



Assessment of applications on women's sexual and gynecological health

Avaliação de aplicativos sobre saúde sexual e ginecológica da mulher
Evaluación de aplicaciones sobre salud sexual y ginecológica de la mujer

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ABSTRACT

Objective: to assess the quality of applications on women's sexual and gynecological health. **Methodology:** a four-stage study: objective definition, inclusion and exclusion criteria, search strategy, and assessment; platform search (October 2024); application assessment; and analysis of results. Applications focused on women's sexual and gynecological health were included, excluding applications for professionals or for use in hospital settings, duplicates, paid or restricted-use applications, or games. **Results:** of the 741 applications, 32 were included, predominantly applications focusing on the menstrual cycle and with a mean quality score of 3.5. "Cycles: Period & Cycle Tracker" received the highest score (4.6). The texts presented low credibility and low adoption of scientific evidence. **Conclusion and implications for practices:** the applications analyzed promote self-care but are limited, leaving gaps in other gynecological conditions. There is a need for updated, educational, and evidence-based tools. The applications assessed primarily focus on the menstrual cycle and present minimal or acceptable quality. The gaps found in the results highlight the need for the development of women's health education technologies.

Keywords: Mobile Applications; Women's Health; Sexual Health; Technologies.

RESUMO

Objetivo: avaliar a qualidade de aplicativos sobre saúde sexual e ginecológica da mulher. **Metodologia:** estudo com quatro etapas: definição do objetivo, critérios de inclusão e exclusão, estratégia de busca e avaliação; busca nas plataformas (outubro de 2024); avaliação dos aplicativos; e construção dos resultados. Foram incluídos aplicativos voltados para saúde sexual e ginecológica da mulher, excluindo-se aplicativos para profissionais ou de uso em ambiente hospitalar, duplicados, pagos ou de uso restrito, ou voltados para jogos. **Resultados:** de 741 aplicativos, 32 foram incluídos, predominando aplicativos com foco no ciclo menstrual e uma média de qualidade de 3,5. O "Calendário Menstrual – Cycles" obteve a maior nota (4,6). Textos apresentaram baixa credibilidade e baixa adoção de evidências científicas. **Conclusão e implicações para a prática:** os aplicativos analisados promovem autocuidado, mas são limitados, deixando lacunas em outras condições ginecológicas. Há necessidade de ferramentas atualizadas, educativas e baseadas em evidências. Os aplicativos avaliados focam principalmente no ciclo menstrual e apresentam qualidade mínima ou aceitável. As lacunas encontradas nos resultados trazem a necessidade do desenvolvimento de tecnologias de educação em saúde da mulher.

Palavras-chave: Aplicativos Móveis; Saúde da Mulher; Saúde Sexual; Tecnologia.

RESUMEN

Objetivo: evaluar la calidad de las aplicaciones sobre salud sexual y ginecológica de la mujer. **Metodología:** estudio con cuatro etapas: definición de objetivos, criterios de inclusión y exclusión, estrategia de búsqueda y evaluación; búsqueda en plataformas (octubre de 2024); evaluación de apps; y elaboración de resultados. Se incluyeron apps centradas en la salud sexual y ginecológica de la mujer, excluyéndose las apps para profesionales o para uso hospitalario, las duplicadas, las apps de pago o de uso restringido, y los juegos. **Resultados:** de 741 aplicaciones, se incluyeron 32, con predominio de aplicaciones centradas en el ciclo menstrual y una calidad promedio de 3,5. El "Calendario Menstrual – Cycles" obtuvo la puntuación más alta (4,6). Los textos presentaban baja credibilidad y adopción de evidencia científica. **Conclusión e implicaciones para la práctica:** las aplicaciones analizadas promueven el autocuidado, pero son limitadas, dejando vacíos en otras condiciones ginecológicas. Se necesitan herramientas actualizadas, educativas y basadas en evidencia. Las aplicaciones evaluadas se centran en el ciclo menstrual y presentan una calidad mínima o aceptable. Las lagunas encontradas en los resultados plantean la necesidad de desarrollar tecnologías de educación para la salud de las mujeres.

