scheduled to begin in April 2025.

Conclusions: This protocol outlines the design and methodology of a RCT that aims to assess the impact of the *emmii* app in facilitating menopause care through primary care clinician-patient communication and shared decision-making.

Trial Registration Number: NCT06919887

Key Words: Menopause, Mobile Health (mHealth), Randomized Controlled Trial (RCT), Digital Health, Mobile App

INTRODUCTION

Menopause is defined as the absence of menses for 12 consecutive months or surgical removal of both ovaries prior to natural menopause.(1) The average age of menopause is 52 years, with natural menopause occurring between ages 45 and 56 in 90% of women.(1, 2) However, menopause can also occur prematurely (<40 years) in approximately 3% of women or early (40-44 years) in 6%.(3) Perimenopause, occurring 2–7 years before the final menstrual period through the first year after menopause, is characterized by irregular menstrual cycles.(4) Common symptoms of perimenopause include vasomotor symptoms, mood changes, as well as genitourinary symptoms.(5, 6) During perimenopause and menopause, 50-75% of women experience vasomotor symptoms, 45-68% experience psychological symptoms, and more than 50% develop genitourinary symptoms.(7, 8)

Menopause hormone therapy (HT) is the first-line treatment for bothersome vasomotor and genitourinary symptoms in symptomatic women without contraindications at and around the time of menopause and may also alleviate some menopause-related sleep and psychological symptoms.(7-9) For women in whom HT is contraindicated or there is a personal preference not to use HT, effective nonhormonal treatments are available.(10) Despite the availability of menopause treatments, substantial gaps remain in menopause care, leaving many symptomatic women without access to

treatment.(11) Women may hesitate to report menopause symptoms due to prior negative experiences, discomfort discussing menopause, or the perception that primary care is not the appropriate setting to address such concerns.(12, 13) Additionally, menopause symptoms are not routinely screened for in primary care settings, and primary care clinicians may lack the knowledge or training to manage menopause symptoms effectively.(14, 15)

With the widespread adoption of smartphones, mobile health applications (mHealth apps) have emerged as useful tools for healthcare management. These apps offer a range of functions, from educational resources and symptom tracking to medical record access and therapeutic guidance. It is estimated that there is at least one app for every medical condition.(16, 17) Research suggests that menstrual health and cognitive-behavioral therapy apps can enhance physical and psychological well-being.(18, 19) A small but growing number of mHealth apps focus specifically on menopause, addressing patient education, symptom tracking, and therapeutic guidance.(17) A longitudinal study of 1,900 women using the “Health & Her” app found that those who engaged more frequently with the app’s features—such as symptom tracking, period logging, and using in-app activities (e.g., reminders to drink water, pelvic floor exercises, etc.), experienced significantly greater reductions in menopause symptoms over a two month period. Although the app did not directly connect users to primary care clinicians, its integrated tools may have empowered women to recognize their symptoms and adopt self-care strategies to alleviate them.(20) Despite the potential benefits of menopause-focused apps, their utility remains limited. A 2019 systematic review of 22 mHealth menopause apps found that only 27.3% involved medical professionals in their development, and only 22.7% used evidence-based information, raising concerns about the quality and reliability of these tools.(17)

Objectives

Mayo Clinic Center for Women’s Health, in collaboration with a digital health company, BettrHealth, co-developed a patient-centered mobile app for menopause symptom identification and

management. The app was designed to empower women experiencing bothersome menopause-related symptoms to seek appropriate care from their primary care clinicians. It further facilitates shared decision making about the treatment of menopause symptoms. For this study, participants with primary care appointments scheduled within 3 weeks of enrollment at one of several geographic locations of Mayo Clinic will be identified.

This paper describes the protocol, design and methodology of a randomized controlled trial (RCT) which will evaluate the effectiveness of the *emmii* mHealth app (*emmii*) for improving menopause-related knowledge and shared decision-making compared to a traditional menopause education pamphlet.

METHODS

App Development

The *emmii* app was co-developed through collaboration of Mayo Clinic Center for Women's Health with BettrHealth, a digital health company, to offer comprehensive menopause education, evidence-based treatment options, and a personalized discussion guide for patients. It was developed with direct input from health care professionals who are certified by The Menopause Society. The primary aim of the app is to provide individualized education and recommendations to the users, in order to enhance shared decision-making for managing bothersome menopause symptoms by providing recommendations and education to users that are individualized based on their responses within the app.

