

## REVIEW ARTICLE

# Effectiveness of Health Education for Teenagers in the Digital Era: A Review

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### ABSTRACT

This study aimed to assess the efficacy of digital education programs in adolescent reproductive health. This study involved a narrative review that used sources from the databases of scientific journals (Elsevier, BMC, BMJ, Sage-Pub, Taylor & Francis, and Scopus) for adolescents' reproductive health, promotion, social media, health education, health reproduction, sexual health, digital era, cell phone, mHealth, mcare, eHealth, telemedicine, health services, adolescence, youth, young adults, and young adolescents. Of the 75 studies identified during the search, 21 were eligible for inclusion. Interventions regarding reproductive health for adolescents in the digital era are diverse and range from social media and healthcare applications to gaming models. Therefore, the success of a health intervention program depends strongly on government support. Some interventions involved in-depth preparations and included discussions with decision makers and relevant professionals. Others have pinpointed training to make most of the interactions with adolescents during reproductive health education. In a review of 21 studies, 90.4% showed an increase in knowledge, attitudes, or behavior toward providing reproductive health education to adolescents. Interventions in the digital era of adolescent reproductive health are diverse and range from social media and healthcare applications to gaming models. The range of interventions was diverse and wide as most studies in the literature presented very good quality and validated interventions. As information technology plays an integral role in the lives of adolescents, education that makes greater use of social media and gaming can be very effective.

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early sexual activity (6,7). However, media can also be helpful. effect of enhancing teenage sexual health also raises awareness of dangerous HIV/STD risk factors and prevention (8–10).

### INTRODUCTION

The meanings of the media can be seen and unseen, both little and a lot (1). The media selection process must be customized to the target's qualities, including young adults. Most young people access online information about their reproductive health using mobile devices. Teens think about and primarily obtain information from the Internet (2). However, there are issues with the information obtained, the veracity of the information as to whether it is true or false, and semantic hurdles in the form of poorly understood scientific jargon (3). According to Chassiakos et al (4), the effects of these media are complex and depend on the nature, consumption, and volume of the media as well as the individual characteristics of its users, including children and teenagers (5). Media typically features sexually explicit materials that pose dangers, such as

Digital media have a remarkable possibility of involving and assisting adolescent sexual well-being(11). Media development as a treatment for health and welfare youth must be encouraged so that the media is useful and beneficial for teenage boys and girls (12,13) and shields teenagers from the media's potential for harm. Media representation that has been created for healthcare must be available to the general population. Suppliers and parents must encourage their children to use media that are crucial for the development and progress of health. Media-based health promotion has enormous potential for monitoring young people, including the ability to define goals, raise awareness, and self-monitor (14).

Data from the Central Statistics Agency show an increase in adolescent delinquency in several areas, including promiscuity and drugs, from 1.0% in 2014–2015 to 2.4% in 2015–2016 (2). social media is one

of the contributing factors to the surge in adolescent delinquency and premarital sexual behavior (15,16). In recent years, sexual activity, early pregnancy, and sexually transmitted infections (STIs), such as HIV, have increased, exerting pressure on the reproductive health of adolescents.(17) Some people become sexually active as they are drawn to the world because of psychological changes. Because they lack adequate understanding of safe sex, they are at risk of STIs and pregnancy (18).

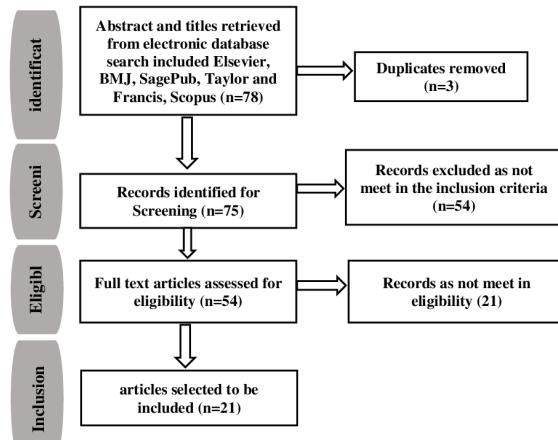
The psychological state of teenagers is inherently precarious, as evidenced by the fact that 47.4% of those who engage in sexual activity do not use condoms, whereas 15.3% have sex with four or more partners (19). Many adolescents lack basic information on reproductive and discussing this matter with their parents is delicate and taboo. They only obtain information from their peers based on their personal experiences, which is often misleading (20). Therefore, appropriate promotion of amputation is required for reproductively healthy adolescents. The US Centers for Disease Control and Prevention (CDC) recommends the implementation of innovative measures to promote reproductive health knowledge through modern technology (21). This study aimed to assess the efficacy of digital education programs on adolescents' reproductive health.

