

App-lying Knowledge: MyPCOS App Guiding Symptomatic Women to PCOS Awareness

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Abstract

This study delves into the effectiveness of educating women about polycystic ovarian syndrome (PCOS) alongside the utilization of a dedicated mobile health application in raising awareness about PCOS and promoting healthcare-seeking behavior. PCOS, a prevalent endocrine and metabolic disorder affecting 8-13% of women in their reproductive age, lacks definitive remedies, and its underlying causes remain elusive. The primary objective is to establish that empowering women with knowledge about PCOS, facilitated by the MyPCOS mobile app, can lead to increased awareness and encourage them to seek further evaluation from healthcare providers. Rooted in the Health Promotion Model (HPM), the study adopts a quasi-experimental design with a control and intervention group, employing pre-test and post-test assessments. A sample of 50 female college students aged 18-25 undergoes an educational session, with the intervention group using the MyPCOS app, while the control group does not. Data analysis includes various statistical tests to compare knowledge levels, app usage, and healthcare-seeking behavior. Acknowledging limitations, such as a small sample size and reliance on self-reported data, the study upholds ethical principles, emphasizing informed consent, participant privacy, and ongoing well-being monitoring. The overarching aim is to contribute valuable insights into the role of mobile health interventions in enhancing PCOS awareness and fostering proactive healthcare engagement among women.

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Polycystic ovarian syndrome (PCOS) is defined as one of the most common endocrine and metabolic disorders in women (Escobar-Morreale, 2018). The symptoms can be characterized by hyperandrogenism, chronic oligo-anovulation, insulin resistance, and polycystic ovaries. This condition affects 8-13% of women in their reproductive years (Zeng et al., 2020). PCOS is a complex condition for which there is no known surgical or pharmacological remedy. Despite ongoing research efforts, the medical community has not been able to fully understand the underlying causes of PCOS (Dapas & Dunaif, 2022). The syndrome is most commonly associated with clinical manifestations of symptoms such as, “oligomenorrhea and hyperandrogenism, as well as the frequent presence of associated risk factors for cardiovascular disease, including obesity, glucose intolerance, dyslipidemia, fatty liver, and obstructive sleep apnea” (Barbieri & Ehrmann, 2022). This knowledge deficit is an issue because women need to know the signs and symptoms to notify their healthcare provider. In a study of 349 participants surveyed, 84.3% were familiar with the term PCOS. However, only 21.7% demonstrated sufficient awareness of the syndrome (Zaitoun, 2023). Increasing awareness and knowledge will help women identify PCOS characteristics and encourage them to reach out to their provider for diagnostic confirmation and help with symptom management. Women diagnosed with PCOS exhibit diminished emotional well-being, specifically experiencing heightened levels of anxiety and depression, along with body dissatisfaction and compromised quality of life (Scaruffi et al., 2019). Empowering women with education and support with PCOS is crucial for addressing and mitigating these challenges as well as preventing future complications.

Problem Statement

PCOS is linked to challenges such as infertility and negative outcomes in reproduction, metabolism, and cardiovascular health including insulin resistance, obesity, and type II diabetes (Copp et al., 2019). A PCOS diagnosis helps women understand their body's metabolism and starts an important conversation about the significance of weight loss and lifestyle. Earlier diagnosis can prevent or limit long-term health issues related to PCOS. For instance, weight loss may lead to spontaneous ovulation, eliminating the need for costly fertility treatments. Early diagnosis allows women to access fertility treatment at a younger age, increasing the chances of success. Weight loss before conception also improves the likelihood of a low-risk pregnancy and delivery (Hillman, 2018). Eliminating the knowledge deficit requires enhancing access to PCOS education, enabling early detection, and encouraging proactive healthcare engagement.

Purpose Statement

The study aims to demonstrate that combining PCOS education with the use of a mobile health application can raise awareness about PCOS and motivate women to seek care from their healthcare providers.

Hypothesis

Providing women with education on PCOS and equipping them with a dedicated mobile application will result in a measurable increase in their knowledge about PCOS, consequently leading to a higher likelihood of seeking further evaluation when necessary.

Research Question

How does the combination of education on PCOS and the use of mobile applications impact women's likelihood of seeking further evaluation from their healthcare provider?