Palabras clave: Aplicaciones Móviles; Salud de la Mujer; Salud Sexual; Tecnologías.

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INTRODUCTION

Approximately 53.6% of the world's population has access to the internet. In Brazil, the most widely used device for accessing the internet is the cell phone (89%).^{1,2} This widespread use of smartphones has caused profound changes in customs, habits, social and personal relationships, also impacting populations' behaviors and emotions.³ With the incorporation of computing resources into cell phones, these devices are no longer used primarily for voice communication, becoming multifunctional tools that increasingly influence the way people interact and connect.⁴

As a result, smartphones became part of users' daily routines, and social media and mobile applications emerged as attractive tools that increased user engagement. The development of mobile applications reached diverse audiences through games, social interaction tools, and data and information search tools. Healthcare also became a field of activity, giving rise to mobile health (mHealth), a term that refers to healthcare practices aided by virtual assistants, applications, or mobile devices.⁵

These technological innovations have impacted diagnostics, treatments, and care flows, promoting faster recovery for the population. In Brazil, tools such as electronic medical records, teleconsultations, and care software have been adopted, making care planning more efficient.⁶

Furthermore, the use of mHealth has transformed teaching and learning, while Artificial Intelligence revolutionizes technology and healthcare by empowering computer systems for intelligent decisions.^{7,8} Therefore, the growing use of mobile applications in healthcare has contributed to improving the effectiveness of treatments, with professionals and patients seeking continuous improvement and updated information.⁶ This data is corroborated by observing that, when combined with traditional care, healthcare applications can generate positive clinical results.^{6,9}

Among the numerous stages involved in developing a technology is selecting the target audience. For an application to succeed in its objectives, developers must understand the target audience. For women, cell phones emerge as a tool for self-expression and a facilitator of social interaction.

It is worth noting that, globally, 48% of women have access to a smartphone. Therefore, adopting cell phones as a health education tool for women is an important ally in educating this population about self-care and good health practices.¹ However, there is a shortage of health education applications for this population. Furthermore, their availability is primarily in English and for Android, which poses limitations that hinder access and engagement. Involving users in development can help create applications that are more tailored and effective for their needs.¹⁰

With technological advances, new possibilities emerge for monitoring, guidance, and empowering women in the health field. The use of applications as a channel for modifying lifestyle habits through health literacy is an innovative and effective tool.¹¹ Therefore, it is essential to assess the quality of these

mHealth applications, ensuring that their adoption is based on scientific evidence.

By mapping and analyzing available studies, this work can inform decision-making by women and healthcare professionals, ensuring that recommended technologies meet rigorous scientific criteria and contribute to improved care. Therefore, this study aimed to assess the quality of applications for women's sexual and gynecological health.

METHOD

This is a descriptive evaluative study constructed in four stages:

- 1- Defining the objective, inclusion and exclusion criteria, search strategy, and assessment;
- 2- Searching the platforms;
- 3- Assessing the applications; and
- 4- Developing the results.

In the first stage, the guiding question was defined: "What is the quality of applications that address women's sexual and gynecological health?" To address this question, the search terms "woman", "sexual health", "women's health", and "health-woman" were selected as search terms on the platforms. Furthermore, to narrow the search and address the target question, applications focused on women's sexual and gynecological health were included. Applications for professionals or for use in hospital settings, duplicates, paid applications, restricted-use applications, or applications focused on games were excluded.

The second stage took place in October 2024, through a search for applications on major mobile platforms, such as the Apple Store and Play Store. The search was conducted using three smartphones: a Moto G 52 and a Redmi Note 12, on the Play Store (Android, Google), and an iPhone 12 Pro Max, on the Apple Store (iOS, Apple).