This research reviews the latest types of health promotion in the form of applications, games, social media, and websites to make it easier for adolescents to get accurate, safe information about health education and see how effective various forms of intervention are in increasing knowledge about health education.

## METHODOLOGY

The strategy involved identifying the different types of education undertaken by adolescents through online media from the databases of the following scientific journals: Elsevier, BMC, BMJ, SagePub, Taylor and Francis, and Scopus. Data collection was conducted in one period from December 7 to 15, 2020. Search Term such as adolescent reproductive health, promotion, social media, health education, and education, and the keywords were "education," "promotion," "health reproduction," "sexual health," "digital era," "social media," "cell phone," "Mhealth," "mcare," "ehealth," "telemedicine," "health services," "adolescent," "adolescence," "youth," "young adult," "young adolescent," or "young."

The team identified 21 publications using the aforementioned strategies. First, titles were filtered and a full-text search identified 75 journals. Studies that did not provide interventions through social media, applications, or websites, and did not include opinions, criticism, or reviews were excluded. Thus, 21 journals were selected based on these criteria (Figure 1).



**Figure 1: Research Flow Chart**

## RESULTS AND DISCUSSION

The data were analyzed to determine the characteristics and main findings of the publications. This review and synthesis examined the consistency and divergence of findings across publications, methodological constraints, and gaps in knowledge. Additionally, articles were eliminated based on their quality. The preliminary findings were evaluated and adjusted following consultation with experts. The analysis of the 21 studies showed three categories of study types: quasi-experimental ( $n = 5$ ), descriptive ( $n=15$ ), and randomized controlled trials ( $n=1$ ). The most widely used methodology is the cross-sectional design (Table I).

### Effectiveness of Interventions

In the lives of millennial teenagers, social media creates and shapes a new universe in their psyche by connecting and communicating in novel ways, particularly in the realm of education. Students want media to make the educational process more convenient. Social media has succeeded in meeting these needs and has exceeded the expectations of millennial teenagers (22). A review of 21 studies showed, 90.4% of the studies showed an increase in knowledge, attitudes, or behavior toward providing reproductive health education to adolescents, while 9.6 considered that the internet still presented a contradictory perspective and provided a cultural shift (17,20). The results showed that 85.7% of adolescents used the social media sites Facebook and Instagram, of which 71.4% and 10.7% had a good and sufficient level of knowledge, respectively (23). Social media was found to be a very effective medium for adolescents in cities, but not for those in rural areas (17). Reproductive health, a taboo subject to debate in some circles and one that is generally sensitive.

### Implementation

Interventions in the digital era of adolescent reproductive health are diverse, ranging from social media (23–28) and healthcare applications to gaming models (28,29).

