



MALAHAYATI INTERNATIONAL JOURNAL
OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024



ARTICLE INFORMATION

Received: August, 13, 2026

Revised: September, 19, 2026

Available online: September, 27, 2026

at : <https://e-jurnal.iphorr.com/index.php/minh>

Digital reproductive health literacy and sexually transmitted infection prevention among female adolescents

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Abstract

Background: In today's digital age, people can easily access information—particularly regarding reproductive health—through various digital platforms. Sexually transmitted infections (STIs) are caused by pathogens such as bacteria, viruses, or parasites that are transmitted between people through bodily fluids. For adolescents, puberty marks a transitional phase accompanied by significant physical and psychological changes. This period can sometimes lead to risky sexual behavior, which increases the potential for the transmission of sexually transmitted infections. Most adolescents today have ample access to the internet to obtain information about reproductive health.

Purpose: To analyze the relationship between digital reproductive health literacy and STI prevention behaviors among female adolescents.

Method: A correlational design with a cross-sectional approach was employed. The study population consisted of 156 female students in grades 10 and 12, from which a sample of 114 students was selected using proportional stratified random sampling. Data were collected via questionnaires and analyzed using the bivariate Fisher's exact test.

Results: Students' digital reproductive health literacy was mostly in the moderate category (52.6%), while the absolute majority demonstrated good STI prevention behaviors (97.4%). The significance test yielded a p-value of 0.603 (p-value >0.05), meaning the null hypothesis (H₀) was accepted. Therefore, there is no significant association between digital reproductive health literacy and STI prevention behaviors among these female adolescents.

Conclusion: Digital reproductive health literacy was not significantly associated with STI prevention behaviors in this study. The findings suggest that digital reproductive health literacy alone may not explain variations in STI prevention behavior, while other contextual factors may also be relevant and warrant further investigation.

Keywords: Digital Literacy; Prevention Behavior; Reproductive Health; Sexually Transmitted Infection.

INTRODUCTION

Adolescence is a fundamental developmental transition phase, characterized by rapid biological maturation, changes in neural development, and complex psychological reorientation (Mariyati & Rezanisa, 2021). During this phase, the process of pubertal maturation sparks growing curiosity and drives the exploration of sexual identity among adolescents (Purba et al., 2025). When biological sexual maturation is not accompanied by adequate guidance and critical thinking skills, adolescents become highly vulnerable to engaging in risky sexual behavior (Subiyatin, 2025). As a result, adolescence may face increased vulnerability to STIs, highlighting the importance of adequate knowledge and preventive behaviors (Rahayu et al., 2021).

The global burden of Sexually Transmitted Infections (STIs) remains a major public health challenge. According to the World Health Organization (WHO), more than one million curable STIs are acquired every day worldwide among people aged 15-49 years. In 2020, an estimated 374 million new infections occurred with one of four curable STIs: chlamydia, gonorrhea, syphilis, and trichomoniasis (Data Bridge Market Research, 2025). East Java Province recorded the highest number of newly identified AIDS cases in Indonesia during January-March 2025, totaling 768 cases (Ministry of Health of the Republic of Indonesia, 2025). At the broader regional level, health data from Malang City indicate that sexually transmitted infections remain a public health concern, indicate that sexually transmitted infections remain a public health concern requiring continued attention and preventive efforts (Health Office of Malang City, 2025).

In today's digital age, access to health information has undergone a radical transformation thanks to the widespread use of smartphones, high-speed mobile internet, and social media platforms (Sutheeraphrasert et al., 2024). Theoretically, high digital connectivity should empower adolescents by providing instant access to clinical knowledge, thereby promoting protective health behaviors (Anjeli et al., 2026). However, this developmental phase often conceptualized in developmental psychology as "*Emerging Adulthood*" is frequently accompanied by cognitive biases such as the "invulnerability myth," in which adolescents view themselves as immune to

biological factors (Bawono, 2023). Therefore, exposure to online health content does not automatically lead to the adoption of preventive behaviors (Liu, 2025). Furthermore, the digital world is rife with medical hoaxes, unverified advice, and highly sexualized content that can distort adolescents' perceptions of sexual health (Oktaviana & Solihin, 2025). Without adequate digital health literacy particularly the ability to critically evaluate, assess, and apply online health information adolescents remain highly vulnerable to peer pressure and digital disinformation (Subiyatin, 2025; Setyaningsih et al., 2021).

