Review Article

Technology-based contraceptive decision aids and the role of healthcare providers: A scoping review

Syah R. Wisdayanti[1]* and Shinta Prawitasari[2]

[1]Department of Obstetrics and Gynecology, Faculty of Medicine, Nursing, and Public Health, Universitas Gadjah Mada, Yogyakarta, Indonesia; [2]Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia

*Corresponding author: syahrini_spog1@staff.uns.ac.id

Abstract

Technology-based decision aids are increasingly integrated into contraceptive counseling to enhance informed decision-making and promote patient-centered care. However, evidence regarding their effectiveness on clinical outcomes and the evolving role of healthcare providers remains limited. The aim of this study was to map existing evidence on technology-based contraceptive decision aids and to examine the role of healthcare providers in supporting decision-making processes. The study was conducted in accordance with the PRISMA-ScR framework. A systematic search was performed across PubMed/MEDLINE, Cochrane Library, ProQuest, ScienceDirect, and Scopus for studies published between January 1, 2000, and March 1, 2025. Study selection and data extraction were performed independently by two reviewers, with discrepancies resolved through discussion. A total of five studies were included, encompassing web-based platforms, mobile applications, and tablet-based tools. The findings suggest that technology-based decision aids improve patient knowledge and satisfaction. However, the assisting technology does not improve contraceptive uptake and continuation rates. Across studies, healthcare providers remained essential in facilitating shared decision-making by contextualizing information, addressing patient concerns, and supporting individualized choices. In conclusion, current evidence suggests that the use of technology to support contraceptive decision-making improves subjective outcomes, but not clinical outcomes. Healthcare providers remain essential in complementing these tools, ensuring that decisions are informed and tailored to individual contexts. Further high-quality studies are needed to strengthen the evidence base and evaluate long-term effectiveness.

Keywords: Digital age, contraceptive counseling, healthcare providers, shared decision-making, patient autonomy

Introduction

The integration of technology in healthcare, particularly in reproductive health, has transformed patient-provider interactions [1,2]. Physicians are increasingly positioned as consultants, guides, or collaborators, enabling patients to take an active role in decision-making. This shift moves away from the traditional model, where providers predominantly dictated diagnoses and treatment plans [3]. Despite advances in contraceptive technologies and access, significant gaps in contraceptive use persist globally. An estimated 121 million unintended pregnancies occur each year worldwide, with nearly half of all pregnancies being unintended [2]. These outcomes are often associated with unmet need for contraception, inconsistent use, or method dissatisfaction.

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These gaps highlight the importance of improving contraceptive counseling and decision-making processes to reduce unintended pregnancies and enhance reproductive health outcomes [2].

In the context of contraceptive counseling, this shift represents a movement toward patient-centered care, where the focus is on fostering collaboration between providers and patients [3]. Several studies have explored the application of digital technologies in healthcare, demonstrating their potential to improve service delivery, patient engagement, and health outcomes. For instance, a previous study highlighted that technologies such as mobile authentication systems, artificial intelligence, and electronic health records can strengthen healthcare systems by enhancing monitoring, data analysis, and decision-making processes [4]. Meanwhile, another study found that smartphone-based health applications can improve patient knowledge and support disease management, particularly by facilitating continuous monitoring and promoting self-management behaviors among patients with chronic conditions [5].

Technology-aided decision-making is inherently linked to patient-centered counseling, as both emphasize shared decision-making, respect for patient autonomy, and alignment of healthcare choices with individual preferences and values. Digital decision aids operationalize patient-centered care by enabling patients to actively engage in the decision-making process, clarify their values, and prepare for meaningful interactions with healthcare providers [6-7]. Patient-centered contraceptive counseling prioritizes the incorporation of individual preferences and values. This model emphasizes shared decision-making, ensuring that patients have the autonomy to make informed choices about their reproductive health [8]. Technology-based decision aids, such as printed materials, videos, websites, and mobile applications, play an instrumental role in this transformation [9]. These tools simplify complex medical information, present clear evidence about risks and benefits, and empower patients to align contraceptive choices with their unique needs and goals [10-11].