The app includes several key features designed to guide users through their menopause journey. Initially, users input basic health information including height, weight, and relevant personal medical history and current use of menopause treatments. **(Figure 1)** Users rate their menopause-related symptoms assessed using the Menopause Rating Scale (MRS).(21) **(Figure 2)** Based on user input, the app generates personalized evidence-based recommendations, including lifestyle modifications as well as hormonal and nonhormonal treatment options.**(Figure 3)**

A distinctive feature of *emmii* is its ability to also generate a personalized discussion guide which can be shared with their primary care clinicians. **(Figure 4)** This guide is designed to facilitate productive conversations with primary care clinicians about menopause symptoms and available treatment options.

Beta Testing

The app underwent beta testing using Apple's proprietary TestFlight software (Apple Inc) with a convenience sample of 24 women aged 40 and above. The app was also tested on Android devices to ensure cross-platform functionality. Beta testers were focused on app usability and therefore not required to meet a specific MRS threshold or have an upcoming primary care appointment. All beta testers completed a post-test survey to assess their perceptions of the app's utility, functionality, and overall experience. The System Usability Scale (SUS), a validated 10-question survey tool commonly used for app functionality assessment, was used to evaluate user feedback.⁽²²⁾ SUS scores above 50 are generally considered to be acceptable among users. The average SUS score among participants was 59, with scores ranging from 35 to 88, indicating generally acceptable usability.

Several modifications were made to the app based on feedback from beta testers. These changes included improving the user interface to better accommodate the input of height and weight, resolving display issues with the "GET MY RESULTS" button, adding a welcome page to improve user onboarding, adjusting font settings, and modifying the date of birth entry field so that users could retain and edit their information.

Study Design and Participants

Using a prospective randomized study design, women aged 45–55 years who have a primary care appointment at Mayo Clinic scheduled within 3 weeks of enrollment will be identified through Mayo Clinic's electronic medical record (EMR) system and flagged by the research team. Potential participants will be contacted via email to complete a screening assessment with the MRS and to

provide consent. Participants with a total MRS score of >5 will be randomized to one of two groups: the intervention group ($n=200$), which will receive access to *emmii* on their smart phone, or the control group ($n=200$), which will receive an evidence-based menopause education pamphlet. Those randomized to the control group will not have access to *emmii*. This study was approved by the Mayo Clinic Institutional Review Board.

Menopause Rating Scale (MRS):

The MRS is a validated self-administered questionnaire used to assess the severity of menopause-related symptoms. It is composed of 11 distinct items across three symptom domains: somatic, psychological, and urogenital symptoms.⁽²¹⁾ Each item is scored on a severity scale ranging from 0 (absent) to 4 (very severe), with increasing severity scores of 1 (mild), 2 (moderate), 3 (severe) and 4 (very severe). The overall score, which ranges from 0 to 44, is calculated by summing the individual item scores, with a higher total indicating a greater burden of menopause symptoms. For this study, a total MRS score of ≥ 5 will be used as the threshold to determine eligibility, indicating the presence of bothersome menopause symptoms warranting further evaluation.

Inclusion	and	Exclusion	Criteria
Eligible participants meeting the age, appointment, and MRS outlined criteria, must be English-speaking, and provide consent. Exclusion criteria are the inability to provide informed consent or lack of willingness to engage with the app.			

Recruitment

Initial contact with eligible participants will be made via email, which will include an overview of the study and a secure link to complete the MRS and provide informed consent. Participants who meet the eligibility threshold and provide consent will be enrolled and randomized. If needed, follow-up phone calls will be made to ensure enrollment targets are met. Recruitment will occur on a rolling basis until the target sample size is reached.

Study Procedures

Participants randomized to the intervention group will be emailed instructions on how to download and use *emmii*. Participants in the intervention group will be instructed to bring the personalized discussion guide generated by the app to their upcoming primary care appointments. The control group will be emailed an evidence-based menopause education pamphlet.