Literature Review

This literature review explores the effects of using mHealth as an education program to improve awareness of PCOS. The following articles were sourced from the following Dominican University of California Library databases: Pubmed, CINAHL Complete, Iceberg, and Google Scholar. The search terms used were “polycystic ovarian syndrome”, “mHealth” and “underdiagnosis”. Six articles were identified for review and are categorized under the following subheadings:

- Technological Interventions for PCOS Management
- Understanding the Knowledge Deficit and Impact of Delayed Diagnosis on Women with PCOS

Online Interventions for Female Reproductive Health

The authors of the following three articles looked at mobile health apps, online modules, and menstrual cycle tracking technologies to assess their efficacy as tools to enhance PCOS awareness and management.

In a single-blind randomized controlled trial (RCT), Wang et al. (2022) evaluated the long-term effects of the Transtheoretical model (TTM) on helping women with PCOS stay consistent with healthy habits. In this study, 122 participants were recruited from gynecology outpatient clinics of the Hospital of Zunyi Medical University in a province of China. Inclusion criteria for the study were; (a) participants fulfilling at least two of the three Rotterdam Criteria

for diagnosing PCOS; (b) being 18 years or older with a BMI equal to or greater than 25 kg/m²; (c) having smartphone; (d) maintaining a sedentary lifestyle. Exclusion criteria were: (a) pregnancy; (b) severe disabilities hindering self-care; and (c) participation in other PCOS intervention programs. Researchers performed a power analysis to determine a sample size of 110, which they increased to 122 to allow for attrition. They provided each participant with a TTM-based mHealth app along with routine care. The control group received routine care. The results revealed statistically significant improvements in Body Mass Index (BMI) ($P < 0.05$), waist circumference ($P < 0.05$), self-rating anxiety scale ($P < 0.05$), and self-rating depression scale scores at 6 and 12 months in the intervention group compared to the control group. They sought to have an impact size of 0.30, a power of 90% with a 5% margin of error, however, the study was underpowered, because they only completed the study (Wang et al. 2022).

Stujenske et al. (2023) conducted a cross-sectional study to investigate the usage of current menstrual cycle tracking technologies for managing conditions such as PCOS, endometriosis, and infertility. Three-hundred-eighty-six participants were recruited. Recruitment primarily occurred through Facebook groups focusing on fertility awareness-based methods, menstrual cycle tracking, natural family planning, PCOS, and infertility. Inclusion criteria were: (a) female, (b) aged 18-50, (c) English-speaking, (d) computer access, and (e) use of tracking technologies like smartphone applications, at-home urine hormone tests, or temperature tracking devices. In addition to demographics and education, researchers also collected data on menstrual patterns, cycle monitoring methods, the presence of conditions like PCOS, infertility, or endometriosis, and the use of technology for diagnosis and reproductive health knowledge. With the majority (88.3%) having a menstrual cycle length between 25 and 35 days, most participants (72.8%) tracked their cycles primarily to avoid pregnancy, and 96.7% used Fertility

Awareness-Based Methods (FABMs) for tracking. The Marquette Method was the most common FABM (68.2%) and urine hormone tests or monitors were the preferred technology (81.3%). Smartphone apps (68.8%) and temperature-tracking devices (31.5%) were also popular. Participants reported high satisfaction (87.2%) with tracking technologies, with many attributing them to reproductive disorder diagnoses (61.8% for endometriosis, 63.6% for PCOS, and 75% for infertility). Urine hormone testing, especially with the Marquette Method, was the primary method for tracking menstrual cycles. The findings may not apply to women from diverse demographic, geographic, ethnic, or socioeconomic backgrounds. The learning module had a substantial impact on participants' understanding of PCOS, leading to a significant increase in knowledge. Initially, nearly half (48.8%) of the participants had a moderate level of awareness, but post-intervention, 63.4% of the participants demonstrated good awareness. The sample may not fully represent a diverse range of demographics. Given the high proportion of Marquette Method users in the sample, they could potentially skew the results (Stujenske et al. 2023).

