Exploring Sexual Health Information Technology Adoption Intention: a Systematic Review Through the Lens of UTAUT

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Abstract. Sexual health is a global concern, often exacerbated by inadequate information and services. Information technology (IT) has the potential to bridge this gap, but its adoption is influenced by various factors. Therefore, it is crucial to understand the impact of these factors on the adoption of sexual health IT. This investigation analyzed the factors that affect users' adoption intentions in sexual health IT using UAUT. Moreover, this study aimed to recognize the primary objectives in the research field and the study's constraints. By undertaking a systematic literature review following the PRISMA guidelines, we explored literature from January 2013 to November 2023. We extensively searched eight databases to identify UTAUT-relevant studies on sexual health IT adoption. Subsequently, we selected six high-quality articles for a detailed evaluation. The results indicate that the intention to adopt sexual health information technology is influenced by several factors, such as Effort Expectancy, Performance Expectancy, Social Influence, Facilitating Conditions, and Habits. Furthermore, Facilitating Conditions, behavioral intentions, and habits can directly influence adoption behaviors. Specifically, effort expectations and performance expectations are critical in influencing intentions. Future research should incorporate additional factors to explore the adoption of sexual health IT to improve our understanding of this area. The study's significance lies in providing valuable insights to institutions for sexual health education. By promoting and enhancing the dissemination of sexual health information technology, the standard of services provided internationally can be elevated.

Keywords. UTAUT; sexual health information; sexual health information technology; sexual health information adoption intentions; PRISMA guidelines; systematic literature review

1 Introduction

Globally, despite concerted efforts to improve sexual health programs, annually, more than 120 million couples face challenges in accessing contraception [15]. The burden of sexually transmitted diseases varies among countries with low, middle, and high-income levels. Recent

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global estimates indicate that chlamydia accounts for approximately 131 million new cases annually, followed by gonorrhea with 78 million cases, trichomoniasis with 143 million cases, and syphilis with 6 million cases [31]. In numerous countries, sexual and reproductive health services not only suffer from inadequacy but also from substandard quality, resulting in their underutilization [35]. Inadequate sexual health services have a significant impact on a vast number of women and adolescents. Urgent attention is required to provide accurate sexual health information to women and adolescents residing in numerous developing countries [15]. Dispensing relevant and easily accessible sexual health information can enhance the quality of sexual health services.

The emergence of diverse communication technologies has facilitated health education and promotion, specifically in the realm of sexuality education [18]. Various types of sexual health information technology (SHIT), available online or otherwise, have eliminated geographical barriers and granted equal access to sexual health information for individuals residing in different areas. It's noteworthy that in certain cultures, conversations about sexual and reproductive health (SRH) can be deemed taboo and uncomfortable [24]. Technology-based sexual health information resources offer advantages over conventional methods for delivering SRH education due to the privacy and interactivity they afford. In certain nations, sexual health education initiatives have utilized a diverse range of information technologies, including websites [18], text messaging [16], artificial intelligence [24, 30], and social media platforms [8].

To optimize the utilization of emerging technologies for sexual health communication, numerous scholars have explored factors associated with the utilization of sexual health information technology across diverse user groups. These factors encompass social, individual, and technological dimensions [32, 36]. Meanwhile, various models of technology applicability have explored factors influencing the utilization of sexual health IT. Prominent theoretical frameworks utilized in understanding technology adoption and behavior include the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by [37], the Theory of Reasoned Action (TRA) introduced by [13], and the Technology Acceptance Model (TAM) developed by [12].

UTAUT integrates several established models, such as TRA, TAM, the Innovation Diffusion Theory (IDT), the Model of PC Utilization (MPCU), the Theory of Planned Behavior (TPB), and Social Cognitive Theory (SCT). UTAUT consolidates these into four core variables and four control variables based on demographics. It demonstrates an explanatory power of up to 70% in predicting user adoption of information. UTAUT incorporates performance expectations (PE), effort expectations (EE), social influence (SI), and facilitating conditions (FC) as its predictors. The mediator variable is behavioral intention, while use behavior is considered the endogenous variable. Moreover, age, experience, gender, and voluntariness of use have been integrated as moderating variables [37].

