Beyond Social Media: Gender and Health Information Exposure in Adolescent Sexual Risk Behavior Literacy

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ABSTRACT

Background: *Sexual risk behavior literacy is essential for helping adolescents understand, evaluate, and apply sexual and reproductive health information in making safe health decisions. However, the increasing use of digital media as a health information source does not always ensure adequate literacy. This study aimed to examine factors associated with literacy in sexual risk behavior among high school students in Central Kalimantan, Indonesia, with particular attention to gender and exposure to health information.*
Method: *: A cross-sectional study was conducted from February to March 2026 among Grade X students at a public vocational high school in Palangka Raya, Central Kalimantan, Indonesia. From a population of 451 students, 90 participants were included using proportionate stratified random sampling across 12 classes. Data were collected using a structured self-administered questionnaire covering socio-demographic characteristics, health information exposure, and sexual risk behavior literacy. Data were analyzed using IBM SPSS Statistics version 25.*
Result: *Most respondents had poor literacy in sexual risk behaviors (74.4%), whereas 25.6% demonstrated good literacy. In the multivariable model, female students had higher adjusted odds of good literacy than male students (AOR = 4.654; 95% CI: 1.454–14.896; p = 0.010). Adolescents obtaining information from formal sources had approximately four times higher adjusted odds of good literacy than those relying primarily on social media (AOR = 4.003; 95% CI: 1.213–13.207; p = 0.023). Strengthening credible school-based and healthcare-based education, gender responsive engagement, and critical appraisal of digital information is therefore necessary.*

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INTRODUCTION

Adolescence is a critical developmental stage characterized by rapid physical, psychological, cognitive, and social changes. During this period, adolescents begin to explore interpersonal relationships and sexual identity, which may increase their vulnerability to risky sexual behaviors if not accompanied by adequate knowledge and health literacy. Sexual risk behaviors, including unprotected sexual intercourse, multiple sexual partnerships, early sexual debut, and exposure to sexually transmitted infections, remain major public health concerns globally because they contribute to unintended pregnancies, sexually transmitted diseases, unsafe abortions, and long-term reproductive health problems.(1) Consequently, strengthening adolescents' sexual risk behavior literacy has become an important strategy for promoting healthy decision-making and preventing adverse reproductive health outcomes.

Globally, adolescent sexual and reproductive health remains a significant challenge. The World Health Organization estimates that approximately 21 million girls aged 15–19 years become pregnant annually in low- and middle-income countries, with nearly half of these pregnancies being unintended. Furthermore, more than one million sexually transmitted infections are acquired every day worldwide, with adolescents and young adults representing one of the most affected population groups.(2) The United Nations International Children's Emergency Fund also reported that inadequate sexual and reproductive health knowledge continues to be a major contributor to adolescent vulnerability, particularly in settings where access to comprehensive sexuality education remains limited. These findings indicate that improving adolescent health literacy is essential to reducing preventable reproductive health risks.(3)

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In Indonesia, adolescent reproductive health remains a growing concern. Data from the Indonesian Health Survey revealed persistent challenges related to adolescent health behaviors, including limited reproductive health knowledge and inadequate utilization of youth-friendly health services.(4) The National Population and Family Planning Agency has consistently reported that many Indonesian adolescents continue to possess misconceptions regarding reproductive health, sexually transmitted infections, and pregnancy prevention. Additionally, increasing internet penetration among adolescents has transformed the landscape of health information acquisition. According to Statistics Indonesia, more than 98% of Indonesian adolescents have access to the internet, with social media becoming the primary source of information. While digital platforms provide unprecedented access to health information, concerns have emerged regarding the quality of information, misinformation, and adolescents' ability to critically evaluate online content.(5)

The increasing reliance on digital media has generated new challenges in adolescent health promotion. The World Health Organization has highlighted the emergence of a global "infodemic," characterized by an excessive amount of information of varying quality circulating across digital platforms. Adolescents frequently encounter health-related content through social media applications such as TikTok, Instagram, YouTube, and other internet-based platforms. Although these channels increase information accessibility, exposure to inaccurate or misleading information may negatively affect adolescents' understanding of sexual and reproductive health issues. Recent evidence suggests that exposure to online health information alone does not necessarily improve health literacy unless adolescents possess sufficient digital literacy and critical appraisal skills.(6)

Health literacy has increasingly been recognized as a key determinant of adolescent health outcomes. Health literacy encompasses not only the ability to access information but also the capacity to understand, evaluate, and apply health information to make appropriate health decisions. Adolescents with adequate sexual health literacy are more likely to engage in protective behaviors, seek reliable health information, and avoid risky sexual practices.(7)(8) Conversely, inadequate literacy may increase vulnerability to misinformation, unhealthy decision-making, and risky sexual behaviors. Therefore, identifying factors associated with literacy in sexual risk behavior is crucial for designing effective health promotion interventions.