Zhaunova et al. (2023) conducted a cross-sectional study examining self-reported knowledge and well-being improvements in users of the Flo Period Tracking Application. Also investigated were the app's key components associated with the menstrual cycle, pregnancy, and general well-being. The researchers assessed variations in improvement based on education level, country of residence (low- and middle-income vs. high-income countries), app subscription (free or premium), duration of use (short- or long-term), and frequency of use. To take part in this study, participants needed to be at least 18 years old and use the English language version of the Flo app for at least 30 days. There were 2,212 surveys collected from Flo app subscribers. Participants were surveyed about demographics, motivations for app usage, and the app's impact on their knowledge and health. Most participants (88.98%) reported improved

menstrual cycle knowledge and 84.7% reported better pregnancy knowledge using the Flo app. Users with higher education and from high-income countries mainly focused on fertility and pregnancy tracking, while those with lower education used it for contraception and general health. Users from low- and middle-income countries aimed to enhance sexual health knowledge. The app matched the intended goals. Key features for improved knowledge and health were period tracking, fertility predictions, and symptom monitoring. Reading articles and videos were helpful for pregnancy education. Premium users who used the app frequently and long-term saw the most significant improvements. The study's cross-sectional, nonexperimental design, hinders the ability to draw causal inferences about the impact of the Flo app on user knowledge, health, and well-being (Zhaunova et al., 2023).

Discussion

In this literature review, Stujenske et al. and Zhaunova et al. suggest that using smartphone apps designed for tracking menstrual cycles can significantly improve women's understanding of reproductive health. At the same time, Gour et al., while acknowledging limitations like a small and similar group of participants, argue that showing women online videos about Polycystic Ovary Syndrome (PCOS) increased their knowledge. Overall, these findings support the idea of adding PCOS educational videos to menstrual cycle-tracking apps, potentially improving women's awareness of reproductive health. In summary, the reviewed studies provide empirical evidence that supports the hypothesis. They demonstrate that mobile health apps, online modules, and menstrual cycle tracking technologies can contribute to increased awareness and knowledge about PCOS among women. The positive outcomes observed in these studies support the idea that combining education on PCOS with a dedicated

mobile application could lead to a measurable increase in knowledge, encouraging women to seek further evaluation and healthcare engagement.

Understanding the Knowledge Deficit and Impact of Delayed Diagnosis on Women with PCOS

To discover the impact of increasing awareness about PCOS and the challenges associated with delayed diagnosis and insufficient information provision for women with PCOS, researchers have studied the importance in the following articles.

In their RCT, Alotaibi and Shaman (2020) evaluated the effectiveness of a private social network in enhancing disease management awareness among women with PCOS. In Tabuk, Saudi Arabia, 54 women, aged 20 to 40 with PCOS were recruited during hospital visits for the study and randomly assigned to either the intervention or control group. All participants were asked to complete an 11-question multiple-choice pre-study survey. Medical staff posted over 80 articles and 10 images on PCOS and exchanged around 120 private SMS messages with patients. Results showed the intervention group had a significantly greater increase in awareness compared to the control group ($F = 18.25$; $P < 0.0001$). Initially, the control group had higher awareness, but after the intervention, the intervention group surpassed the control group in PCOS awareness. Nevertheless, a significant drawback in this regard is the absence of control over the quality and credibility of online information exchanged by women from one another. (Alotaibi and Shaman, 2020).

Gour et al. (2022) conducted a longitudinal study to explore the usage of an online video-based educational module to assess baseline knowledge of PCOS and reinforce understanding of changing one's lifestyle and sticking to treatment plans for PCOS. The