Numerous studies have demonstrated that UTAUT is a mature research model for technology behavior and the most predictive model for technology acceptance [3]. UTAUT is suitable for various technological domains, including educational technology, health technology, business technology, and communication technology, according to existing studies [11, 17, 22, 23]. UTAUT has been widely employed in health technology research to analyze information systems and social media related to health subjects [7, 5, 10, 33]. Venkatesh et al. (2003)

asserted that UTAUT is successful in clarifying changes in behavioral intentions related to the adoption of a given technology.

Moreover, the UTAUT model continues to develop and expand. UTAUT2 by incorporating new variables: hedonic motivation, habit, and price-value. This expansion aimed to enhance the original UTAUT model, which primarily focused on technology usage in the consumer setting. UTAUT2 has gained widespread adoption in health technology research, including chatbot technology for aiding domestic violence victims and wearable health devices, as well as fitness-focused mobile applications [19].

Literature reviews are currently available that summarize research on UTAUT and UTAUT2 in various fields, including mobile payments [2], health-related mobile apps [14], education [6], government convenience systems [4], and banking systems [27]. There are currently no systematic literature studies on sexual health information technology using UTAUT or UTAUT2. Instead, literature reviews have focused on the sexual health of female adolescents, either on all digital media or a specific category, and it is still in the early stages [25, 18]. There is a lack of summary on the results of the information technology model used in the studies. This study endeavors to address the current lack by reviewing previous research on factors influencing intentions to use sexual health IT, utilizing the UTAUT framework. Research questions include:

Q1. How are the years published distributed among the selected studies?

Q2. What is the sample size distribution for the selected research?

Q3. What is the primary purpose of UTAUT-based research on sexual health information use?

Q4. What are the UTAUT-based empirical evidence factors that best influence sexual health information use intentions?

Q5. What are the main limitations of research on sexual health IT based on UTAUT?

This study assists sexual health education organizations and individuals in understanding the critical factors influencing users' adoption of sexual health IT. By doing so, it enables them to disseminate sexual health information more effectively and to conduct sexual health education programs with greater efficiency.

2 Materials and Methodology

2.1 Literature search method

We undertook a systematic review of English-language peer-reviewed journals from January 2013 to November 2023. The primary search was for articles utilizing UTAUT as a theoretical framework to examine sexual health information technology. The systematic review followed PRISMA guidelines [29, 34]. The systematic literature review flowchart was created following the PRISMA principles (Figure 1). The study utilized eight primary databases, which included Google Scholar, PubMed, Springer, Taylor & Francis, ScienceDirect, IEEE, Scopus, and Web of Science. The study utilized a specific database index to supplement keywords, including "UTAUT" and "sexual health", "UTAUT" and "HIV", "UTAUT" and "STIs", "UTAUT" and "reproductive health", "UTAUT" and "condoms", and "UTAUT" and

"contraception/contraceptives" (Table 1). Additional searches were conducted to ensure that articles retrieved through snowballing were included in the researcher's list of studies. The process of selecting literature is shown in Figure 1.

Table 1. Search Strategy Summary.

Database for all Searching	Searching Logic (TITLE-ABS-KEY)	Time
Google Scholar, PubMed, Springer, Taylor & Francis, ScienceDirect, IEEE, Scopus, Web of Science	("Unified Theory of Acceptance and Use of Technology" OR UTAUT) AND ("Sexual Health")	January 2013 - November 2023
	("Unified Theory of Acceptance and Use of Technology" OR UTAUT) AND ("HIV" OR "human immunodeficiency virus")	January 2013 - November 2023
	("Unified Theory of Acceptance and Use of Technology" OR UTAUT) AND ("STIs" OR "sexually transmitted infections")	January 2013 - November 2023
	("Unified Theory of Acceptance and Use of Technology" OR UTAUT) AND ("reproductive health")	January 2013 - November 2023
	("Unified Theory of Acceptance and Use of Technology" OR UTAUT) AND ("condoms")	January 2013 - November 2023
	("Unified Theory of Acceptance and Use of Technology" OR UTAUT) AND ("contraception" OR "contraceptives")	January 2013 - November 2023

2.2Inclusion and Exclusion Criteria

The article's inclusion criteria were as follows: (a) The study needed to be empirical and conducted in English, and (b) The article should be grounded in UTAUT, which serves as a theoretical framework for investigating sexual health information technology, including web pages, text messaging, social networks, mobile apps, etc., and (c) any technical terminologies were explained at first use. Sexual health is the main subject matter, covering sexual health, HIV, STIs, reproductive health, and contraception. Article exclusion criteria comprise (a). Full-text articles are required, with articles excluded if they only discuss sexual health technology and are not based on UTAUT. The article solely focuses on UTAUT and does not include information on sexual health technology. The article is written in English, is not an empirical study, and is not available in full text.