**Table I:** Results of the review on effectiveness Effectiveness of Health Education for Teenagers

Reference	Location, Year, Organization, name and type	Objective and design	Result	Type of Article
(Haruna et al., 2019)	Hongkong, 2019, University of Hong Kong, , Hussein Haruna and Zamzami Zainuddin et al, Research paper.	This study attempts to fill that gap by describing the process of creating one such game. Design-based research was used in iterative cycles to affect the digital game's design, development, testing, and refining.	Gamified learning groups are also available were more optimistic about the effectiveness of their teaching technique than traditional learning groups.	Original Article
(Brayboy et al., 2020)	United States, 2020, Brown University, Lynae M. Brayboy, Katryna McCoyc, Sneha Thamotharand,e, Emily Zhuf, Gabriela Gilg, Christopher Houckd.	This study aimed to look at current approaches to sexual health education for teenagers and identify knowledge gaps. Disparities in sexual health education are common, and young women of color are disproportionately affected. As a result, employing technology to reach out to underprivileged communities has the potential to make a difference.	Using technology provides the benefit of privacy, which is Particularly crucial for populations such as YWOC who have been stigmatized because of their sexual health.	Original Article
(Naja et al., 2017)	Semarang, 2017, Diponegoro University, Naja Zs, Agushyabana F, Mawarni A.	The aim of this study was to see if there was a link or influence between premarital sexual conduct and knowledge, attitudes about sexuality, and social media exposure in high school students in Semarang.	Male respondents accounted for 29.5% of the total, while female respondents accounted for 70.5%. The majority of responses were 17 years old, accounting for 57.6%, 18 years old for 35.8%, and 19 and 20 years old for 6.5%, according to the criteria analyzed.	Original Article
(Sunarsih et al., 2020)	Yogyakarta, 2020, University of Jenderal Ahmad Yani Sunarsih T, Astuti Ep, Shanti Efa, Ambarwati Er	The research goal was to find out what factors influence teenage reproductive health. Adolescent reproductive health challenges are affected by a variety of factors, such as knowledge, access to reproductive health information sources, stakeholder support, reproductive health promotion, and parental participation are just some of the factors to consider.	The study outcomes show that the strategy for promoting great health Adolescent reproductive health focuses on improving the effectiveness of promoting reproductive health for adolescents, stakeholders, and parents. Parental involvement, stakeholder involvement, and increased access to information	Original Article
(Wahyuningtias & Wibisono, 2018)	Blitar, 2018, Institute of Health Patria Husada Wahyuningtias H, Wibisono W.	The goal of this study was to see if there was a link between Students at PGRI TALUN Blitar senior high school used Facebook and Instagram and had free sex knowledge. The study's design was observational with a cross-sectional design.	According to the findings, 85.7% of teenagers who used social media sites like Facebook and Instagram had good knowledge, while 10.7% had reasonable knowledge, while 7.1% of adolescents who did not use Facebook and Instagram had high knowledge and 10.7 percent had fair knowledge.	Original Article
(Cornelius et al., 2019)	USA, 2019, University of North Carolina, Cornelius Jb, Whitaker-Brown C, Neely T, Kennedy A, Okoro F.	Focus groups were used to acquire information on teenage use of mobile phones and social media, and their perspectives of risk-reduction techniques, in the United States and Botswana. The three focus groups were held in separate locations (two in the United States and one in Botswana).	Adolescents in all categories talked about peer pressure and being linked via mobile phones and social media, and having a basic understanding of STIs and HIV.	Original Article
(Alhassan et al., 2019)	Ghana, 2019, University of Health and Allied Sciences, Alhassan Rk, Abdul-Fatawu A, Adzimah-Yeboah B, Nyaledzibor W, Agana S, Mwini-Nyaledzibor Pp.	This study assessed mobile phone usage among adolescents and young adult populations pursuing tertiary education and their use of these technologies in the education and prevention of STIs. This was a cross-sectional analytical study among 250 adolescents and young adults aged 18–24 at Ghana's premier and biggest public University. The study was however conducted in only one public university in the Greater Accra region which potentially poses generalizability challenges due to socio-cultural and economic differences in other regions of the country. Data was collected using structured questionnaire and data analysis done with STATA (version 12.0). Univariate probit regression (VCE, Robust) analysis was used to determine factors associated with adolescents and young adult population's usage of mobile phones in the education and prevention of STIs	Out of the 250 adolescents and young adults interviewed, 99% owned mobile phones. Out of this number, 58% them were smartphone users. Also, it was found that male young adults ( $\text{Coef.} = 1.11, p = 0.000$ ) and young adults who owned a smartphone ( $\text{Coef.} = 0.46, p = 0.013$ ) were more likely to use mobile phones for education and prevention of STIs.	Original Article
(Djannah et al., 2020)	Yogyakarta, 2020, University of Ahmad Dahlan, Djannah SN, Sulistyawati S, Sukesti TW, Mulasari SA, Tentama F..	The study aimed to see how audio-visual media affected the increase in sexual-reproduction knowledge.	This study suggests that audio-visual media have an essential role in developing teenage sexual-reproduction health knowledge.	Original article