objective of this study is to assess the impact of an online, video-based, structured educational module on enhancing awareness among women with PCOS. The researchers used purposive sampling and included 41 women between the ages of 18 and 35 with a diagnosis of PCOS, based on the Rotterdam criteria. Participants were surveyed before and after exposure to the intervention to calculate their awareness scores. There was no control group. The survey assessed the participants' knowledge of PCOS facts, syndrome conditions, and lifestyle and pharmacological treatments for PCOS. The intervention group watched an educational video about normal periods, PCOS symptoms, what causes it, and how it progresses. The video covered the difference between healthy and unhealthy lifestyles and explained the importance of sticking to treatment. After watching the video, they completed the same survey. The initial survey results showed that 17.1% possessed "fair" knowledge, while 48.8% and 34.1% demonstrated "moderate" and "good" knowledge, respectively. However, the awareness scores of the intervention group improved from 15.09 ± 4.31 to 18.60 ± 3.85 ($p < 0.00001$), which is a 0.85 effect size. Pre-intervention, 48.8% of participants fell within the "moderate" awareness range (scores between 11 and 17), whereas post-intervention scores demonstrated improvement, with 63.4% of women now falling into the "good" category. The study's limitation lies in the small, homogeneous sample from a single center. However, the significant effect size suggests potential efficacy in a more diverse participant pool. To explore this, validated teaching modules adaptable to local contexts are needed. The author recommends incorporating a control group with a crossover design to boost internal validity (Gour et al. 2022).

Gibson-Helm et al. (2017) conducted a cross-sectional study to examine the experiences women have with PCOS, the information received, and the worries related to PCOS. Participants were respondents to a web-based survey distributed through PCOS Challenge and Verity, the two

largest global PCOS support organizations at the time of the study. They needed to be at least 18 years old and have a PCOS diagnosis from a doctor. Out of 1,550 respondents, 64.8% of them were aged 18 to 35, 1,385 women self-reported PCOS, with 53.0% in North America, 42.2% in Europe, and 4.9% in other regions. The purpose of this study is to observe late diagnosis and insufficient information linked to discontent among women suffering from PCOS. The researchers found that late diagnosis and having to see many health professionals to be diagnosed were strongly associated with dissatisfaction with their PCOS diagnosis. Women who had to encounter five or more health professionals to get a diagnosis were likely to be dissatisfied (OR 0.5; 95% CI 0.3 to 0.8). Women who experienced a diagnostic delay of over two years were also likely to be dissatisfied (OR 0.4; 95% CI 0.3 to 0.6). Limitations of this study were that PCOS diagnosis was self-reported, and thus, not confirmed. Results may have differed based on distinct PCOS phenotypes, however, the researchers did not request this data (Gibson-Helm et al., 2017).

The studies by Alotaibi and Shaman (2020), Gour et al. (2022), and Gibson-Helm et al. (2017) collectively affirm that interventions enhance awareness of polycystic ovarian syndrome (PCOS) and address challenges related to delayed diagnosis and insufficient information. Alotaibi and Shaman's trial revealed a significant increase in PCOS awareness through a private social network, while Gour et al.'s study demonstrated improved awareness with an online educational module. Gibson-Helm et al. highlighted dissatisfaction with late diagnosis and insufficient information, supporting the hypothesis that educating women about PCOS, coupled with a mobile application, increases knowledge and prompts further evaluation. These findings stress the necessity for diverse and well-controlled interventions to tackle the complex challenges of PCOS awareness and management.

Research Proposal

Theoretical Framework

The Health Promotion Model (HPM) best suits this study. HPM suggests that individuals are biopsychosocial beings influenced by their surroundings while also striving to shape an environment that allows the complete expression of inherent and acquired human potential. The HPM is put forth as a comprehensive predictive model for health-promoting behavior, intended for application in both research and practical contexts. The HPM developed by Nola J. Pender has three pillars that can be used to assess health promotion behaviors: (a) personal characteristics and experiences; (b) behaviors-specific cognition and affect; and (c) behavioral outcome (Aqtam and Darawad 2019).

The HPM acknowledges that an individual's likelihood of taking action is influenced by their perceived self-efficacy and the perceived benefits of the action. The literature reviewed in this thesis indicates that mobile applications can enhance self-efficacy by providing accessible and personalized information, making women feel more capable of understanding and addressing their health concerns.

The proposed research study aligns with the HPM concept of patient empowerment. By providing women with knowledge about PCOS through education and a mobile application, we empower them to take an active role in managing their health. This empowerment is crucial for encouraging women to seek further evaluation from their healthcare providers.