Previous studies have identified several determinants of adolescent sexual and reproductive health literacy. Sociodemographic factors such as sex, parental educational attainment, socioeconomic status, and access to health information have consistently been associated with adolescent health literacy outcomes.(8)(9) Gender differences are particularly important because female adolescents generally exhibit higher levels of health-seeking behavior and reproductive health awareness than male adolescents.(9) Furthermore, parental educational attainment may influence adolescents' exposure to health information through family communication and educational support. However, evidence regarding the relationship between parental education and adolescent health literacy remains inconsistent across settings, suggesting the need for further investigation.

Another emerging factor is the exposure of health information. Recent studies have demonstrated that the source and quality of health information significantly influence adolescents' health literacy.(6)(10) Information obtained from healthcare professionals and educational institutions tends to be more accurate, structured, and evidence-based than information obtained from social media or informal interpersonal networks. Nevertheless, social media has become the dominant information source among adolescents worldwide. This phenomenon raises an important question about whether high exposure to digital health information actually improves literacy or merely increases information consumption without enhancing understanding.

Although social media has become a dominant source of health information for adolescents, its contribution to sexual health literacy remains uncertain. Digital platforms can expand access, but the educational value of that exposure depends on the credibility of the sources, the completeness of the messages, and adolescents' ability to evaluate information critically. This uncertainty warrants empirical examination of whether different information pathways are associated with adolescents' sexual risk behavior literacy.

Central Kalimantan is a relevant setting for this investigation because adolescents in Palangka Raya are increasingly exposed to digital information while access to structured sexual and reproductive health education remains uneven. Central Kalimantan represents a geographically diverse province where disparities in access to adolescent reproductive health information remain evident. Although internet penetration and social media use among adolescents have increased substantially, access to reliable health information through formal educational and healthcare channels remains uneven. These contextual characteristics make Central Kalimantan an important setting for examining sexual risk behavior literacy among

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adolescents. At the study school, sexual risk behavior was not taught as a distinct, structured topic in the curriculum, increasing the importance of informal and digital information pathways. Among adolescents enrolled in a public vocational high school in Palangka Raya across accounting, digital business, online business, and office management programs, providing a heterogeneous school-based population for examining gender and information source differences. Evidence from Central Kalimantan remains limited, although locally grounded findings are needed to design contextually appropriate and gender responsive health promotion programs.(11)

Therefore, this study aimed to examine factors associated with sexual risk behavior literacy among grade X students at a vocational high school in Palangka Raya, Central Kalimantan, Indonesia, with particular emphasis on sex, parental educational attainment, and health information exposure. Addressing this gap is important because contextual evidence is needed to inform health promotion programs that are responsive to local adolescent needs and the information environment. These determinants are expected to contribute to the development of evidence-based and gender-responsive health promotion strategies aimed at improving adolescent sexual and reproductive health literacy in the digital era.

METHOD

Study design

This study employed a cross-sectional design to assess sexual risk behavior literacy and its associated factors among high school students. The study was conducted from February to March 2026 at SMKN 2 Palangka Raya, Central Kalimantan, Indonesia. A cross-sectional approach was considered appropriate because the study aimed to examine the distribution of sexual risk behavior literacy and its association with socio-demographic characteristics and health information exposure at a single point in time.

Population and sample

The study population consisted of 451 grade X students enrolled at SMKN 2 Palangka Raya. Sample size was calculated using the Slovin formula, with a tolerated margin of error (d) of 0.10. The calculation produced a minimum sample of 82 students. To account for nonresponse or incomplete questionnaires, the minimum sample size was increased by 10%, resulting in a final target of 90 participants. Proportionate stratified random sampling was used, with the 12 grade X classes treated as strata. The sample was proportionally distributed across all Grade X classes based on the number of students in each class. Eligible students were then randomly selected from the class list. This sampling method was used to minimize selection bias and improve the sample's representativeness of the overall student population.