**Table I: Results of the review on effectiveness Effectiveness of Health Education for Teenagers (continued)**

Reference	Location, Year, Organization, name and type	Objective and design	Result	Type of Article
(Solehati et al., 2019)	Bandung, 2019, Padjajaran University, Solehati T, Rahmat A, Kosasih CE.	The research aimed to explore how the media affects adolescent reproductive health attitudes and behaviors. The investigation took a cross-sectional approach. Data was collected through questionnaires, which were then analyzed using frequency distribution and the chi-square test.	The manual ( $p = 0.31$ ), newspapers ( $p = 0.46$ ), television ( $p = 0.63$ ), radio ( $p = 1.00$ ), VCD ( $p = 0.92$ ), and the Internet ( $p = 0.13$ ) all had no effect on attitudes. The internet ( $p = 0.03$ ), newspapers ( $p = 0.01$ ), and radio ( $p = 0.02$ ), on the other hand, all exhibited a relationship with behavior, although handbooks ( $p = 0.14$ ), TV ( $p = 0.49$ ), and VCD ( $p = 1.00$ ) did not. Teenage reproductive health is discussed on the internet, on the radio, and in the media.	Original article
(Sari ZA et al., 2019)	Sumatera Barat, 2019, Andalas University, Sari ZA, Sari Np, Nabila N.	The purpose of this project is to see how BSE health promotion using Instagram can help students at Andalas University improve their knowledge, attitudes, and beliefs about technology use.	According to the findings, there were differences in respondents' knowledge, attitudes, and perceptions of their technology's usefulness before and after BSE health promotion via Instagram social media ( $p$ -value 0.05). Instagram can help users disseminate health information visually as widely as possible with an appealing appearance.	Original article
(Omurtag & Turek, 2013)	California, 2013, Wasington University, Omurtag K, Turek P.	Apps with personal messaging capabilities allow for one-on-one interactions; however, medical conversations that aren't encrypted don't comply with HIPAA privacy regulations.	Medical practitioners' use of social media is unavoidable, even if it is delayed, especially in the field of Patients who commonly use internet resources to address their health concerns in reproductive health.	Original article
(Ainiyah, 2018)	Low-middle Income country, 2017, Nicole B. Ippoliti1* and Kelly L'Engle	Both developed and developing countries are becoming more interested in mHealth as a technical area. While published research shows that Higher-income countries are increasing their spending on mHealth solutions for teenage sexual and reproductive health (SRH), There is very little research on SRH mHealth treatments for youth in resource-poor areas. We conducted a global landscape study to address the following research question: How are mHealth treatments being utilized to promote adolescent SRH in low- and middle-income countries (LMICs)?	In total, 17 projects met our requirements. Africa accounted for the majority of these projects (67%), with Eurasia (26%) and Latin America (13%) following closely behind (13%). Most projects (82%) employed mHealth to promote young SRH by fostering knowledge sharing and behavior change. Other efforts (18%) used mobile health to connect people to vital SRH services like family planning, medical abortion, post-abortion care, and HIV care and treatment.	Original article
(Kurebwa, 2020)	Zimbabwe, 2020, NGO, Kurebwa J.	The purpose of this study was to see how effective In Bindura, Zimbabwe, Teenagers' Sexual Reproductive Health (SRH) is promoted through Adolescent Reproductive Health Services (ARHS).	The data revealed that both socio-cultural and healthcare institution characteristics influence SRH service utilization.	Original article
(Aventin et al., 2020)	Aventin B, et al. Engaging Parents In Digital Sexual And Reproductive Health Education: Evidence From The Jack Trial. Bmc. 2020;17(1):1-18.	The acceptability and practicality of employing OMTs to engage parents in SRH education are reported in this study, filling a gap in the literature. The findings will be useful to anyone working on developing and implementing digital SRH programs with parents around the world.	109 teens, teachers, parents, and SRH policy experts engaged in semi-structured interviews and focus groups, 134 parents completed an online survey, and 3179 adolescents completed a program engagement and satisfaction questionnaire.	Original article
(Nuwamanya et al., 2018)	Uganda, 2018, Nuwamanya E, Nuwasima A, Babigumira JU, Asiiimwe FT, Lubinga SJ, Babigumira JB.	To determine the impact of the mobile application, the study uses rigorous evaluation procedures. We propose a randomized control trial study to investigate the causal influence of a mobile phone app in promoting sexual and reproductive health service awareness and utilization in Uganda.	The study outcomes will lead to the creation of a demand-driven, culturally relevant, and simple-to-use mobile app to encourage Ugandan and global adolescents to embrace SRH care.	Original article