All participants will receive a follow-up survey within three days after their clinical appointment, assessing the use of the assigned educational materials, their experiences discussing menopause symptoms during the visit, knowledge of treatment options, and their perceived access to care. The survey will also include questions about their priorities for menopause-related care and preferences for receiving additional information. Participants will receive up to three reminder messages and will have up to one month after their appointments to complete the survey.

Data Collection

This study includes both existing data at the time of IRB submission and newly collected data. Existing appointment data will be used to determine eligibility, and demographic data will be incorporated into the analysis. Newly collected data will be gathered through participant surveys conducted after their appointments, as well as through the extraction of clinical outcome data from the EMR to evaluate treatment outcomes. Specific treatment outcomes of interest include the rates of hormonal and nonhormonal treatment prescribing, such as selective serotonin reuptake inhibitors/serotonin-norepinephrine reuptake inhibitors (SSRIs/SNRIs), gabapentin, oxybutynin, and fezolinetant.

Data analysis

Descriptive statistics will be used to analyze cross-sectional survey data and summarize participant characteristics. Statistical tests, including Chi-square tests and Wilcoxon rank sum tests, will be used to compare treatment outcomes between intervention and control groups. Multivariable models will be applied to assess differences in outcomes after adjusting for baseline differences

between groups. All data analyses will be performed using SAS version 9.4 software (SAS Institute, Inc.; Cary, NC).

RESULTS

The beta testing for *emmii* content and functionality was conducted from October through December 2024. Feedback collected during this phase led to several updates to the app, which were implemented in January and February 2025. Data collection for the RCT is scheduled to begin in April 2025.

Outcome variables to be collected and analyzed include menopause-related knowledge, whether participants discussed menopause with their clinicians during their appointments, and shared decision-making regarding menopausal treatment. Post-appointment surveys will capture whether participants used the menopause discussion guide from the *emmii* app (intervention group) or patient-education pamphlet (control group) during their clinical visits, as well as their priorities for menopause-related care, perceived access to menopause treatment, and preferences for receiving menopause-related health information. Additionally, the EMR clinical data will be used to assess treatment outcomes, including prescription rates of hormonal and nonhormonal therapies. App usage metrics, including frequency of use and features accessed, will also be collected for participants in the intervention group to explore potential correlations between engagement and outcomes.

DISCUSSION

By integrating symptom tracking, evidence-based educational content, and a personalized discussion guide, the *emmii* app has the potential to enhance patients' knowledge about treatment options for menopause symptoms, which may result in shared decision-making with their primary care clinicians regarding treatment options, including HT. Many mHealth apps lack evidence-based content or medical expertise; however, *emmii* was developed by physicians at Mayo Clinic who are certified by The Menopause Society, ensuring that the app provides evidence-based, clinically relevant information. Given that many women may hesitate to discuss menopause symptoms in the

healthcare setting, *emmii* offers a valuable tool for facilitating structured and informed conversations between patients and their primary care clinicians.(23)

While the short-term benefits of *emmii* are clearly defined, evaluating its long-term impact will be essential to understand its role in improving long-term patient outcomes, such as symptom management, and treatment adherence. The results will also help determine the app's broader applicability and its potential for widespread implementation in diverse healthcare settings.

Limitations

While the study will present an innovative approach by integrating evidence-based content, symptom tracking, and personalized discussion guides, there are several potential limitations. Reliance on self-reported symptom data may introduce bias, as participants' engagement with the app may vary based on factors like symptom severity, comfort with technology, and personal preferences. Additionally, the study's focus on patients with upcoming primary care appointments within a specific healthcare system may limit the generalizability of the findings, as the sample may not fully represent the broader population of women experiencing menopause. Moreover, the lack of cultural and racial diversity among the participants could limit the applicability of the results to all women, as cultural and racial factors may influence symptom reporting and app engagement. Furthermore, the study may not capture the experiences of women from lower socioeconomic backgrounds, including those who are uninsured or underinsured, lack access to smartphones, or face other barriers to participation, which could further impact the generalizability of the findings.

Conclusion

This protocol paper outlines the use of *emmii*, an innovative mHealth app designed to improve the menopause experience for midlife women. The app offers a comprehensive approach to managing menopause symptoms by addressing knowledge gaps, tracking symptoms, and facilitating communication between patients and primary care clinicians. This tool has the potential to enhance clinical interactions, support shared decision-making, and ultimately improve patient experience and

quality of life.