Variables and data collection

Data were collected using a structured self-administered questionnaire. The questionnaire consisted of sections covering socio-demographic characteristics, health information exposure, and sexual risk behavior literacy. Socio-demographic variables included sex and parental educational attainment. Parental educational attainment for both the father and mother was categorized into primary or lower education, which includes no formal education, elementary school, and junior high school; secondary education, comprising senior high school or vocational high school; and tertiary education, encompassing diploma, bachelor's, master's, and doctoral degrees. Health information exposure was categorized into three groups, formal sources, including teachers and healthcare professionals; interpersonal sources, including parents, relatives, siblings, and peers; and digital media sources, including social media platforms and internet-based media.

Sexual risk behavior literacy was assessed using 25 dichotomously scored items adapted and modified from a previously validated questionnaire. Correct answers received 1 point, and incorrect answers received 0 points, resulting in a total score ranging from 0 to 25. The instrument covered definitions of risky sexual behavior (3 items), forms of risky sexual behavior (6 items), contributing factors (4 items), consequences (5 items), sexually transmitted infections (4 items), and prevention (3 items). Validation showed item correlation coefficients greater than 0.632 and high internal consistency, with a Cronbach's alpha of 0.958. The level of sexual risk behavior literacy was classified into two categories using the modified Arikunto scale, good or high literacy when respondents answered at least 76% of the items correctly, and poor or low literacy when the proportion of correct answers was below 76%.(12)(13) Accordingly, in binary logistic regression, scores of 19–25 were categorized as good literacy, and scores of 0–18 as poor literacy. The modification was applied to support binary bivariate and multivariable analyses and to distinguish respondents who had achieved the expected level of cognitive mastery from those whose knowledge had not yet reached the application level. In the health behavior framework described by Notoatmodjo, knowledge that remains primarily at the remembering or understanding stages may not be sufficient to support the correct application of health information.

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Therefore, respondents scoring below the 76% threshold were grouped into the poor or low literacy category for the purposes of this study.

Statistical analysis

Data were coded, entered, cleaned, and analyzed using IBM SPSS Statistics version 25. Categorical variables were summarized as frequencies and percentages, whereas the literacy score was summarized using the mean, standard deviation, median, interquartile range, minimum, and maximum.

Pearson's Chi-square test was used to examine bivariate associations between the independent variables and sexual risk behavior literacy. Variables with $p < 0.05$ in the bivariate analysis were entered into a multivariable binary logistic regression model. The dependent variable was explicitly coded as 0 = poor literacy and 1 = good literacy. Male sex was used as the reference category for sex, and social media sources were used as the reference category for health information exposure. Results were reported using the regression coefficient (B), standard error (SE), Wald statistic, degrees of freedom (df), adjusted odds ratio [Exp(B)], 95% CI, and p-value. The overall Wald p-value was also reported for health information exposure because it contained more than two categories.

Model adequacy was assessed using the Omnibus test, Hosmer–Lemeshow goodness-of-fit test, Cox and Snell R^2, Nagelkerke R^2, and classification accuracy. Statistical significance was established at $p < 0.05$.

Ethical clearance

This study received ethical approval from the Health Polytechnic of the Ministry of Health, Palangka Raya, Central Kalimantan, Indonesia (No. 120/IV/KE.PE/EXM/2026). Before data collection, students were informed about the study's purpose, procedures, voluntary participation, confidentiality, and the right to decline or withdraw without penalty. Written informed consent was obtained from participating students, and questionnaires were completed anonymously.

RESULT AND DISCUSSION

Table 1. Characteristics of participants and distribution of study variables with 95% confidence intervals (n = 90)

Category	n	%	95% CI
Sex			
Male	41	45.6	35.7–55.8
Female	49	54.4	44.2–64.3
Father's Educational Attainment			
Primary or Lower Education	37	41.1	31.5–51.4
Secondary Education	40	44.4	34.6–54.7
Tertiary Education	13	14.4	8.6–23.2
Mother's Educational Attainment			
Primary or Lower Education	36	40.0	30.5–50.3
Secondary Education	43	47.8	37.8–58.0
Tertiary Education	11	12.2	7.0–20.6
Health Information Exposure			
Formal Sources (Teachers and Healthcare Professionals)	21	23.3	15.8–33.1
Family/Social Sources (Parents, siblings, relatives, and peers)	21	23.3	15.8–33.1
Social Media Sources (Social media platforms and internet-based media)	48	53.3	43.1–63.3
Sexual Risk Behavior Literacy			
Good Literacy	23	25.6	17.7–35.4
Poor Literacy	67	74.4	64.6–82.3

Table 2. Prevalence of sexual risk behavior literacy among high school students (n = 90)

Outcome Variable	n	%	95% CI
Good Sexual Risk Behavior Literacy	23	25.6	17.7–35.4
Poor Sexual Risk Behavior Literacy	67	74.4	64.6–82.3

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Table 3. Descriptive statistics of sexual risk behavior literacy scores (n = 90)

Variable	Mean ± SD	Median (IQR)	Minimum	Maximum
Sexual Risk Behavior Literacy Score	16.66 ± 4.24	17 (14–20)	8	25

Note: SD = Standard Deviation; IQR = Interquartile Range.