A recent study has highlighted the positive impact of technology-based contraceptive decision aids, showing improvements in contraceptive use, continuation, knowledge, and self-efficacy [8]. However, while these tools empower patients, their increasing use has also raised questions about the evolving role of healthcare providers. Therefore, the aim of this study was to explore how digital decision aids influence the role of healthcare providers, particularly in supporting patient-centered contraceptive counseling and advancing the principles of shared decision-making.

Methods

Study design

This scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines [12]. A scoping review approach was selected due to the heterogeneity of study designs, interventions, and outcomes, as well as the exploratory nature of the research question, particularly in understanding the evolving role of healthcare providers in technology-based contraceptive decision-making.

Eligibility criteria

The eligibility criteria were defined using the Population–Concept–Context framework. The population included individuals of reproductive age, including women, men, or couples who were potential or current users of contraception. The concept focused on technology-based decision aids designed to support contraceptive decision-making, including mobile applications, web-based platforms, computerized tools, and other digital health interventions. The context included healthcare or community settings where contraceptive counseling or decision-making support was provided, particularly involving healthcare providers. Studies were included if they were original research using quantitative, qualitative, or mixed-method designs; evaluated or described technology-based contraceptive decision aids; and reported outcomes related to decision-making quality (such as knowledge or decisional conflict), user satisfaction, counseling experience, contraceptive uptake or continuation, or healthcare provider roles. Articles published in English or Indonesian between January 1, 2000, and March 1, 2025, were included. Studies

were excluded if they did not involve technology-based decision aids, focused solely on contraceptive methods without addressing decision-making processes, involved non-reproductive populations, or were editorials, commentaries, narrative reviews, conference abstracts without full text, or articles with inaccessible full texts. Systematic reviews were not included in the primary synthesis but were used for reference screening.

Search strategy

A comprehensive literature search was conducted using five electronic databases: PubMed/MEDLINE, Cochrane Library, ProQuest, ScienceDirect, and Scopus. Search terms were developed using MeSH terms and free-text keywords, structured around three main concepts: contraception, decision-making or decision aids, and digital or technology-based interventions. Equivalent search strategies were adapted for each database. Filters were applied for publication year (2000–2025) and language (English and Indonesian). The full search strategy for each database is provided in **Table 1**.

Table 1. Comprehensive search strategies used across databases

Database	Search string (Boolean)
PubMed/MEDLINE	("Contraception"[MeSH] OR contraception OR contraceptive* OR "family planning") AND ("Decision Making"[MeSH] OR "decision aid*" OR "decision support system*" OR "shared decision making" OR "contraceptive counseling") AND ("Technology"[MeSH] OR "digital health" OR eHealth OR mHealth OR "mobile application*" OR "web-based" OR "computerized" OR "digital tool*" OR "interactive tool*")
Scopus	(TITLE-ABS-KEY (contraception OR contraceptive* OR "family planning")) AND (TITLE-ABS-KEY ("decision aid*" OR "decision support system*" OR "shared decision making" OR "contraceptive counseling")) AND (TITLE-ABS-KEY ("digital health" OR eHealth OR mHealth OR "mobile application*" OR "web-based" OR "computerized" OR "digital tool*" OR "interactive tool*"))
Cochrane Library	(contraception OR contraceptive* OR "family planning") AND ("decision aid*" OR "decision support system*" OR "shared decision making" OR "contraceptive counseling") AND ("digital health" OR eHealth OR mHealth OR "mobile application*" OR "web-based" OR "computerized" OR "interactive tool*")
ScienceDirect	("contraception" OR "contraceptive" OR "family planning") AND ("decision aid" OR "decision support" OR "shared decision making" OR "contraceptive counseling") AND ("digital health" OR "mobile application" OR "web-based" OR "computerized" OR "technology-based")
ProQuest	(contraception OR contraceptive* OR "family planning") AND ("decision aid*" OR "decision support system*" OR "shared decision making" OR "contraceptive counseling") AND ("digital health" OR eHealth OR mHealth OR "mobile application*" OR "web-based" OR "computerized" OR "technology-based")

Study selection

All identified records were imported into reference management software, and duplicates were removed. The study selection process was conducted in two stages. First, two independent reviewers screened titles and abstracts to identify potentially relevant studies. Second, full-text articles were assessed against the eligibility criteria. Any discrepancies between reviewers were resolved through discussion, and when necessary, a third reviewer was consulted to reach consensus. The study selection process is presented using a PRISMA-ScR flow diagram.