To complete application assessment, the third stage used the validated Mobile Application Rating Scale (MARS), developed for assessing mHealth applications. This instrument contains 23 items in three sections: rating; quality; and satisfaction. Each area is scored from 1 to 5, resulting in a mean and, at the end, an overall quality mean, with the subjective area assessed separately (1 = inadequate, 2 = poor, 3 = acceptable, 4 = good, and 5 = excellent). The MARS is scored by calculating the mean scores of the application quality subscales and the total mean score.¹²

The results were constructed descriptively and quantitatively. After quality assessment, the results were discussed with current literature on the topic.

The study did not require submission to a research ethics committee because it used only public data.

RESULTS

The search across operating systems yielded 741 applications; four were excluded for being duplicates, leaving 737. Of these, 658 were excluded for addressing other topics,

and another 38 applications were excluded for charging for use. Of the remaining 41 applications, two were deleted for being incompatible with the operating systems of the smartphones used in data collection, and seven were excluded for having paid features that made analysis impossible. Ultimately, 32 applications were included in this study. Figure 1 represents the selection flowchart.

Among the technologies included, the predominant language was Portuguese (n=23), followed by English (n=08), and only one application adopted Spanish as its primary language (*Maya - Menstrual & Salud*). The "WomanLog Period Calendar" had versions in English and Portuguese. Regarding the adopted operating system, 18 applications were available in the Play Store for Android and 14 in the Apple Store for iOS. The most frequent classification was free (n=16), followed by 12 years (n=09), four years (n=03), nine years (n=02), 14 years (n=01), and 17 years (n=01). Regarding user assessment, the maximum recorded was 4.9 (n= 09), followed by 4.8 (n= 05),

4.7 (n= 05), 4.6 (n= 05), 4.4 (n= 02), 4.3 (n= 01), 4.2 (n= 02), 4.0 (n= 01) and the minimum of 2.0 (n= 01). Furthermore, one application had no registered ratings. Regarding the number of downloads, the most frequent records were 10,000 (n= 04) and 5,000,000 (n= 04) accesses, followed by 10,000,000 accesses (n= 03), 10,000 (n= 02), 1,000,000 (n= 02), 100,000,000 (n= 02). Finally, 500,000 (n= 01) were registered. Applications available for iOS did not report the number of downloads.

In the sample that comprised the study, 29 applications identified menstrual cycle tracking as their main objective; to this end, the technologies adopted a personalized calendar that allowed users to track the different phases of their cycle, including notes and reminders. In the "sexual health" area, only three technologies were identified: one with an educational purpose; another to monitor and track the clinical progression of polycystic ovary syndrome (PCOS); and an application focused on pelvic floor exercises. Only 6.5% (n=02) applications had an educational purpose (Figure 2).