A total of 90 high school students were included in this study. Female students accounted for 54.4% (95% CI: 44.2–64.3) of the study population, while males represented 45.6% (95% CI: 35.7–55.8), indicating a relatively balanced gender distribution. Most participants were from families with moderate educational backgrounds, as nearly half of both fathers (44.4%; 95% CI: 34.6–54.7) and mothers (47.8%; 95% CI: 37.8–58.0) had completed secondary education. Conversely, only a small proportion of parents had attained tertiary education, accounting for 14.4% of fathers and 12.2% of mothers.

Regarding health information exposure, social media sources constituted the predominant information pathway among adolescents, reported by more than half of the respondents (53.3%; 95% CI: 43.1–63.3). In comparison, information obtained from school and healthcare-based sources and interpersonal sources each accounted for 23.3% (95% CI: 15.8–33.1). This distribution reflects the growing centrality of digital platforms in adolescents' health information-seeking behaviors.

The prevalence of good sexual risk behavior literacy was 25.6% (95% CI: 17.7–35.4), whereas 74.4% (95% CI: 64.6–82.3) of students demonstrated poor literacy. Thus, approximately three in four adolescents lacked an adequate understanding of sexual risk behaviors. From a public health perspective, this finding is noteworthy given the critical role of sexual health literacy in promoting informed decision-making and preventing adverse reproductive health outcomes during adolescence.

Descriptive analysis of literacy scores revealed a mean of 16.66 ± 4.24, a median of 17 (IQR: 14–20), and a range of 8–25. The observed variability suggests substantial heterogeneity in adolescents' knowledge and understanding of sexual risk behaviors. Despite the widespread availability of information through digital channels, the relatively low prevalence of adequate literacy indicates that access to information alone may not guarantee sufficient comprehension of sexual health issues.

Overall, the univariate findings highlight two important patterns. First, social media has become the dominant source of health information among adolescents. Second, despite this extensive exposure to digital information, the prevalence of adequate sexual risk behavior literacy remains low. These descriptive findings provide a rationale for examining the extent to which gender and health information exposure contribute to disparities in sexual risk behavior literacy among adolescents.

Association between sex and sexual risk behavior literacy

The present study identified a statistically significant association between sex and sexual risk behavior literacy (χ^2 = 7.066; p = 0.008). Female students demonstrated a substantially higher proportion of good literacy than male students. This finding suggests that female adolescents possess greater capacity to access, understand, and apply sexual health information than their male counterparts.

The observed gender disparity may be explained through the Health Literacy Framework, which posits that health literacy develops through an individual's ability to access, comprehend, evaluate, and utilize health information for informed decision-making.(14) Female adolescents are generally more exposed to reproductive health issues, including menstruation, pregnancy prevention, and reproductive health services, which may encourage greater engagement with sexual health information. This is consistent with evidence showing that adolescence is a critical developmental period marked by biological, psychosocial, and sexual maturation, during which gendered experiences may influence health knowledge, risk perception, and health-seeking behaviour.(15)

Furthermore, Social Cognitive Theory emphasizes that knowledge acquisition is shaped by observational learning, social interactions, and environmental influences.(16) Female adolescents are often more likely to discuss reproductive health issues with parents, teachers, and healthcare providers, thereby increasing opportunities to acquire accurate information and develop stronger health literacy skills. Previous studies have also shown that communication patterns, school-based sexuality education, and access to adolescent-friendly reproductive health information contribute to better sexual and reproductive health knowledge among young people.(17)(18)

The findings of this study are consistent with recent evidence demonstrating that female adolescents tend to exhibit higher levels of sexual and reproductive health literacy than males adolescents. For example, adolescent girls showed significantly better reproductive health literacy compared with boys, primarily because they were

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more likely to seek and utilize reproductive health information.(19) Similarly, female students demonstrated higher sexual health literacy scores and greater engagement in preventive reproductive health behaviors.(19) Other studies have also reported that sex, health literacy, reproductive health awareness, and service-seeking behavior are important factors influencing adolescents' ability to understand and apply sexual and reproductive health information.(20)(21)

The higher literacy observed among female adolescents may also reflect differences in perceived vulnerability and motivation to seek reproductive health information. Girls are more frequently exposed to issues related to menstruation, pregnancy prevention, and reproductive health consequences, whereas boys may receive less structured guidance and may underestimate their vulnerability to sexual and reproductive health risks.(22)(23) In addition, gender norms can shape freedom of movement, communication with adults, comfort in discussing sexuality, and willingness to seek formal health information, which may contribute to lower engagement among male adolescents.(24)

From a public health perspective, the significant gender gap observed in this study suggests that current sexual health education strategies may not adequately engage male adolescents. Therefore, gender-responsive health promotion programs are needed to improve male adolescents' participation in reproductive health education and enhance their sexual risk behavior literacy.