Data extraction

Data extraction was conducted independently by two reviewers using a standardized extraction form. Extracted data included study characteristics (author, year, country, study design, and setting), participant characteristics, type of technology-based decision aid, description of healthcare provider involvement, and reported outcomes such as decision-making quality, user satisfaction, counseling experience, and contraceptive uptake or continuation. Any disagreements during data extraction were resolved through discussion.

Data synthesis

The findings were synthesized using a descriptive and thematic approach. Studies were grouped according to intervention types, outcomes, and the roles of healthcare providers. A thematic synthesis was performed to identify patterns, similarities, and differences across studies,

particularly in relation to how digital decision aids influence decision-making processes and provider involvement. Due to heterogeneity in study designs and outcomes, a quantitative meta-analysis was not performed. A complementary appraisal of the methodological quality of included studies was conducted to support the interpretation of findings. The limitations and potential biases of the included studies are described in the discussion section.

Results

Screening and selection

A total of 566 records were identified through database searching, including PubMed (n=224), Cochrane Library (n=57), ScienceDirect (n=88), ProQuest (n=123), and Scopus (n=74) (**Figure 1**). Prior to screening, 364 records were excluded based on publication year and study design, and an additional 25 non-English articles were removed. Following this, 177 records were screened based on titles and abstracts. During this stage, 149 duplicate records were identified and removed. The remaining 28 reports were sought for full-text retrieval, of which 11 could not be retrieved. A total of 17 full-text articles were assessed for eligibility. Of these, 12 studies were excluded for the following reasons: different intervention (n=6), different outcome (n=5), and protocol-only publication (n=1). Ultimately, five studies met the inclusion criteria and were included in this scoping review [13-17]. A summary of these studies is presented in **Table 2**.