To further explore this issue at the study site, a preliminary survey was conducted by the researchers in October 2025 at SMK Al-Ishlahiyah in Malang Regency. The findings revealed a notable gap between students' access to digital information and their understanding of reproductive health. Although 95% of female students reported using internet-connected devices for more than five hours per day, approximately 28% of the surveyed students were unable to correctly identify basic types or transmission routes of STIs. Interviews with school guidance counselors also provided contextual information regarding regulations on romantic relationships and student interactions, as well as the continued access of students to digital platforms. The preliminary assessment further indicated that the school's Adolescent Information and Counseling Center had been inactive for approximately two years. These findings provided the initial context for examining students' digital reproductive health literacy and its relationship with STI prevention behavior.

These contextual observations highlight the need to examine whether digital reproductive health literacy is associated with STI prevention behaviors among students in this setting. Guided by the Lily Model of eHealth Literacy, the Theory of Planned Behavior, and the Health Belief Model, this study analyzes the relationship between digital reproductive health literacy and STI prevention behaviors among female students at Al-Ishlahiyah Vocational High School.

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RESEARCH METHOD

A quantitative approach with a correlational analytical design and a cross-sectional study design was employed. This approach was chosen because the observation and measurement of the independent variable digital reproductive health literacy and the dependent variable behaviors to prevent sexually transmitted infections (STIs) are conducted simultaneously at the same point in time. This design allows researchers to efficiently analyze the relationship between variables without directly intervening with the subjects.

The accessible population in this study comprised all 10th and 12th grade female students at SMK Al-Ishlahiyah, totaling 156 students. To obtain a representative sample size, calculations were performed using the Slovin formula at a 5% error rate or significance level ($\alpha=0.05$), resulting in a sample of 114 female students. Sampling was conducted using the Proportionate Stratified Random Sampling technique to ensure proportional representation from each grade level. Based on this sampling technique, the respondent composition consisted of 50 10th-grade female students and 64 12th-grade female students.

All stages of the research were conducted at SMK Al-Ishlahiyah from March to May 2026. The process of collecting primary data in the field took place intensively from April 9 to 12, 2026. To maintain the quality and validity of the responses, the administration of the questionnaires was carefully scheduled during free time outside of school exam hours. This strategy was implemented so that the students could complete the instruments with focus without feeling disrupted by their academic activities and to avoid emotional exhaustion.

Primary data was collected using two paper-and-pencil questionnaires that had been validated for both validity and reliability. The first instrument is the HLS-EU-SQ10-IDN questionnaire, used to measure four cognitive domains of reproductive health digital literacy. Respondents' answers were transformed into an index score ranging from 0 to 50 on an ordinal scale with four categories: Very Low, Low, Moderate, and High. This instrument demonstrated

excellent internal consistency with a Cronbach's α value of 0.904. The second instrument was a modified SSBQ (Safe Sex Behavior Questionnaire), consisting of 25 Likert-scale statements (range 1–4) to measure daily preventive practices. The SSBQ yields a score ranging from 25 to 100, categorized as "Poor" or "Good," and exhibits very high reliability with a Cronbach's α value of 0.922.

After all raw data were successfully collected, data processing was conducted in a phased and systematic manner through six standard steps: editing (checking the completeness of questionnaire responses), coding (assigning codes to variables), scoring (evaluating responses), tabulating (organizing data into working tables), processing (entering data into the computer system), and cleaning (cleaning the data and ensuring the absence of errors). Statistical analysis was performed using IBM SPSS software through two stages of analysis. Descriptive analysis was used to summarize and describe the frequency distributions and percentages of respondent characteristics and main variables. For bivariate analysis, the categorized scores of digital reproductive health literacy and STI prevention behavior were arranged in a 2x2 contingency table. Fisher's Exact Test was used to examine the association between the two categorical variables because of the small number of observations in some cells. Statistical significance was set at ($\alpha = 0.05$), with a p-value <0.05 considered statistically significant.