Disclosures:

- CS: No conflicts of interest directly related to the subject of this manuscript. She is an advisor for Bayer Pharmaceuticals.
- JMK: Consulting for Bayer and Elsevier. CME and non-CME honorarium for AiCME, City of Mesa, Paradise Valley Country Club, EPG Health, Vindico Medical Education, Arizona Public Services, WebMD, and Evolve Medical Education LLC
- MH: None

- EK: No conflicts of interest directly related to the subject of this manuscript. However, over the past 36 months she has had the following conflicts of interest: She has been a consultant for Astellas Pharmaceuticals, Estetra SRL, WellFound Inc., Fresenius Kabi USA Inc., and Exeltis.
- MP: None
- PR: None
- SO: None
- EP: None
- KC: None
- SSF: Consulting for Era Women's Health Platform, Weight Watchers Scientific Advisory Board, CME lectures for PriMed, Medscape and MedAll.
- RC, EK and SSF: We and Mayo Clinic have a financial interest related to this research. This research has been reviewed by the Mayo Clinic Conflict of Interest Review Board and is being conducted in compliance with Mayo Clinic Conflict of Interest policies.

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References

1. Peacock K, Carlson K, Ketvertis KM. Menopause. StatPearls. Treasure Island (FL): StatPearls Publishing
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2. Zhu D, Chung HF, Pandeya N, Dobson AJ, Kuh D, Crawford SL, et al. Body mass index and age at natural menopause: an international pooled analysis of 11 prospective studies. Eur J Epidemiol. 2018;33(8):699-710.
3. Rocca WA, Gazzuola Rocca L, Smith CY, Kapoor E, Faubion SS, Stewart EA. Frequency and

type of premature or early menopause in a geographically defined American population. *Maturitas*. 2023;170:22-30.

4. Harlow SD, Gass M, Hall JE, Lobo R, Maki P, Rebar RW, et al. Executive summary of the Stages of Reproductive Aging Workshop + 10: addressing the unfinished agenda of staging reproductive aging. *J Clin Endocrinol Metab*. 2012;97(4):1159-68.

5. Avis NE, Stellato R, Crawford S, Bromberger J, Ganz P, Cain V, et al. Is there a menopausal syndrome? Menopausal status and symptoms across racial/ethnic groups. *Soc Sci Med*. 2001;52(3):345-56.

6. Gold EB, Colvin A, Avis N, Bromberger J, Greendale GA, Powell L, et al. Longitudinal analysis of the association between vasomotor symptoms and race/ethnicity across the menopausal transition: study of women's health across the nation. *Am J Public Health*. 2006;96(7):1226-35.

7. Crandall CJ, Mehta JM, Manson JE. Management of Menopausal Symptoms: A Review. *JAMA*. 2023;329(5):405-20.

8. Maki PM, Kornstein SG, Joffe H, Bromberger JT, Freeman EW, Athappilly G, et al. Guidelines for the Evaluation and Treatment of Perimenopausal Depression: Summary and Recommendations. *J Womens Health (Larchmt)*. 2019;28(2):117-34.

9. The 2022 hormone therapy position statement of The North American Menopause Society. *Menopause*. 2022;29(7):767-94.

10. The 2023 nonhormone therapy position statement of The North American Menopause Society. *Menopause*. 2023;30(6):573-90.

11. Barber K, Charles A. Barriers to Accessing Effective Treatment and Support for Menopausal Symptoms: A Qualitative Study Capturing the Behaviours, Beliefs and Experiences of Key Stakeholders. *Patient Prefer Adherence*. 2023;17:2971-80.

12. Utian WH, Maamari R. Attitudes and approaches to vaginal atrophy in postmenopausal women: a focus group qualitative study. *Climacteric*. 2014;17(1):29-36.

13. Women Have Been Misled About Menopause. . *The New York Times* 2023.

14. Bevry ML, Stogdill ER, Lea CM, Taylor KR, Lovaas AM, Bailey KJ, et al. Addressing menopause symptoms in the primary care setting: opportunity to bridge care delivery gaps. *Menopause*. 2024.