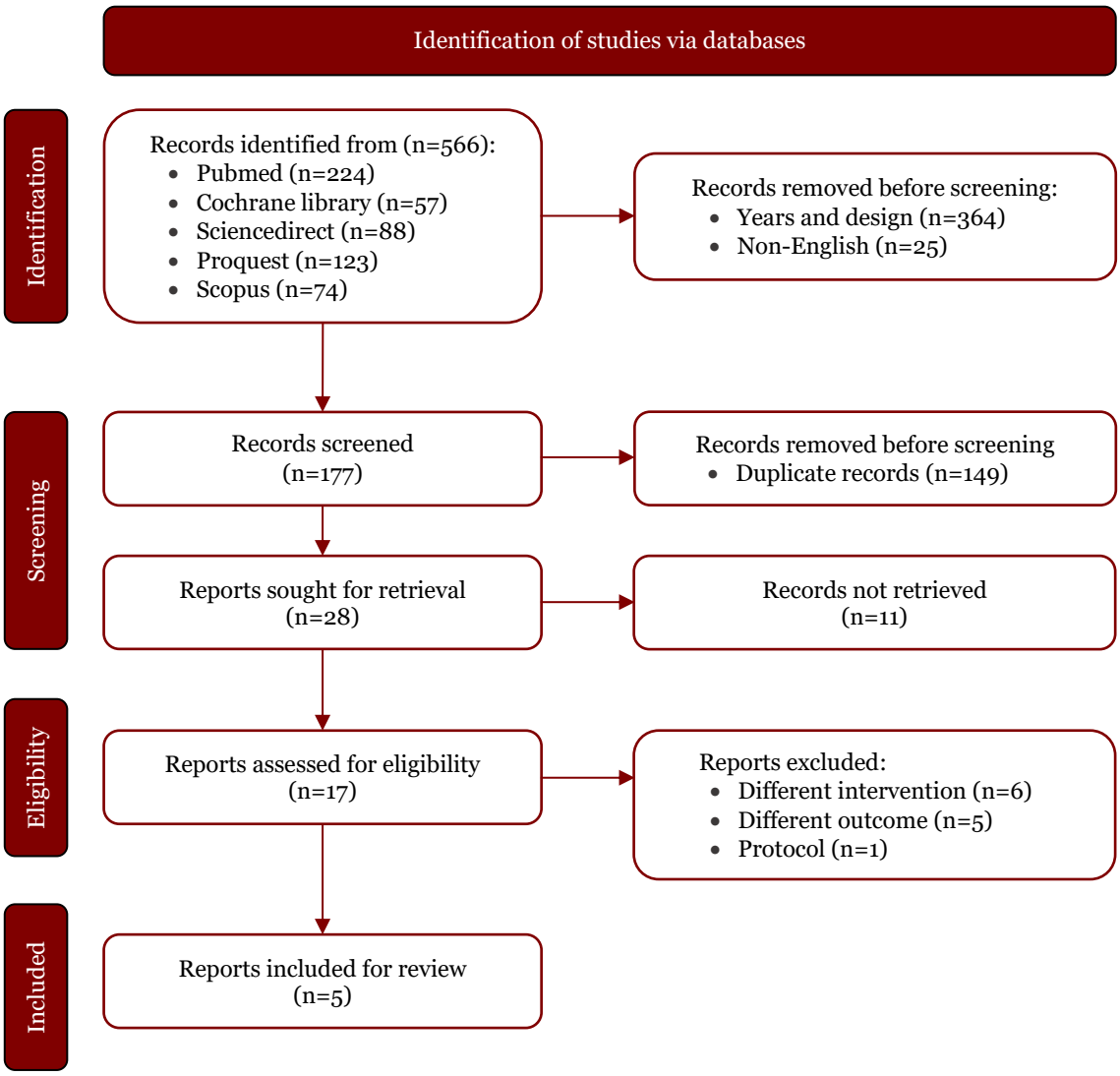

Figure 1. Flowchart of the study selection process.

Table 2. Characteristics of the included studies

Study	Design	Population	Setting	Intervention	Comparison	Outcomes	Key findings	Role of healthcare providers
Dehlendorf *et al.* (2019) [13]	Randomized controlled trial	Providers (n=28); Patients aged 15–45 (n=758)	Clinical setting	My Birth Control Tool (tablet-based, preference-based tool)	Usual counseling	Knowledge, satisfaction, decision quality, continuation, unintended pregnancy	Improved knowledge, satisfaction, and decision quality; no difference in continuation or method uptake	Providers used tool outputs to guide counseling; enhanced interpersonal quality without changing clinical roles
Koo *et al.* (2017) [14]	Post-test experimental	Women aged 15–44 (n=340)	Clinical setting	Smart Choices (computer-based, questionnaire + audiovisual guide)	Usual counseling	Knowledge, counseling quality, method choice	Increased knowledge and patient-centeredness; more pill use, less LARC selection	Providers used summaries to tailor counseling; integration varied due to workflow constraints
Madden *et al.* (2020) [15]	Randomized controlled trial	Women aged 18–45 (n=241)	Clinical setting	Tablet-based decision aid (algorithm-based recommendations)	General health survey	Decisional conflict, satisfaction, method selection	No difference in decisional conflict or satisfaction; high alignment with preferences	Providers used tool as support; no major change in counseling behavior; integration challenges noted
Sridhar *et al.* (2015) [16]	Randomized controlled trial	Women aged 18–45 (n=120)	Clinical setting	Plan A Birth Control (mobile app)	Health educator counseling	Method choice, knowledge, satisfaction	Similar method choice and knowledge; lower satisfaction vs. human counseling	Providers/educators remained essential for satisfaction and reinforcing understanding
Stephenson *et al.* (2020) [17]	Randomized controlled trial	Women aged 15–30 (n=927)	Multi-setting (clinic + online)	Contraception Choices (interactive website)	Standard care	LARC use, satisfaction, pregnancy, STI, costs	Improved knowledge and empowerment; no significant clinical outcome differences	Providers complemented tool by addressing barriers and contextualizing information

LARC: long-acting reversible contraception; STI: sexually transmitted infection.

Characteristics of the included studies

The included studies comprised five quantitative studies conducted in clinical and multi-setting environments, predominantly using randomized controlled trial (RCT) designs, with one post-test experimental study [13-17]. The study populations mainly involved women of reproductive age (15–45 years), with sample sizes ranging from 120 to 927 participants, and one study additionally included healthcare providers [13-17]. All interventions utilized technology-based decision aids, including tablet-based tools [13,15], computer-based applications [14], mobile applications [16], and interactive web platforms designed to support contraceptive decision-making [17]. These interventions were generally compared with usual counseling, standard care, general health surveys, or educator-led counseling [13-17].