Research Design

Method

The study aims to address this knowledge deficit by investigating the impact of education about PCOS, combined with the use of a mobile health application (MyPCOS), in increasing awareness and encouraging women to proactively seek care from their healthcare providers. A two-group quasi-experimental study will be conducted to assess the effectiveness of the MyPCOS app in educating women about PCOS and encouraging them to reach out to their healthcare provider about their symptom profile. The process involves administering a pre-test and post-test to measure the impact of exposure to an in-person information session. Participants will be recruited from two study locations both of which will be similarly sized urban university campuses. The control group will be recruited from university site 1. After being screened for eligibility and taking a pretest to assess their PCOS knowledge, researchers will expose them to a one-hour PCOS information session and then give them a post-test. They will not be given any information about the PCOS app. The intervention group will be recruited from university site two. Researchers will expose them to the same PCOS information session as the control group but also have them stay for 30 minutes to download and navigate the MyPCOS app. The intervention group will also be told that: (a) they are expected to interact with the MyPCOS app for at least 20 minutes each day for the next 14 days; (b) they will receive text messages daily to remind them of their commitment; and (c) that their app usage will be tracked. The mobile app will include features such as (a) educational resources; (b) symptom tracking; and (c) reminders for healthcare appointments.

Sample

A total of 50 participants will be recruited by convenience sampling, 25 from each university. Participants will be 18-25 year old female college students. The study will administer a pre-test and post-test to assess the impact of providing participants with a mobile application. A

total of 50 participants will take part in the study. During the pre-test phase, all participants will attend an educational class about PCOS. Following the pre-test, participants will be divided into two groups: an intervention group and a control group. The intervention group, comprising 25 participants, will be instructed to utilize the MyPCOS mobile application, designed to offer supplementary information and support regarding the condition. The researchers will advertise the study using paper and online posters on-campus event listings, social media feeds, and bulletin boards. All candidates for participation will take a survey in which they will circle what symptoms they correspond with. The survey will be composed using modified Rotterdam criteria for typical signs and symptoms associated with PCOS and will cover queries related to both menstrual cycle characteristics and hyperandrogenism. The survey will contain questions about menstrual pattern irregularity, **contraception type, body hair and depilatory practice (e.g., electrolysis, shave, wax, bleach), acne status, location of prominent hair growth (e.g., chin, upper lip, chest, upper abdomen, lower abdomen, inner thigh)**. Inclusion criteria will be having access to a cellular device, and internet access. Once enrolled, the researchers will collect participants' demographics including their age, ethnicity, Body Mass Index (BMI), when they started their menstrual cycle, if anyone in their family has PCOS, and if they have been diagnosed with type 2 diabetes mellitus.

Data Collection

Data collection will begin with a three-step process. Both the intervention and control groups will be given an educational presentation at each of their school's lecture halls in collaboration with their student health centers to arrange a meeting space. Two sessions will be held at each school, to ensure attendance of all participants, with an estimated 10-12 participants in each session. After the presentation, the intervention group will be directed to stay an extra 30

minutes to download and navigate the MyPCOS app. These participants must scan the QR code to download the app at the end of the class and register their account. The app will include information about PCOS and encourage them to reach out to their healthcare provider if they suspect they may have PCOS or other health-related conditions. The control group will not be informed about the app and will only have the basic information from the initial presentation. Participants will be left with information given to them for one month.

Once a month has passed, both groups will be asked to take the post-test survey to see if there are any changes in what they know about PCOS and if they have reached out to their healthcare provider. Both control and intervention will take the post-test survey titled, "Post-Test Survey: Impact of PCOS Education and Mobile App" which will test knowledge of PCOS, mobile app usage, if they spoke to their medical provider about PCOS and their overall satisfaction with MyPCOS.

A seven-point Likert scale to evaluate PCOS in-person class and their self-assessment of their knowledge before and after the class (for both groups) and before and after using the PCOS app (for the intervention group). For the intervention group that received the mobile app, additional questions will include: (1) "Did you use the mobile health application provided during the study?" and if "yes," "How often did you use the app?" Participants can choose from options like (1) daily, (2) several times a week, (3) once a week, (4) rarely, or (5) never.

Furthermore, participants will be asked about their healthcare-seeking behavior, specifically if they have contacted their healthcare provider about PCOS concerns in the past 3 months and to rate their comfort discussing PCOS with a healthcare provider using a seven-point scale. It is expected that the intervention group that got the MyPCOS app will have better

knowledge of PCOS and will have contacted their healthcare provider if they felt they had PCOS after the study.