**Table I: Results of the review on effectiveness Effectiveness of Health Education for Teenagers (continued)**

Reference	Location, Year, Organization, name and type	Objective and design	Result	Type of Article
(Byron et al., 2013)	Australia, 2013, Byron P, Albury K, Evers C. Research paper.	Information, particularly sexual health information, is not simply delivered from producers to consumers in today's media environment; It is mediated through new media culture participants. We questioned young people aged 16–22 about the potential for sexual health promotion via Facebook and other social media in focus groups hosted in Sydney and regional Australia in 2011.	Consider the participatory culture of social media, the stigma of sexual health disorders, particularly STIs, young people's careful presentation of self, privacy concerns, and the role of humour in sexual health messaging when giving sexual health information to them via social media.	Original article
(Seif et al., 2019)	Zanzibar, 2019, NGO, Seif SA, Kohi TW, Moshiro CS Research paper.	It was also looked at the relationship between communication practice and the model-constructs of information, motivation, and behavioral capacities. The information-motivation-behavioral skills paradigm guided the implementation and evaluation of the intervention.	The experimental group statistically significantly higher immediate post-test ratings in sexual health communication, motivation, and behavioral skills than the control group ( $p=0.05$ ).	Original article

**Acronym**

YWOC: young women of color

STIs: sexually transmitted infections

SRH: sexual and reproductive health

NGO: *Non-Governmental Organization*

AGYW: adolescent girls and young women

ARHS: Adolescent Reproductive Health Services

BSE: Breast Self-Examination

The interventions in this study lasted from 10 days to a year, with one conducted through Instagram posts(30) and (29) over 10 days. The respondents in the latter study signed an agreement not to seek information that related to self-breast examination and breast cancer from sources other than from the posts.(30) A non-governmental organization was employed to promote reproductive health through social media platforms,such as Instagram, Facebook, and Twitter. The administrator of the program first attended a training course and discussed the project with policymakers, academics, and professionals in the field (31).

**Process and Support**

Some of the interventions studied involved in-depth preparations, which included discussions with decision-makers and relevant professionals. In the lives of millennial teenagers, social media creates and shapes a new universe in their psyche when it comes to connecting and communicating in novel ways, particularly in the realm of education. As students, millennials want media to make the educational process more convenient. Whether we realize this, social media has succeeded in meeting these problems and exceeding millennial teenage expectations. In the Instagram study, respondents were divided by age to determine the difference between SNS rates and cell phone use for those who were still or no longer in high school. This study evaluated the results using methods similar to the data collection procedures used in previous studies (25,30,32), which involved the completion of a questionnaire. This comprised information on (1) the individual, (2) media, (3) attitude, and (4) behavior. Individual and social media data were entered via a checklist, and a Likert scale was used for data concerning attitudes and behaviors.

The research found 21 studies that fulfilled the inclusion criteria, of which seven involved the

government(20,26,33), community social (33), and educational institutions (27,33). The virtual world comprises various communication technologies and computer networks (sensors, transducers, connections, transmissions, processors, signals, and controllers). It connects communication equipment (computers, cell phones, electronic instrumentation) worldwide. However, government support and policies are required to disseminate accurate information and prevent the spread of misinformation among irresponsible individuals.

**Coverage and Quality**

Adolescents was used to determine the coverage of this intervention. A total of 21 studies reviewed corresponded to young people who participated in the intervention, of which six covered (27,32), with a population of 28 to 1,500 adolescents. Other studies have not included this population size. The quality of health promotion interventions through social media is very good (26). In contrast, in Agu et al (20) research, the accuracy of the information sources must be improved.