A total of 2,561 articles (Table 2) were selected from 4 databases, and 1 additional article was obtained through snowball sampling. After eliminating duplicate articles, the final count of articles included in the study stood at 507. The researcher reviewed the abstracts and keywords of these articles and excluded 487 articles that fell outside the scope of the study. A total of 20

articles were acquired for in-depth review. After review, six research articles remained as the final results.

Table 2. Search results from various databases.

Databases	Total number of articles
Google Scholar	2,032
PubMed	8
Springer	395
Taylor & Francis	30
ScienceDirect	50
IEEE	1
Scopus	39
Web of Science	6
Total	2,561

Table 3. Article quality assessment items.

#	Dimension	Assessment Criteria
1	Title	The title reflects the research content and is engaging.
2	Study Design & Methods Used	Is the study design clearly described, and are the methods appropriate?
3	Data Collection & Analysis	Are the data collection methods reliable, and are the analysis techniques appropriate?
4	Theoretical Framework	Is the study built upon a solid theoretical framework?
5	Consistency of Results	Do the results align with the research questions and methods?
6	Credibility of Results	Are the results credible, and do the authors honestly discuss the limitations of the results?
7	Innovation & Importance	Does the study propose new viewpoints or methods?
8	Writing Quality	How is the writing quality of the article? Is it clear and concise?

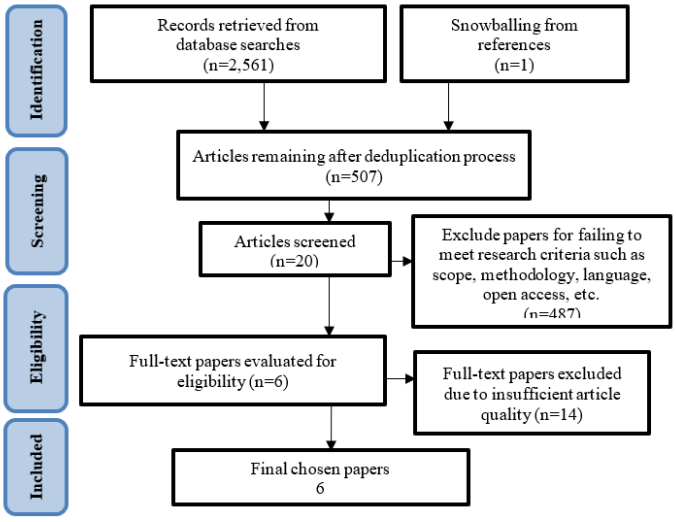

Figure 1. Article Selection Flowchart according to PRISMA (Prisma, 2009).

2.3Quality Assessment

During the in-depth review phase, the study evaluated the quality of the selected records. The article's quality assessment table comprises 8 dimensions (Table 3). Each item was evaluated using a scale ranging from 1 to 5, with 1 denoting very poor quality and 5 signifying excellent quality. The ratings were used to identify significant flaws (rated 1), some deficiencies (rated 2), strengths and weaknesses (rated 3), numerous strengths with room for improvement (rated 4), or minimal flaws with comprehensive excellence (rated 5) in the evaluated dimension. Articles (N=6) that achieve a total score of 32 or higher (at least 80% of the maximum total score) will be considered for further review. Two researchers conducted the scoring process in parallel, and the discussion continued until both parties reached a final agreement percentage of 90%. Table 4 presents the assessment results, demonstrating that all articles have been approved.

Table 4. Results of the assessment.