Data Analysis

Quantitative analysis will be performed to understand the impact of a PCOS class alone versus a PCOS class plus access to the MyPCOS app on college students' PCOS knowledge level and rate of follow-up with a healthcare provider regarding PCOS. Quantitative analysis will be performed to understand the impact of a PCOS class alone versus a PCOS class plus access to the MyPCOS app on college students' PCOS knowledge level and rate of follow-up with a healthcare provider regarding PCOS. Descriptive statistics for both groups will be gathered including the mean, standard deviations, and frequencies for the demographic variables including age, ethnicity, BMI, menstrual cycle onset, family history of PCOS, and a history of type II diabetes to describe the participant in both groups. Independent sample t-tests will be performed to compare the initial knowledge levels of participants about PCOS between both the intervention and control groups. Analysis of mobile app usage will be measured through descriptive statistics and a Pearson correlation coefficient will be used to explore the correlation between app usage frequency and changes in knowledge or healthcare-seeking behavior. Changes in knowledge analysis will be conducted with independent sample t-tests to compare the change in knowledge scores. Healthcare-seeking behavior will be measured using a chi-square test to compare the proportion of participants in each group who contacted their healthcare provider about PCOS concerns.

Limitations

The study design presents several potential limitations. The small sample size of 50 participants, with 25 in each group, may limit the generalizability of findings and the ability to

detect nuanced effects. The use of convenience sampling on a college campus introduces selection bias, impacting the broader applicability of results. Relying on self-reported data, including knowledge levels, app usage, and healthcare-seeking behavior, poses a risk of response bias and inaccurate recall. The one-month follow-up period may provide insights into short-term effects but lacks an examination of long-term sustainability. By having the control group on one campus and the intervention group on another the study design protects against unintended interactions or shared exposure to the intervention that would cause contamination, however, it does not allow for randomization. Without randomization, key variables across the groups have the potential to be very different and thus confounding. The study lacks control over app usage frequency and specific features engaged with the intervention group. Restricting the sample to college students may limit generalizability, and their unique health-seeking behaviors may not fully represent the broader target population. Addressing these limitations is crucial for enhancing the internal and external validity of the study.

Ethical Considerations

In conducting this study, ethical considerations are paramount and align closely with the research design. Ensuring informed consent is a top priority, necessitating transparent communication about the study's purpose, procedures, and potential risks, especially concerning the use of a mobile app and discussions about PCOS. Safeguarding participant privacy and confidentiality, given the sensitive nature of the data collected, is crucial. Additionally, the study's focus on assessing the impact of a mobile app underscores the need for continuous monitoring of participant well-being, provision of support services, and addressing potential psychological or emotional impacts. A campus health center hotline will be available for the participants to reach out for any questions and concerns. Equitable recruitment, given the

convenience sampling approach, should be considered to minimize biases and enhance the study's generalizability. These ethical principles collectively uphold participant integrity and well-being throughout the research process.

Conclusion

In conclusion, PCOS presents significant health challenges, impacting reproduction, metabolism, and cardiovascular health in women. Despite its high prevalence and the inherent risks it poses, there exists a substantial knowledge deficit among women concerning PCOS. This lack of awareness is particularly disconcerting, given that prompt diagnosis and intervention can alleviate complications, leading to enhanced overall health outcomes. The study aims to address this knowledge deficit by investigating the impact of education about PCOS, combined with the use of a mobile health application (MyPCOS), in increasing awareness and encouraging women to proactively seek care from their healthcare providers. It is expected that the intervention group that got the MyPCOS app will have better knowledge of PCOS and will have contacted their healthcare provider if they felt they had PCOS after the study. Ultimately, this research seeks to contribute valuable insights into the effectiveness of combining education and mobile health interventions in addressing the knowledge gap surrounding PCOS. By enhancing awareness and promoting proactive healthcare engagement, the study aims to empower women to manage their health effectively and prevent potential long-term complications associated with PCOS.