15. Kling JM, MacLaughlin KL, Schnatz PF, Crandall CJ, Skinner LJ, Stuenkel CA, et al. Menopause Management Knowledge in Postgraduate Family Medicine, Internal Medicine, and Obstetrics and Gynecology Residents: A Cross-Sectional Survey. *Mayo Clinic Proceedings*. 2019;94(2):242-53.

16. Slomian J, Reginster J-Y, Ethgen O, Appelboom G, Bruyère O. Opportunity and challenges of eHealth and mHealth for patients and caregivers. *Journal of public health and epidemiology*. 2014;1.

17. Gkrozou F, Tsonis O, Godden M, Siafaka V, Paschopoulos M. Mobile Health (mHealth) apps focused on menopause: Are they any good? *Post Reprod Health*. 2019;25(4):191-8.

18. Zhaunova L, Bamford R, Radovic T, Wickham A, Peven K, Croft J, et al. Characterization of Self-reported Improvements in Knowledge and Health Among Users of Flo Period Tracking App: Cross-sectional Survey. *JMIR Mhealth Uhealth*. 2023;11:e40427.

19. McCloud T, Jones R, Lewis G, Bell V, Tsakanikos E. Effectiveness of a Mobile App Intervention for Anxiety and Depression Symptoms in University Students: Randomized Controlled Trial. *JMIR Mhealth Uhealth*. 2020;8(7):e15418.

20. Andrews R, Lancaster D, Bache K, Lacey AS. Does Health & Her app use improve menopausal symptoms? A longitudinal cohort study. *BMJ Open*. 2023;13(12):e077185.

21. Heinemann K, Ruebig A, Potthoff P, Schneider HP, Strelow F, Heinemann LA, et al. The Menopause Rating Scale (MRS) scale: a methodological review. *Health Qual Life Outcomes*. 2004;2:45.

22. Brooke J. SUS: A quick and dirty usability scale. *Usability Eval Ind*. 1995;189.

23. Guthrie JR, Dennerstein L, Taffe JR, Donnelly V. Health care-seeking for menopausal problems. *Climacteric*. 2003;6(2):112-7.



Supplementary Files

Figures

Basic Health Information and Medical History –Screenshot from emmii App.

The screenshot displays two questionnaire phases from the emmii App. The left phase, 'Basic health information', includes a progress indicator (1, 2, 3), a question 'What is your date of birth?' with a date field containing '1/17/1975', a question 'What is your height?' with a quantity field (180) and unit choice (In/Cm), and a multi-select field for conditions. The right phase, 'Health history', includes a progress indicator (1, 2, 3), a text box about menopause symptoms, a 'BACK' button, a 'CONTINUE' button, a question 'How many periods have you had in the past 12 months?' with a quantity field (0), and a question 'Do you smoke or vape tobacco?' with radio button options (Yes/No).

Basic health information

1 2 3

What is your date of birth?

1/17/1975

Date field

What is your height?

180 In Cm

Quantity field (with unit choice)

Select all conditions that a healthcare professional has ever told you that you have.

Select all that apply

- ☒ Blood clots in your legs or lungs, or a gene that increases your risk of blood clots.
- ☐ Breast cancer.
- ☒ Increased risk of breast cancer due to a history of breast cancer in a mother, sibling, or child or having a gene that increases risk.

Multi-select field

Health history

1 2 3

As you transition through menopause, you can have a range of symptoms. Which ones affect you? If you don't have any of these, select "None."

BACK CONTINUE

How many periods have you had in the past 12 months?

0

Quantity field (without unit choice)

Do you smoke or vape tobacco?

Select one

☐ Yes

☒ No

1. Close questionnaire (data is saved for next time)

2. Title of the current questionnaire phase

3. Indicator of the progress (at phase level)

4. Question text and answer field

5. Space for previous and next button

Symptom Checker -Screenshot from emmii App.

Health history ×

1 — 2 — 3

As you transition through menopause, you can have a range of symptoms. Which ones affect you? If you don't have any of these, select "None."