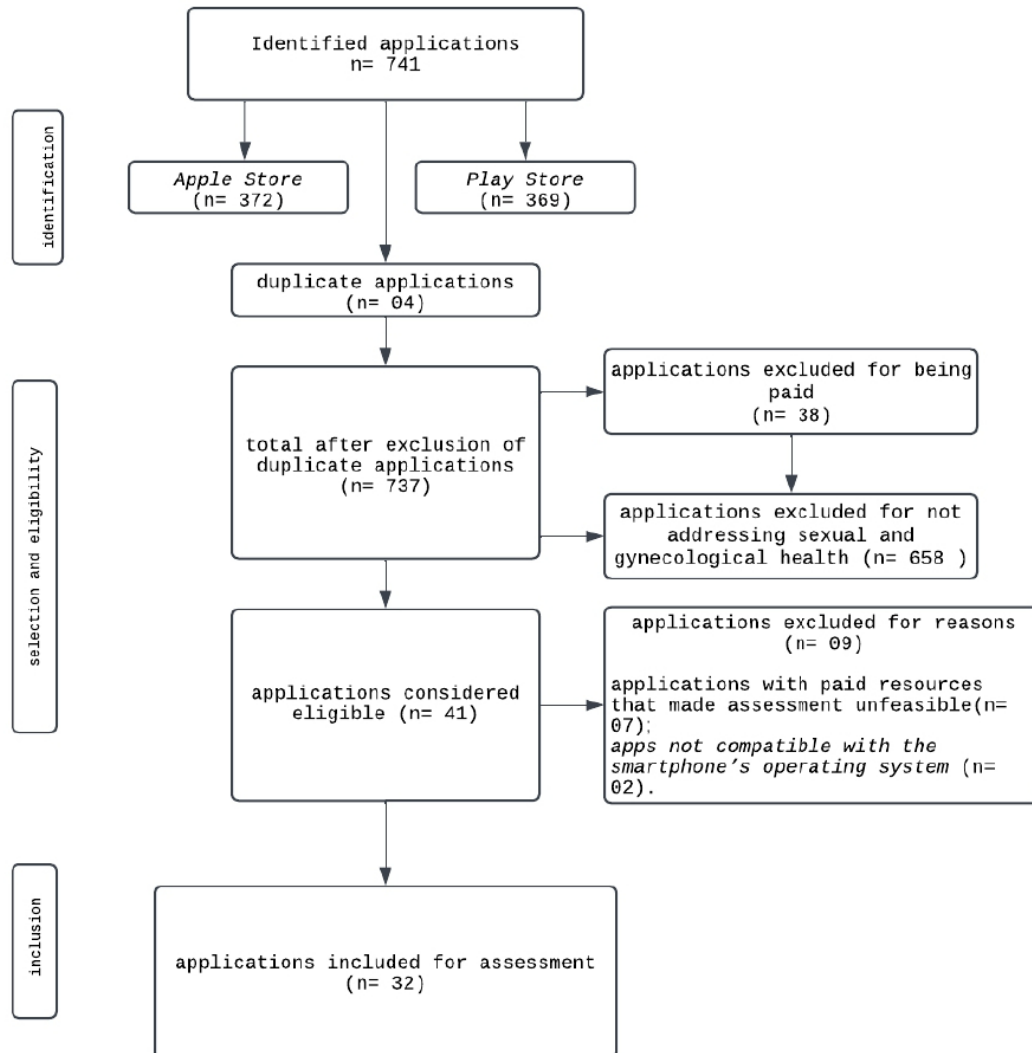


Figure 1. Application selection and inclusion flowchart.

Through the analysis of applications according to MARS, it was found that the application "Cycles: Period & Cycle Tracker", developed by Perigee, obtained the highest overall mean quality score (n=4.6), followed by "My Calendar: Period Tracker", by Prutvi (n=4.3), and "Glow Eve Period Tracker", by Glow. The overall mean quality among the applications included in the research was 3.5, and only three technologies registered means below the minimum acceptability score (n=3.0), such as "Ovulation & Pregnancy Calendar" (n=3.9), "Woman App - Female Cycle Calendar" (n=2.8) and "Mile Calendário Menstrual" (n=2.6).

Furthermore, it was not possible to apply item 19 of MARS, as it observes the adoption of scientific evidence in the construction of technologies, and the applications present in the study did not contemplate this item; however, this did not affect the results obtained (Table 1).

In the "engagement" category, the applications scored a mean of 3.5, with a maximum of 4.6 and a minimum of 2.2. This section assesses aspects of engagement, interactivity, and targeting. It also assesses whether content is appropriate and targeted to the target audience, with the adoption of interactive measures such as reminder notifications, allowing for feature customization. The applications adopted the reminder as a

period alert tool, and the prediction calculation is based on users' history.

In the "functionality" section, the mean score was 4.1, with a maximum of 5 and a minimum of 2.2. The mHealth applications assessed presented intuitive navigation with a smooth flow between screens, were easy to learn, and were free of technical flaws such as slowness or interruptions. This category performed best when compared to the others. Concerning the applications' aesthetic quality, visual appeal, graphic design, color scheme, and stylistic consistency were analyzed. The mean for this category was 3.4, with a maximum of 4.6 and a minimum of 2.0. Although visual design was consistent, the graphic quality was moderate, with errors in visualizing items in the accompanying charts. The visual appeal was consistent with the target audience, but it was unattractive.