While this study highlights the potential benefits of combining education and mobile health interventions for PCOS awareness, addressing identified limitations requires further research. Future studies should consider increasing sample sizes and diversifying demographics, implementing Randomized Controlled Trials (RCTs) for a stronger study design, conducting longitudinal studies to assess long-term intervention impact, incorporating objective measures

alongside self-reported data, and exploring specific features of mobile applications contributing to increased awareness and healthcare-seeking behavior.

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Zhaunova, L., Bamford, R., Radovic, T., Wickham, A., Peven, K., Croft, J., Klepchukova, A., & Ponzio, S. (2023). Characterization of Self-reported Improvements in Knowledge and Health Among Users of Flo Period Tracking App: Cross-sectional Survey. *JMIR mHealth and uHealth*, 11, e40427. <https://doi.org/10.2196/40427>

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Appendix A: Literature Critique Table

Citation: Zhaunova L, Bamford R, Radovic T, Wickham A, Peven K, Croft J, Klepchukova A, Ponzo S 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 doi: 10.2196/40427 PMID: 37099370 PMCID: 10173043

Title: Characterization of Self-reported Improvements in Knowledge and Health Among Users of Flo Period Tracking App

Purpose: this study is intended to examine knowledge and health improvements in menstrual cycle, pregnancy, and general well-being among Flo app users.

Sample: 2212 Flo app users who had it in English for at least 30 days and were over 18 years old.

Study design: Cross-sectional study

Study method: Completed a survey that included questions about demographics, motivations for app usage, and the app's impact on their knowledge and health

Major findings: Most participants (88.98%) reported improved menstrual cycle knowledge, and 84.7% reported better pregnancy knowledge using the Flo app. Users with higher education and from high-income countries mainly focused on fertility and pregnancy tracking, while those with lower education used it for contraception and general health. Users from low- and middle-income countries aimed to enhance sexual health knowledge.

Strengths: The study was able to get a wide range of participants

Limitations: A limitation is that this non-experimental, cross-sectional study cannot establish a causal link between the Flo app and changes in user knowledge, health, and well-being.

Citation: Wang, L., Liu, Y., Tan, H., & Huang, S. (2022). Transtheoretical model-based mobile health application for PCOS. *Reproductive health*, 19(1), 117. <https://doi.org/10.1186/s12978-022-01422-w>

Title: Transtheoretical model-based mobile health application for PCOS.

Purpose: to evaluate the long term effects of effects of the Transtheoretical model (TTM) on helping women with PCOS stay consistent with healthy habits

Sample: 100 participants from gynecology outpatient clinics of affiliated Hospital of Zunyi Medical University in Guizhou

Study design: randomized control, single blind trial.

Study method: The intervention group were given a TTM-based mobile health app along with routine care, while the control group only received routine care

Major findings: The intervention group saw significant improvements in BMI, waist circumference, self-rating anxiety scale, and self-rating depression scale scores at 6 and 12 months compared to the control group. Additionally, there was a notable shift in exercise and diet behavior stages at 6 and 12 months between the intervention and control groups.

Strengths: Pooled participants from relatable community

Limitations: There's been little research on this.

Citation: Stujenske, T. M., Mu, Q., Pérez Capotosto, M., & Bouchard, T. P. (2023). Survey Analysis of Quantitative and Qualitative Menstrual Cycle Tracking Technologies. *Medicina (Kaunas, Lithuania)*, 59(9), 1509. <https://doi.org/10.3390/medicina59091509>

Title: Survey Analysis of Quantitative and Qualitative Menstrual Cycle Tracking Technologies

Purpose: to look at how current menstrual technologies are used for conditions like PCOS, endometriosis, and infertility

Sample: 386 participants were recruited from facebook groups

Study design: cross-sectional study

Study method: Participants were also asked about tracking habits, methods used, and if technology aided in diagnosis or improved knowledge about reproductive health.

Major findings: Different tracking apps serve distinct purposes, and safeguarding user privacy and data is crucial. We also explored how these technologies are utilized by women with reproductive disorders like PCOS, endometriosis, and infertility. High proportion of Marquette Method users in our sample after using the learning module, participants knew more about PCOS.