Research	A1	A2	A3	A4	A5	A6	A7	A8	Totals	Percentage
1	5	4	5	3	5	5	5	4	36	90%
2	5	5	5	5	5	5	5	5	40	100%
3	4	3	5	4	5	5	5	3	34	85%
4	5	5	5	5	5	5	5	5	40	100%
5	5	3	3	4	4	4	4	5	32	80%
6	5	4	4	3	5	5	5	5	36	90%

3 Results and discussion

The detailed findings of the literature analysis are outlined in Table 6. Here is a general overview of the findings and responses to the research questions.

3.1 Overview of research

Six articles were included in the study. The search spanned from 2013 to 2023, with the highest concentration of published articles observed between 2019 and 2023. Notably, there was an increased number of articles published in 2019, 2021, and 2023 (see Figure 2).

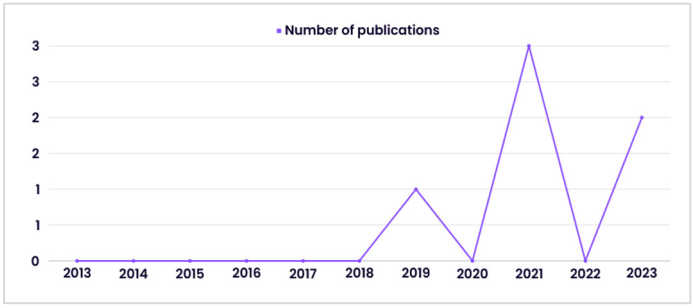

Figure 2. Distribution of sample articles by publication year.

The study population consisted mainly of surveys conducted in developing countries (N=5), with significantly more surveys conducted in society (N=5) than on campus (N=1). The selected

articles employed questionnaire-based research methods, all of which were quantitative studies. This may be attributed to the variable dimensions and solid theoretical sources of UTAUT and UTAUT2. All studies used Likert scales, with sample sizes varying from 49 to 936 (M=305.83). The detailed sample distribution is shown in Figure 3. The majority of studies (N=5) utilized UTAUT theory, while only one study employed UTAUT2.

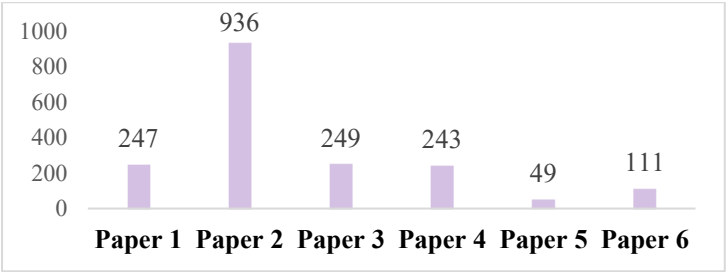

Figure 3. Sample size distribution.

Most of the studies investigated cell phone-based sexual health information systems and explored the factors influencing sexual health information systems based on UTAUT (N=4). Another study focused on exploring the influencing factors of UTAUT-based applications, including social media and robotics (N=2). These studies provide new perspectives on the promotion and application of sexual health information systems.

3.2 Critical factors influencing sexual health technology adoption intention based on UTAUT

Considering the research focus on factors affecting the intention for adopting sexual health IT, the reviewed literature broadens the application of UTAUT to include various technological platforms. This expansion confirms the applicability of UTAUT within the realm of sexual health information. Three studies, carried out in various countries (US, Indonesia, and Malaysia), examined interventions related to sexual health IT [21, 28, 24]. These studies investigated how sexual health technology can enhance sexual health education using a UTAUT-based framework. Additionally, a study conducted by Olamijuwon and Odimegwu specifically targeted young individuals in Africa [33]. The main objective was to aid sexual health educators in effectively utilizing social media for crafting practical and engaging sexual health messages. Two studies were conducted on specific populations. The first study, conducted in China by Ma, Zhong, Lin, and He, investigated various factors influencing the use of prevention systems among individuals engaging in same-sex behavior, aimed at reducing the risk of contracting the disease through prevention measures [26]. The second study, conducted in Uganda, focused on a care delivery system specifically designed for HIV patients, exploring ways to enhance patient acceptance of this system [9]. Table 5 displays the frequency of the impact of UTAUT factors on intention across the sample studies.

Table 5. Frequency of the influence of UTAUT factors on intention in the sample studies (N=6).