In the "information" section, the mean was 3.2, the maximum was 5.0, and the minimum was 2.2. This category assessed the quality of the texts provided and their sources. The information provided was coherent but not comprehensive, and the sources of information showed little credibility when found and assessed. The descriptions provided on the platforms were accurate, and the applications presented some of the content cited. Furthermore, the objectives and goals were achievable.

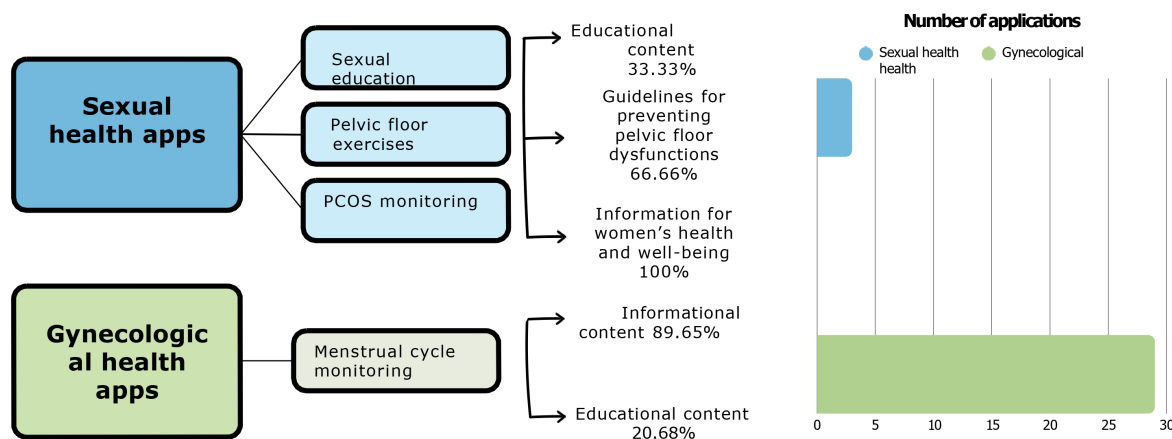


Figure 2. Categorization of applications according to thematic axes and topics covered.

Table 1. Assessment scores according to the Mobile Application Rating Scale. Redenção, CE, Brazil, 2024.

Application name	Engagement mean	Functionality mean	Aesthetic mean	Information mean	Overall quality mean	Subjective quality mean
Flo Period & Cycles Tracker	4.2	4.5	4.3	3.4	4.1	4
Calendário Menstrual, Ovulação	3.4	3.7	3.3	2.8	3.3	2.5
Period Calendar	3.6	3.2	3.3	3.1	3.3	3
WomanLog Period Calendar	3.6	3.2	3.0	2.7	3.1	2.2
My Calendar: Period Tracker	3.8	4.0	3.3	2.2	3.3	2.7
Maya - Menstrual & Salud	2.8	4.0	3.3	3.0	3.2	1.7

Table 1. Continued...