Ethical approval for this study was obtained from the Health Research Ethics Committee (KEPK) of Politeknik Kesehatan Malang (No.DP.04.03/F.XIII.31/0184/2026). In addition to using an informed consent form, the researchers also provided a protocol allowing respondents to withdraw from the study at any time if they so desired. The researchers collaborated with the school's guidance and counseling teachers to provide special support to any female students who experienced emotional distress during the questionnaire-completion process.

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RESEARCH RESULTS

Table 1. Demographic Profile and Digital Health Metrics (N=114)

Variables	Results
Age (Mean±SD)(Range)(Year)	(17.56±2.31)(13-21)
Middle Adolescent (13-16 years old)	47/41.2
Late Adolescent (17-21 years old)	67/58.8
Duration of Internet Usage (n/%)	
<1 hr	7/6.1
2-3 hr	26/22.8
4-5 hr	37/32.5
>5 hr	47/38.6
Reproductive Health Information Source (n/%)	
Internet	88/77.2
Internet and other media	26/22.8
Digital Reproductive Health Literacy (n/%)	
Low	54/47.4
Moderate	60/52.6
Sexual Transmitted Infections (STIs) Prevention Behavior (n/%)	
Poor	3/2.6
Good	111/97.4

Table 1 outlines the demographic profile and digital health metrics of the study population. Late adolescents (aged 17–21 years) constituted the majority of participants (58.8%), with daily internet consumption surpassing five hours for 38.6% of the cohort. Among female respondents, 77.2% utilized online sources as their primary origin of reproductive health knowledge, and 52.6% demonstrated moderate digital literacy in this domain. Nevertheless, proactive STI prevention behaviors were identified in 97.4% of the participants.

Table 2. The Relationship between Digital Reproductive Health Literacy and Sexual Transmitted Infections (STIs) Prevention Behavior

Reproductive Health Literacy	STIs Prevention Behavior		<i>r</i>	<i>p-value</i>
	Poor (n/%)	Good (n/%)		
Low	2/3.7	52/96.3	0.06	0.60
Moderate	1/1.7	59/98.3		

Table 2 indicates that the majority of respondents fall into the moderate category, totaling 60 respondents (52.6%), while those with low digital literacy account for 54 respondents (47.4%). On the other hand, the profile of behaviors related to the prevention of sexually transmitted infections (STIs)

showed a very dominant result in the “good” category, where the majority of respondents 111 respondents (97.4%) exhibited good preventive behaviors, while the remaining 3 respondents (2.6%) fell into the “poor” category. The results of the bivariate analysis using Fisher’s Exact Test yielded a

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DOI: <https://doi.org/10.33024/minh.v9i7.4313>

p-value of 0.60 ($p > 0.05$) with a correlation coefficient of $r = 0.06$. These results indicate that there is no significant association between the level of digital literacy in reproductive health and STI prevention behaviors.

Findings regarding the digital literacy variable indicate that although adolescent girls today are very familiar with the use of mobile devices and digital media in their daily lives, their ability to search for, filter, and critically evaluate the validity of reproductive health information remains limited to basic to intermediate levels. This situation leaves adolescents vulnerable to absorbing health information that is based on myths, is invalid, or has not been verified.

The preventive actions taken by female students are not solely driven by the depth of cognitive understanding derived from digital media. The absence of a significant association may indicate that STI prevention behavior is not determined solely by digital reproductive health literacy. Contextual factors, such as religious norms, school regulations, parental supervision, and peer influences, may also be relevant to adolescents' preventive behaviors. However, these factors were not directly measured in the present study and therefore cannot be established as determinants of the observed behavior.