UTAUT (Include UTAUT2) factor in studies	Number of times significant
PE	4
EE	4

SI	3
FC	1
Habits (Moderator)	1

Table 6. Overview of Reviewed Articles (N=6).

Author	Database	Research population	Factors From UTAUT/ UTAUT2	Method	Sample size	Technology	Results
[28]	IEEE	Indonesia; Indonesian	PE/EE/FC/BI/UB/Habit/Hedonic Motivations (UTAUT2)	Survey	N=273	The Family Planning Management Information System	PE, EE, and Habits Influence BI, Whereas FC, Habits, and BI Influence UB.
[33]	Springer/Web of Science	Kenya, Nigeria, and South Africa; Young people with access to the internet and Facebook	PE/EE/SI/BI/FC (UTAUT)	Online survey	N=936	Social media	PE, SI, EE, and FC were significantly associated with access to sexual education on social media platforms. Furthermore, these factors were found to be significantly linked with engagement with sexual health information across social media channels.
[9]	Google Scholar / PubMed	Uganda; HIV patients newly engaged in disease care	PE/EE/FC (UTAUT)	Survey	N=249	Text Messaging Reminder System	PE, EE, and SI contributed to the utilization of text messaging interventions and were significantly correlated with strong behavioral intentions to use.
[24]	Google Scholar / Science Direct/ Web of Science	Maylasia; Chatbot Participants	PE/EE/SI/BI/FC (UTAUT)	Survey	N=243	Chatbots providing information on sexual and reproductive health	PE, EE, FC, and SI are prerequisites for Chatbot's adoption intent.

[21]	Google Scholar / Springer	USA; Participants aged between 18 and 65 years, who are married, cohabiting, or engaged, and are considering which family planning method to select	PE/EE/ SI/BI/ FC (UTAUT)	Survey	N=49	Mobile Phone-Based Chatbot for Family Planning and Contraceptive Informat	EE, PE, FC and SI have no direct effect on BI. However, EE has an indirect effect on BI through PE and EE can directly affect PE.
[26]	Google Scholar / Taylor & Francis	China; Men who have sex with men	PE/EE/ SI/BI/ FC (UTAUT)	Survey	N=111	The PrEP （pre-exposure prophylaxis） Intelligent Reminder System	SI exerted the most substantial influence on behavioral intention, with PE following closely behind. Moreover, SI exhibited an indirect impact on behavioral intention, with PE serving as a mediator in this indirect effect.

Note. Behavioral Intention is denoted as BI and Use Behavior is denoted as UB.

3.3 Research limitations of the UTAUT-Based study of sexual health information adoption

Upon analyzing the studies, it was noted that many of them had limitations concerning the age and location of participants, thus limiting their generalizability to a broader population [21, 33, 9, 24]. Moreover, the studies had small sample sizes, limiting their scope [21]. Additionally, the majority of studies utilized a cross-sectional design, limiting the ability to infer causal relationships between the variables examined [26, 33, 24]. Furthermore, some studies modified the UTAUT model to suit their specific research contexts, which could have led to biased results [9]. Hence, it is imperative to incorporate more robust evidence from the literature or employ more precise research methodologies and tools to validate the new model. Detailed research limitations are analyzed below (Table 7).

Table 7. Limitations on review articles.

Source	Limitation for study
[21]	a. Only for a limited population within the United States. b. Integrated sexual health information robots, such as those with integrated family planning program information, were not further tested.
[26]	a. There is no direct validation of usage behavioural influences.

	b. A cross-sectional study failed to consider burnout from users' long-term app use. c. The model needs to be more explanatory, and more factors need to be included.
[28]	a. Moderating relationships in UTAUT were not examined. b. Additional factors (e.g., job characteristics) must be included to supplement the research model.
[33]	a. Only correlations were studied (cross-sectional study). b. FC was used in a different context than before. c. Had self-developed structure. d. Focused only on sexual health information provided by government organizations. e. Results are limited to young people using social media.
[9]	a. Sample population is limited to rural Uganda. b. A high level of adaptation of UTAUT limits the generalization of results. c. Low variability in responses.
[24]	a. The age limit of the study sample was 18-35 years old. b. Respondents in the longitudinal study were aware of chatbots for a short period, resulting in limited generalization of the results and the need for further use of longitudinal studies. c. No further causal studies were used.