Application name	Engagement mean	Functionality mean	Aesthetic mean	Information mean	Overall quality mean	Subjective quality mean
Meet You	3.2	3.7	3.3	3.0	3.3	2
<i>Calendário Menstrual Período</i>	3.8	4.2	3.3	2.8	3.4	2
<i>FEMM Saúde e Ciclo Rastreador</i>	3.2	4.0	3.3	2.5	3.2	2.5
<i>Femin Período e Gravidez</i>	3.8	4.0	3.3	3.3	3.6	2.7
Clover	3.0	4.0	3.3	2.8	3.2	2.2
<i>Calendário Menstrual Lily</i>	3.6	4.2	3.3	3.8	3.7	2.5
<i>Calendário Da Mulher</i>	3.4	4.0	3.0	2.8	3.3	2.5
<i>Meu Calendário Menstrual</i>	4.2	4.7	3.3	3.2	3.8	2
My Cycle	3.0	5.0	3.6	3.5	3.7	3
Period Tracker & Calendar	3.8	4.7	4.0	3.2	3.9	2
Cycles: Period & Cycle Tracker	4.6	5.0	4.0	5.0	4.6	3.5
<i>Calendário Menstrual</i>	3.8	4.2	3.0	3.6	3.6	1.5
Femometer Connect	3.4	4.2	4.0	4.0	3.9	2.5
Period Diary Ovulation Tracker	4.4	4.7	3.6	3.2	3.9	2.7
Ovulation & Pregnancy Calendar	2.2	3.7	3.0	3.0	2.9	1.2
Premom Ovulation Tracker	3.6	4.7	4.6	4.0	4.2	2.7
Period Calendar	4.2	5.0	4.3	3.8	4.3	3.2
Woman App - Female Cycle Calendar	2.8	3.7	2.0	3.0	2.8	1
Period Diary Ovulation Tracker	3.2	4.2	3.3	2.8	3.3	2.2
PCOS Tracker	2.8	3.7	3	3.6	3.2	2
Pleasure: Sexual Wellbeing	3.2	4.5	3.6	3.1	3.6	3.5
<i>Aperta e Solta</i>	3.6	3	4	3.1	3.4	3.2
Ovia Fertility Cycle Tracker	4	4	3	3.3	3.5	2.7
Glow Eve Period Tracker	4.4	4.7	4	4.2	4.3	4.7
Life - Period Tracker Calendar	2.8	3.7	3	3.2	3.2	2
<i>Mile Calendário Menstrual</i>	3.2	2.2	3	2.2	2.6	1.7

DISCUSSION

The use of information and communication technologies in digital health is growing, given the number of users with internet access and smartphones.¹³ Mobile health applications, or mHealth, are emerging as tools for expanding health knowledge and literacy and/or assisting with self-care actions. The results of this study highlight that, among the 32 applications included in the sample, 29 had the primary objective or function of monitoring the female menstrual cycle.

Given the disparity in results in the “sexual and gynecological health” area, the search for mHealth on the adopted platforms allowed researchers to identify a gap in the technologies available for women’s sexual and gynecological health. The scarcity of

applications focused on conditions such as sexually transmitted infections, cervical cancer, menopause, and/or gynecological infections highlights the need to develop mHealth with a focus beyond the menstrual cycle.

In the sexual health field, only three technologies were found, and among these, only one focused primarily on sex education. The app’s primary tool was displaying educational videos on healthy sexual practices, disease and injury prevention, sexuality, and other topics. However, it provided no references for the content displayed, making it difficult to assess the information’s security. Since mHealth is a tool for promoting self-care and health education, testing and analyzing the content provided is essential for this tool to be made available to the audience.¹⁴

Furthermore, the application designed to monitor PCOS was limited to recording signs and symptoms, with little informative or educational information. PCOS affects approximately 10% of women of childbearing age,¹⁵ and is considered a public health problem due to its impact on women's health.¹⁶ The use of technology to educate about the etymology of diseases and the risk factors for developing this syndrome would enable early access to affected women.

Finally, the last application assessed in the sexual health area aimed to promote pelvic floor strengthening exercises by showing videos and sending reminders to notify users of the exercise period. The application also allowed for user interaction through comments. Pelvic floor exercises help prevent and treat dysfunctions such as urinary incontinence and dyspareunia, improving women's body awareness and sexual activity.¹⁷ These data reveal the importance of technology focused on these exercises.

Regarding the "gynecological health" area, all the applications found aimed to track the menstrual cycle, detecting signs of the ovulation phase and chances of pregnancy. Cycle calculations were performed individually, with the software fed by user-provided information, making cycle predictions more accurate. However, these applications were informative in nature. Although they provided explanations about cycle normality, users would not be able to detect warning signs based on the information provided.