The outcomes assessed across studies were varied but commonly included patient knowledge, satisfaction, decision quality, method choice, and clinical outcomes such as contraceptive uptake, continuation, and unintended pregnancy [13-17]. Overall, the findings consistently demonstrated improvements in subjective outcomes, particularly knowledge and satisfaction, following the use of decision aids [13-17]. However, no significant differences were observed in key clinical outcomes, including contraceptive uptake and continuation rates [13-15,17]. Some variations in method choice and patient-centeredness were also reported; however, these findings were not consistent across studies [14,16].

Across all studies, healthcare providers played a complementary role in supporting decision-making by utilizing outputs from decision aids to guide counseling, tailor discussions, and address patient concerns [13-17]. Despite the integration of digital tools, providers remained essential in facilitating shared decision-making and ensuring that patient choices were aligned with clinical considerations [13-17].

Satisfaction

Satisfaction levels varied across studies, with some decision aids enhancing the quality of interpersonal interactions. For instance, one study reported higher satisfaction with interpersonal quality and information about side effects in the intervention group compared to controls, though overall visit satisfaction was similar [13]. Similarly, another study noted high satisfaction during pilot testing of the Plan A Birth Control app, but satisfaction decreased in the RCT, where fewer participants in the intervention group were “very satisfied” compared to those receiving health educator counseling [16]. A previous study found satisfaction rates to be comparable across groups, though participants praised the empowerment and confidence gained from the website in discussing contraception with providers [17]. Another research group reported uniformly high satisfaction with counseling and providers in both groups, indicating that decision aids did not detract from the counseling experience [14].

Knowledge

Decision aids generally improved contraceptive knowledge, though the extent varied. A study [13] demonstrated significant knowledge gains in the intervention group, particularly regarding intrauterine device (IUD) effectiveness, nulliparous suitability, and emergency contraception. One study also observed increased contraceptive knowledge in the intervention group, with participants discussing more topics related to childbearing and sexual health [14]. In contrast, another study found no significant differences in knowledge scores for long-acting reversible contraception (LARC) methods between intervention and control groups, suggesting that the Plan A Birth Control app had limited impact on knowledge improvement [16]. While increased awareness and dispelled misconceptions were highlighted in one study, these knowledge gains did not translate into measurable clinical differences [17].

Decision quality

Decision quality was positively influenced by some decision aids, with improvements in informed decision-making and reduced uncertainty. A previous study [13] reported higher informed decision scores and lower decision uncertainty in the intervention group, highlighting the value of structured, patient-centered tools. Another study [15] showed similar reductions in decisional conflict across groups, although participants with higher post-visit conflict were less likely to select a recommended method.

Contraceptive choices

Contraceptive choices and use showed limited variation across studies. One study found no significant differences in contraceptive continuation rates or the selection of highly effective methods between intervention and control groups [13]. Similarly, another study [15] reported comparable rates of IUD/implant selection, with participants in the decision aid group more likely to choose methods aligned with their preferences. A different study, however, noted that the intervention group was less likely to select highly effective methods such as IUDs and more likely to choose oral contraceptives, reflecting potential differences in how decision aids influence choices [14]. Another study [16] observed similar patterns, with no significant differences in the selection of very effective methods between groups. Additionally, one study suggested that around 24% of participants in both groups switched to more effective methods, but more participants in the intervention group switched to less effective methods [17].

Empowerment

Empowerment and engagement emerged as key themes across studies, particularly in facilitating discussions between patients and providers. A previous study [17] demonstrated that the Contraception Choices website empowered participants to discuss contraception confidently and improved alignment with preferences, though systemic barriers hindered clinical outcomes. Similarly, another study [14] emphasized the role of decision aids in fostering informed and interactive consultations, enabling participants to explore options before meeting with providers.

Role of healthcare providers

Across the included studies, healthcare providers consistently played a complementary and essential role in supporting contraceptive decision-making alongside technology-based decision aids. Their role can be broadly categorized into three interrelated functions: facilitating shared decision-making, contextualizing patient-specific information, and addressing system-level and practical barriers.