4 Discussion

The systematic evaluation scrutinized the factors impacting the adoption of sexual health technology, employing the UTAUT framework. From the literature, six studies employing UTAUT were identified. Upon analysis of these studies, it became apparent that several factors influence the adoption of sexual health IT based on the UTAUT framework. These factors include PE, EE, SI, FC, behavioral intentions, and habits. Among these, EE emerged as the most influential factor.

Effort Expectation emerged as the most pivotal factor affecting intentions to embrace sexual health IT.

This finding underscores the significance of user-friendly and readily accessible technology in fostering its adoption. Individuals were more inclined to embrace sexual health information technology when they perceived it to be straightforward and effortless to use. This aligns with previous research which emphasizes the importance of usability and user experience in technology adoption [20]. Additionally, the perception of performance expectations was found to be a significant influencing factor. This emphasizes the perceived benefits of using sexual health technology. Users who perceive that using the technology will lead to improved sexual health outcomes are more likely to adopt it. Therefore, it is crucial for developers and health educators to inform users about the potential benefits of the technology, enhancing their awareness and comprehension of its value. Social influence exerts both direct and indirect effects on users' intentions. Social factors, such as the impact of peers, family, or healthcare professionals, can affect users' attitudes and intentions toward sexual health technology. It is crucial to comprehend the role of social networks and support systems in promoting technology adoption, particularly in cultures where discussions around sexual health might carry a stigma [1]. Research shows that facilitating conditions can directly impact intentions. This factor

highlights the significance of equipping users with the necessary resources and support to proficiently utilize sexual health technology. It is imperative to ensure availability, technical assistance, and adequate infrastructure to effectively promote the integration of sexual health information technology.

Including behavioral intentions and habits as direct influences demonstrates the depth of analysis in these studies. Technical term abbreviations, such as "behavioral intentions", will be explained upon first use. Behavioral intentions signify users' immediate plans to adopt technology, whereas habits demonstrate that individuals who have developed a routine of utilizing sexual health technology are more inclined to persist in its use. These results underscore the enduring and habitual aspect of technology adoption behaviors. Additionally, the use of value-neutral, clear, and objective language devoid of biased or emotional language ensures this study adheres to academic writing conventions.

The reviewed research expands the utilization of UTAUT to sexual health IT, which is a significant contribution since UTAUT was initially created for broader technology acceptance and usage. The research shows how adaptable the UTAUT framework is for different domains, even those covering culturally sensitive topics. Applying UTAUT to sexual health information technology can create opportunities for targeted interventions and strategies that aim to enhance sexual health education and outcomes, the ultimate goal of all studies.

Nevertheless, it is crucial to acknowledge the reviewed studies' limitations, such as their cross-sectional design and limited sample demographics. Future research should aim to include more diverse and representative samples, employ longitudinal methods to establish causality, and address the unique aspects of adopting sexual health technology in different cultural contexts. A deeper comprehension of UTAUT factors could potentially lead to more efficient sexual health interventions and contribute to enhanced global sexual health outcomes. Due to exclusionary conditions, this systematic literature review study was unable to include articles with qualitative research methods. As sexual health information technology research is still in its infancy, there is limited research and attention from the academic community. As the research on sexual health information continues to expand, it is expected that the range of topics investigated in this study will also broaden.

5 Conclusion

This systematic review adhered to the PRISMA guidelines to identify six high-quality studies on UTAUT and technology for sexual health information. From articles gathered between January 2013 and November 2023, findings demonstrated that EE, PE, SI, and FC play crucial roles in shaping adoption intentions. Additionally, the study concluded that both behavioral intentions and habits impact the adoption of sexual health technology. However, the study had limitations related to sample demographics and study design. Subsequent research should concentrate on addressing these limitations, such as the need for more diverse and representative samples, the utilization of longitudinal methodologies, and the inclusion of impact factors affecting the use of sexual health IT.

The study presents an in-depth review of current research on sexual health technology within the framework of UTAUT. The research has significant practical implications for the education

and promotion of sexual health. It can guide the implementation of targeted and effective interventions, especially in cultural contexts where social stigma affects sexual health discussions, potentially improving global health outcomes.

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