In short, the applications included in the study lacked educational appeal, given their limited information and focus on monitoring and controlling the menstrual cycle, basal body temperature, and fertility rates. Since the menstrual cycle is a physiological indicator of the female reproductive system, and identifying signs of irregularities is a tool for detecting changes, the lack of educational resources in these applications highlights a gap in the technologies found.¹⁸

The impressive number of downloads, such as the 100 million registered by two applications, demonstrates the relevance and potential impact of these technologies. The high user ratings (nine applications with a 4.9/5.0 rating) reflect a general pattern of quality and user adoption. However, the lack of reviews for one of the applications suggests weaknesses that should be investigated, especially regarding reliability and adoption by new users.

All findings were subjected to a quality analysis using MARS. The lowest mean score, 3.2, was recorded in the "information" category of this scale. Although they met the minimum acceptability score (n=3), the content displayed in their interfaces was not comprehensive and presented a weak theoretical basis, with no mention of technology testing. The lack of integration of scientific evidence compromises the reliability of healthcare applications, indicating that many tools available on the market still do not meet the standards required for informed healthcare interventions.

For users to be receptive to technology, the content must be appropriate for them, and the application must be attractive through dynamic features. The "engagement" section assessed these aspects in the included applications. The adoption of tools aimed at personalizing mHealth was observed, such

as reminders and menstrual period predictions based on user-entered information. Linear regression is used to calculate menstrual period predictions, given its ability to generate timeline predictions based on dependent and independent variables. However, inaccurate calculations due to the presence of outliers or inadequate database input produce incorrect predictions,¹⁹ leading to feelings of anxiety and distress among users.

User registration and login requests are personalization features adopted in some mHealth applications. Among the 32 applications assessed, no login requests were identified to access the interface, although eight did require user registration. Menstrual tracking applications request information such as the date of your last period, signs and symptoms, vaginal discharge characteristics, sexual intercourse records, condom use, basal body temperature, and other data. Applications focused on sexual health contained health information and monitoring data, making password-based access an essential tool for the safe use of these technologies, as it is crucial to ensure the security of user data.²⁰

To ensure the effectiveness of these features, developers must be aware of the need for updates based on user feedback. Furthermore, updates to the systems used in the applications ensure good functionality. No errors or operational failures were identified in the applications assessed during the testing period, with the functionality section having the highest mean (4.1). However, it is worth noting that the technology with the lowest overall quality mean (n=2.6) was last updated four years ago. Application upgrades aim to ensure functionality and bug fixes, as well as incorporate information and protocols based on the latest scientific evidence.²¹

The application must be intuitive to use; to achieve this, developers create simplified interfaces, with good visualization and a logical sequence of screens; the user's knowledge of how to use this technology is built through direct use.^{22,23} In the overall quality section by MARS, the results show disparities, in which the "Cycles: Period & Cycle Tracker" technology stood out as the most robust (score 4.6), while the "*Mile Calendário Menstrual*" had the lowest score (2.6), highlighting inconsistencies in functionality and in meeting user expectations. This variation reflects the diversity of standards in application development, reinforcing the need for quality validation for the safe adoption of these tools.

The Portuguese language accessibility present in 23 of the 32 selected applications is a positive point, as it facilitates usability for the target audience, while the balanced distribution between Android and iOS systems expands user reach. However, the pre-exclusion of incompatible applications demonstrates that technological barriers still persist and can limit access in diverse contexts.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

This study assessed the quality of applications focused on women's sexual and gynecological health on Android and iOS operating systems. However, the use of a scale available only in English and not validated in Brazil is a limitation of the research.

The overall quality mean reached the minimum acceptability score, and only two technologies failed to meet the criteria. This implies that the included applications presented good quality according to the MARS scale.

It is noteworthy that all the applications found focused on the menstrual cycle and its monitoring, revealing the need to develop applications for other conditions of the female sexual and gynecological system and the creation of technologies that employ health literacy based on the most recent scientific evidence.

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DATA AVAILABILITY RESEARCH

The contents underlying the research text are included in the article.

CONFLICT OF INTEREST

None.

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