First, healthcare providers facilitated shared decision-making by integrating patient preferences generated through decision aids into clinical consultations. Decision aids enabled patients to identify preferences and increase knowledge prior to consultations; however, providers remained central in interpreting this information, clarifying misconceptions, and guiding patients toward informed and individualized choices [13-15,17]. This indicates that technology supports, rather than replaces, the interpersonal aspects of counseling.

Second, providers played a critical role in contextualizing and personalizing information. While decision aids provided algorithm-based recommendations and summaries of patient preferences, providers ensured that these outputs were interpreted appropriately within each patient's medical and personal context [13-15]. They retained clinical judgment in tailoring counseling and adapting recommendations based on individual circumstances, highlighting the continued importance of provider discretion in the decision-making process.

Third, healthcare providers contributed to overcoming practical and system-level barriers that technology alone could not address. These included facilitating access to services, addressing logistical challenges such as delays and limited availability of certain contraceptive methods, and ensuring alignment between patient preferences and feasible options [16,17]. Additionally, limited provider training and suboptimal integration of decision aids into clinical workflows were identified as barriers that could hinder the effectiveness of these tools [14].

Across the included studies, healthcare providers remain indispensable in contraceptive counseling, even in the presence of technology-based decision aids. While such tools enhance patient knowledge and engagement, providers ensure that decisions are clinically appropriate, context-sensitive, and aligned with patient values, reinforcing a collaborative model of care [13-17].

Discussion

The findings of this review indicate that technology-based contraceptive decision aids are associated with improvements in subjective outcomes, particularly patient knowledge and satisfaction. However, their impact on key clinical outcomes, such as contraceptive uptake and

continuation, remains inconclusive, as no statistically significant differences were consistently observed across studies. In addition, the results highlight the continued importance of healthcare providers in facilitating shared decision-making, contextualizing information, and ensuring that patient choices are aligned with clinical considerations. While most studies employed appropriate designs and clearly reported their outcomes, several methodological limitations were identified, including small sample sizes, potential selection bias, and heterogeneity in study designs and outcome measures. These limitations may have contributed to the variability and lack of significant effects observed in clinical outcomes. Furthermore, differences in the implementation and integration of decision aids into clinical workflows may have influenced their effectiveness.

Across all studies, the integration of decision aids into clinical practice underscored the irreplaceable role of healthcare providers in contraceptive counseling [13-17]. These tools supported providers in delivering patient-centered care, enhancing informed decision-making, and addressing barriers to access. However, the effectiveness of these interventions depended largely on how well providers integrated them into existing clinical workflows and maintained meaningful patient engagement. These suggest that while decision aids can enhance the consultation experience, the presence of a skilled provider remains essential for achieving optimal patient outcomes.

Decision aids functioned as supplementary tools that enabled patients to explore contraceptive options and better understand their choices. Providers used outputs from these tools to guide discussions, address patient concerns, and facilitate shared decision-making [15-16]. In this context, healthcare providers acted not only as information providers but also as interpreters of digital outputs, ensuring that patients received accurate, relevant, and context-specific information. App-only counseling has been associated with lower patient satisfaction compared to provider-led sessions, highlighting the importance of human interaction in delivering personalized care [14]. Similarly, a systematic review in 2020 found that digital decision-making tools without direct provider involvement often failed to improve contraceptive behaviors or satisfaction [18]. These findings emphasize that healthcare providers play a critical role in maintaining relational communication, building trust, and mitigating the risks of misinformation in digital environments.

In the era of widespread digital health information, the concept of infodemiology has become increasingly relevant, as patients are frequently exposed to large volumes of variable-quality health information online. Healthcare providers serve as essential gatekeepers in this context, ensuring the accuracy and credibility of information obtained through digital tools and helping patients navigate conflicting or misleading content [19-20]. By contextualizing digital information within patients' clinical and social circumstances, providers enhance the reliability of decision-making processes and prevent potential misinterpretation of technology-generated recommendations. Moreover, the involvement of healthcare providers has been shown to improve patient engagement with digital tools, as their guidance encourages sustained use, trust, and adherence to recommended interventions. This highlights that provider engagement is not only complementary but also critical in maximizing the effectiveness of technology-based decision aids.