DISCUSSION

The present study found no significant association between digital reproductive health literacy and STI prevention behaviors among female adolescents at SMK Al-Ishlahiyah ($p = 0.603$; $\phi = 0.06$). The absence of a significant association should be interpreted in the context of the distribution of the study variables. Digital reproductive health literacy was concentrated in the low and moderate categories, whereas almost all respondents (97.4%) demonstrated good STI prevention behaviors. Only three respondents (2.6%) were classified as having poor prevention behaviors. This limited variation in the outcome may have reduced the ability to detect an association between the two variables.

The findings also showed that digital reproductive health literacy remained within the low and moderate categories despite the respondents' relatively high use of digital media. This pattern suggests that frequent access to digital devices does not

necessarily indicate a high level of digital health literacy. Digital reproductive health literacy involves more than accessing information; it also includes the ability to understand, evaluate, and appropriately use health information obtained through digital environments. This interpretation is consistent with the Lily Model of eHealth Literacy, which conceptualizes eHealth literacy as a multidimensional set of skills required to access and evaluate health information and apply it appropriately in digital contexts (Adventus et al., 2019; Milanti et al., 2025; Sørensen et al., 2021).

The absence of a significant association may indicate that digital reproductive health literacy is only one component of STI prevention behavior. Although digital literacy may support adolescents in accessing and evaluating reproductive health information, preventive behavior can also be influenced by attitudes, perceived social expectations, perceived control, previous experiences, and the surrounding social environment. From the perspective of Ajzen's Theory of Planned Behavior, behavioral intentions are influenced by attitudes, subjective norms, and perceived behavioral control, which in turn contribute to the formation of behavior (Gasper et al., 2025). Similarly, the Health Belief Model emphasizes that preventive actions may be influenced by perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action (Buana et al., 2023). Thus, adequate digital reproductive health literacy does not necessarily result in preventive behavior when other behavioral and contextual factors are involved.

The high proportion of good STI prevention behavior despite the absence of a significant association with digital reproductive health literacy may indicate that preventive behavior is influenced by factors beyond individual digital literacy. Previous studies have identified social and environmental factors, including parental involvement and peer influence, as relevant to adolescent sexual behavior (Subiyatin et al., 2025; Rachmawati, 2019). In addition, educational settings may provide social norms and behavioral expectations that shape adolescents' health-related practices. However, the present study did not directly measure parental involvement, peer influence, religiosity, school

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disciplinary practices, or other contextual factors. Therefore, these factors should be regarded as possible explanations that require further investigation rather than as established determinants of the observed preventive behavior.

LIMITATION

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design measured digital reproductive health literacy and STI prevention behavior at the same point in time; therefore, the study cannot establish temporal or causal relationships between the variables. Second, STI prevention behavior was highly concentrated in the good category, with 97.4% of respondents classified as having good prevention behavior and only 2.6% classified as having poor prevention behavior. This limited variation may have reduced the ability of the analysis to detect an association between the variables. Third, the study was conducted at a single vocational high school and involved only female students in grades 10 and 12, which may limit the transferability of the findings to adolescents in other educational or social settings. Fourth, the reliance on self-reported questionnaires to assess STI prevention behavior on sensitive topics may introduce social desirability bias, leading respondents to overreport ideal or normative behaviors. Finally, contextual factors such as parental involvement, peer influence, religiosity, school disciplinary practices, and socio-cultural norms were not directly measured in this study. These factors may be relevant to STI prevention behavior, but their relationships with the observed outcomes cannot be established from the present data.

CONCLUSION

The level of digital reproductive health literacy among female adolescents at SMK Al-Ishlahiyah was concentrated in the low and moderate categories, while most respondents demonstrated good STI prevention behaviors. Bivariate analysis showed no significant association between digital reproductive health literacy and STI prevention behaviors ($p = 0.603$). These findings indicate that digital reproductive health literacy alone may not explain variation in STI prevention behavior in this study.

Other contextual factors may also be relevant, however, such factors were not directly measured and therefore require further investigation.

SUGGESTION

Future research should consider comparative studies involving religious-based and public schools and include additional variables that may be associated with STI prevention behavior, such as peer influence, parenting style, socio-cultural norms, religiosity, and school disciplinary practices. Direct measurement of religiosity and school discipline is particularly recommended to examine whether these contextual factors are associated with STI prevention behavior.

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