Reproductive health is the ability of a person to utilize their organs by measuring their fertility, undergoing pregnancy, and experiencing childbirth without any risk (healthy mother and baby), followed by restoration to normal health (34). A healthy state includes the physical, mental, and social aspects of reproductive functions and processes. It is not a state of being disease-free but how a person may live a safe and pleasurable sexual life. Physiological, psychological, social, and cultural shifts that mark the transition from childhood to adulthood define adolescent sexual and reproductive health as a life stage. Adolescents transitioning to adulthood generate a conflict between the need for parental and adult caregiver protection and direction and the right to autonomy and agency (35).

Social media can be used as an innovative and cost-effective reproductive health promotion tool for adolescents that positively impacts health at the individual and community levels, thus allowing behavioral changes. The use of social media platforms such as YouTube, Twitter, and Facebook has proven to be effective in conducting health promotion campaigns in Manchester, UK. It was an effective innovation that reached all people (36). In addition to social media, particular applications that provide health information are very effective in increasing awareness of reproductive health, such as mHealth, which has interesting content and designs. Aligned with national trends, cell phone penetration among young adults is approximately 100%. Additionally, young adults are firm believers in the use of cell phone programs for STI prevention and education. The respondents considered cell phone apps to be more user-friendly than traditional text messages or phone calls (37). This study revealed several crucial findings, including how a cell phone is an inexpensive platform that provides greater anonymity and privacy for young adults in sensitive matters such as sexual and reproductive health. Cell phones have been found to be a viable means for transmitting information on sexual health, although they may not be effective in all aspects of the treatment of STIs, such as notification of test results and counseling. Therefore, future cell phone programs for STI education and prevention must incorporate the development of personalized applications to encourage acceptance among the most vulnerable young people (37).

In the modern era, individuals must access various types of online information. This is due to the sophistication of the technology used to create digital media. Health information is always in demand, and is a vital element in the variety of data downloaded from every community. Reviews have shown that social media have a positive impact on adolescents' health. Its use can increase opportunities for collaboration, communication, and health promotion tools, and it can provide access to essential information such as data on reproductive health. Furthermore, adolescents have the freedom and anonymity to share their experiences and obtain information. The ease, speed, and geographic affordability of social networks are major challenges, but they provide hope in terms of health promotion, particularly reproductive health(38), among adolescents. Social media can be used to improve knowledge, attitudes, behaviors, and practices regarding reproductive health. This study demonstrates how social media can be used in this regard (39). This study aimed to develop the findings of previous studies to build applications by combining several social platforms, including Android applications for adolescents, YouTube, Instagram, and Facebook.

The Android application contains counseling and education services on various topics related to adolescent

reproductive health. The discussion focuses on the dangers of premarital sex and the causes, consequences, and ways to prevent and overcome them. The confidentiality and anonymity of the adolescents who register with the Android application are guaranteed. It has a consultation feature that allows adolescents to ask questions about their reproductive health immediately. It also has an educational video that is accessed through YouTube. Adolescent reproductive health infographics are linked to Instagram and Facebook. These features can be accessed through a single application (a one-stop service).

## CONCLUSION

Reproductive health interventions in the digital age include social media and websites. Their implementation was discussed with policymakers in education on reproductive health, and the use of quality tools and human resources was explored. The range of interventions was diverse and wide as most studies in the literature presented very good quality and validated interventions. As information technology plays an integral role in the lives of adolescents, education that makes greater use of social media and gaming can be very effective. This study recommends that policymakers and stakeholders improve the quality and accuracy of their information. Online materials should be attractive and entertaining for adolescents. They should also be easily understood and have a positive impact on the users. Additionally, this study recommends that further research be conducted to add to the literature and to compare the effectiveness of online and offline health promotions.

The ease of accessing information in the digital era does not necessarily bring positive effects in improving adolescent knowledge, especially related to health. This is because there is still a lack of digital media for health promotion with accurate, precise, and up-to-date information in applications that are more innovative, interesting, and meet the needs of adolescent reproductive health in feeling comfortable and safe. So that is what happens today teenagers tend to get inappropriate information and fall into free sex behavior. This study focused on interventions to promote sexual health using digital media. The Digital Era has presented changes and challenges. One of the most significant is the change in communication patterns that occur in millennials and generation z compared to the previous generation, one of which is the use of digital media in communicating and obtaining various information, and it is necessary to transform sexual health promotion that can be accessed and close to adolescents through digital media.

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