The studies collectively demonstrated that decision aids improve patient knowledge, reduce decisional conflict, and empower individuals to participate more actively in contraceptive decision-making. A prior meta-analysis reported statistically significant improvements in self-efficacy (mean difference (MD): 0.09; 95% confidence interval (95%CI): 0.05–0.13) and knowledge scores (MD: 0.04; 95%CI: 0.01–0.07), with higher immediate retention compared to delayed retention. Additionally, users of technology-based decision aids had higher odds of contraceptive use and continuation (odds ratio (OR): 1.27; 95%CI: 1.05–1.55) compared to controls [11]. Tools such as My Birth Control and Smart Choices were particularly effective in increasing patient understanding, addressing misconceptions, and aligning contraceptive choices with individual preferences [12-14]. These improvements in knowledge and self-efficacy facilitated more informed and confident participation in counseling, reinforcing the role of decision aids as enablers of patient-centered care rather than replacements for provider interaction.

Despite these benefits, technology-based decision aids face several implementation challenges. Providers frequently reported barriers, such as time constraints, limited training, and difficulties integrating these tools into clinical workflows [4,14,17]. Additionally, feasibility and applicability were often assessed descriptively, with limited high-quality evidence to support definitive conclusions. System-level barriers, including appointment delays, resource limitations, and inadequate insurance coverage, further constrained equitable access to contraceptive services [24-25]. These findings suggest that the successful integration of decision aids requires not only technological innovation but also organizational support, provider training, and workflow adaptation.

Effective contraceptive counseling requires a balance between evidence-based recommendations and patient-centered care. Providers who optimized decision-making dynamics—by prioritizing patient preferences, addressing misconceptions, and fostering shared decision-making—achieved greater patient satisfaction and alignment with chosen methods [26]. In contrast, directive counseling approaches that overemphasize method efficacy risk undermining patient autonomy, trust, and satisfaction. The integration of decision aids should therefore be accompanied by strategies that strengthen provider communication skills and ensure that these tools are used to support, rather than replace, individualized counseling [26-27].

This scoping review has several limitations. First, the exclusion of non-English and non-Indonesian language studies may have introduced language bias and limited the generalizability of findings. Second, the reliance on selected databases may have resulted in publication bias and omission of relevant grey literature. Third, the heterogeneity in study designs, populations, and types of decision aids limited the ability to perform direct comparisons or draw definitive conclusions regarding effectiveness. Fourth, the synthesis of results was primarily descriptive, which may reduce the depth of interpretation and limit causal inferences. Fifth, variations in outcome measures across studies, particularly in assessing knowledge, satisfaction, and behavioral outcomes, may have affected consistency in interpretation. Additionally, most included studies were conducted in high-resource settings, limiting applicability to low- and middle-income contexts. Finally, the relatively small number of included studies reflects the emerging nature of this field and underscores the need for further research. Furthermore, the limited focus on long-term outcomes remains a key gap, as most studies assessed short-term measures such as knowledge and satisfaction rather than sustained contraceptive use or continuation. Future research should explore the long-term impact of technology-based decision aids, particularly in diverse populations and healthcare settings, and evaluate strategies to optimize their integration into routine clinical practice.

Conclusion

Technology-based decision aids may support contraceptive counseling by improving patient knowledge and helping align choices with individual preferences. However, current evidence suggests the limited impact of the assisting technology in key clinical outcomes such as contraceptive uptake and continuation. Healthcare providers continue to play an essential complementary role in guiding decision-making, clarifying information, and addressing patient-specific concerns. Given the small number of included studies and variability in study designs and outcomes, these findings should be interpreted with caution. Future research should focus on strengthening methodological rigor, expanding the evidence base, and evaluating the long-term impact of decision aids on both subjective and clinical outcomes, as well as their integration into routine clinical practice.

Ethics approval

Not required.

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

Artificial intelligence (AI) tools were used during the preparation of this study and manuscript. AI-based language models, including ChatGPT and QuillBot, were utilized to assist with language refinement, grammar improvement, sentence restructuring, and enhancing the overall readability of the manuscript. These tools also supported the summarization of content and provided suggestions for improving the clarity and organization of technical descriptions. All outputs generated by AI were carefully reviewed and verified by the authors to ensure the accuracy, integrity, and originality of the final manuscript.

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