Anxiety (inner restlessness, feeling panicky)

MILD MODERATE SEVERE VERY SEVERE

Physical and mental exhaustion (general decrease in performance, impaired memory, decrease in concentration, forgetfulness)

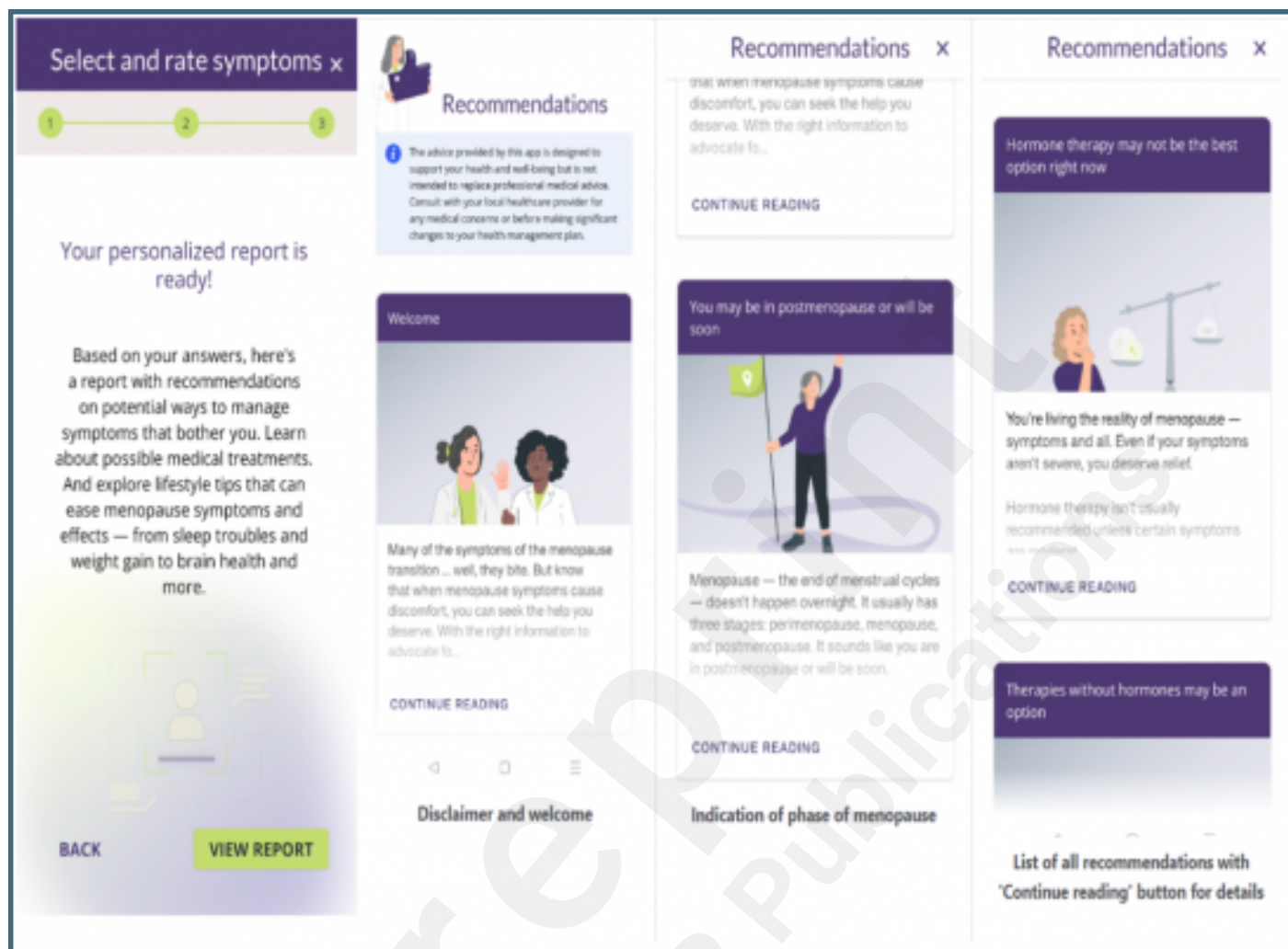
MILD MODERATE SEVERE VERY SEVERE

Bladder problems (difficulty urinating, increased need to urinate, bladder incontinence)

MILD MODERATE SEVERE VERY SEVERE

BACK CONTINUE

Personalized Recommendations Generated Based on User Input - Screenshot from emmii App.



Discussion Guide Generated Based on User Input – Screenshots from emmii App.