Limitations: The findings may not apply to women from diverse demographic, geographic, ethnic, or socioeconomic backgrounds

Citation: Alotaibi M, Shaman AA. Enhancing polycystic ovarian syndrome awareness using private social network. *Mhealth*. 2020 Oct 5;6:33. doi: 10.21037/mhealth.2019.12.02. PMID: 33209914; PMCID: PMC7656104.

Title: Enhancing polycystic ovarian syndrome awareness using private social network

Purpose: to assess the efficacy of mobile health technology, such as a private social network (PCOS system), in increasing awareness of disease management among women diagnosed with PCOS

Sample: Fifty-four women aged 20 to 40 with PCOS were selected for the study

Study design: Randomized control trial

Study method: Women were randomly assigned to two groups. Both groups' participants were requested to complete a pre-study survey, consisting of an 11-question multiple-choice questionnaire, before participating in the study

Major findings: Results showed the intervention group had significantly better PCOS awareness compared to the control group

Limitations: absence of control over the quality and credibility of online information exchanged.

Citation: Gour A, Dubey P, Goel A, Halder A. Remote assessment and reinforcement of patient awareness of role of lifestyle modification and treatment adherence in polycystic ovary syndrome using an online video-based educational module. *J Turk Ger Gynecol Assoc.* 2022 Mar 8;23(1):1-7. doi: 10.4274/jtgga.galenos.2021.2021-9-29. PMID: 35263832; PMCID: PMC8907435.

Title: Remote assessment and reinforcement of patient awareness of role of lifestyle modification and treatment adherence in polycystic ovary syndrome using an online video-based educational module

Purpose: to assess the impact of an online, video-based, structured educational module on enhancing awareness among women with PCOS

Sample: 41 eligible participants

Study design: longitudinal study

Study method: Patients with PCOS were first tested on what they knew about PCOS using a questionnaire. This questionnaire gave them an "awareness score." It asked about facts, understanding the condition, and knowing about lifestyle changes and treatment for PCOS. Then, they watched an educational video. It talked about normal periods, PCOS symptoms, what causes it, and how it progresses. It also showed the difference between healthy and unhealthy lifestyles, explained when medicine might be needed, and stressed the importance of sticking to treatment. After watching the video, they took the questionnaire again to see if the teaching method worked

Major findings: Before the intervention, 17.1% had fair knowledge, 48.8% had moderate knowledge, and 34.1% had good knowledge. Then after the intervention, 63.4% had good knowledge. Educating patients is expected to strengthen the message on lifestyle changes and

ongoing adherence, potentially fostering a patient-centered approach to healthcare in the context of PCOS.

Strengths: Showed that through little effort a big change can be made to the perception and awareness of PCOS

Limitations: small and homogenous sample

Citation: Gibson-Helm M, Teede H, Dunaif A, Dokras A. Delayed Diagnosis and a Lack of Information Associated With Dissatisfaction in Women With Polycystic Ovary Syndrome. *J Clin Endocrinol Metab.* 2017 Feb 1;102(2):604-612. doi: 10.1210/jc.2016-2963. PMID: 27906550; PMCID: PMC6283441.

Title: Delayed Diagnosis and a Lack of Information Associated With Dissatisfaction in Women With Polycystic Ovary Syndrome

Purpose: The purpose of this study is to examine the experiences of PCOS diagnosis, the information received, and the worries related to PCOS

Sample: of 1550 respondents, 1385 were women with a self-reported PCOS diagnosis residing in North America (53.0%), Europe (42.2%), or other regions of the world (4.9%). Furthermore, 64.8% of these individuals were aged between 18 and 35 years

Study design: This study used a web-based survey distributed through PCOS Challenge and Verity, the two largest global PCOS support organizations

Study method: Cross-sectional study

Major findings: There were no significant associations between world region and overall satisfaction, diagnosis time, or satisfaction with information provided. Generally, seeing three or more health professionals and a diagnosis time of over six months had a negative impact on satisfaction, while being satisfied with the information about PCOS had a positive impact on satisfaction

Strengths: The survey was limited in a way that PCOS diagnosis relied solely on self-reported medical confirmation, and we did not aim to categorize distinct PCOS phenotypes.

Limitations: The survey was limited in a way that PCOS diagnosis relied solely on self-reported medical confirmation, and we did not aim to categorize distinct PCOS phenotypes.