Association between mother's educational attainment and sexual risk behavior literacy

No statistically significant association was identified between mother's educational attainment and sexual risk behavior literacy (χ^2 = 5.685 ; p = 0.058). However, descriptive analysis indicated a positive gradient, with the proportion of students exhibiting good literacy increasing alongside maternal educational attainment.

According to the Social Determinants of Health framework, parental education is considered an upstream determinant of health because it influences health knowledge, communication patterns, access to resources, and educational opportunities.(25) Mothers with higher educational attainment generally have greater health literacy and are therefore better able to provide health-related guidance to their children.

Although the present study did not demonstrate statistical significance, adolescents whose mothers attained tertiary education showed a markedly higher prevalence of good literacy than those whose mothers had lower educational attainment. This pattern suggests that maternal education may still play an indirect role in shaping adolescent health literacy.

One plausible explanation for the lack of statistical significance is adolescents' increasing reliance on digital information sources. Contemporary adolescents often obtain health information independently through social media, websites, and online communities rather than exclusively through parental communication. Digital health literacy and information-seeking behaviors are becoming increasingly influential determinants of adolescent health literacy, potentially reducing the direct influence of parental educational background.(26)

Moreover, the relatively small number of mothers with tertiary education in the current study may have limited statistical power, thereby reducing the likelihood of detecting significant differences across educational categories.

Association between father's educational attainment and sexual risk behavior literacy

The present study found no statistically significant association between father's educational attainment and sexual risk behavior literacy (χ^2 = 3.762; p = 0.152). Nevertheless, a positive trend was observed, with adolescents whose fathers had tertiary education demonstrating a higher prevalence of good literacy than those whose fathers had lower educational attainment.

Ecological Systems Theory posits that family environments constitute an important microsystem influencing adolescent development and learning outcomes.(26) Fathers with higher educational attainment may contribute to a more supportive learning environment by encouraging educational achievement, facilitating access to information, and promoting health-seeking behaviors.

However, the influence of paternal education may be attenuated in the digital era. More than half of the respondents in this study reported social media as their primary source of health information. This finding suggests that adolescents increasingly rely on external information environments rather than family-based information sources. Similar observations have been reported in previous research, which found that digital health literacy was more strongly associated with adolescents' health knowledge than parental educational characteristics.(27)

Although paternal education was not statistically associated with sexual risk behavior literacy, the descriptive trend observed in this study suggests that family educational resources may still contribute indirectly to literacy development and should not be overlooked in adolescent health promotion initiatives.

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Association between health information exposure and sexual risk behavior literacy

A statistically significant association was observed between exposure to health information and sexual risk behavior literacy ($\chi^2 = 7.009$; $p = 0.030$). Adolescents who received information from teachers and healthcare professionals exhibited the highest prevalence of good literacy, whereas those relying primarily on social media and interpersonal sources demonstrated substantially lower literacy levels.

This finding supports Health Information Acquisition Theory, which suggests that the effectiveness of health information depends not only on accessibility but also on information quality, credibility, and comprehensibility.(28) Information delivered by teachers and healthcare professionals is generally evidence-based, structured, and aligned with public health recommendations, thereby facilitating more effective learning. This interpretation is consistent with previous evidence showing that school-based sexuality education, healthcare providers, and structured educational materials are considered more trustworthy sources of sexual health information for adolescents than informal or unverified sources.(29)(30)

In contrast, social media platforms expose adolescents to vast quantities of information of varying quality. Although social media increases accessibility, it may simultaneously increase exposure to misinformation, conflicting messages, and unverified content. According to the World Health Organization, health misinformation circulating through digital platforms has become a major challenge for adolescent health promotion worldwide.(31) The digital environment has become an important source of sexuality-related information for young people, but its usefulness depends on whether adolescents are able to assess credibility, identify misinformation, and interpret health messages appropriately.(31)(32)

Interestingly, social media was the dominant source of information among respondents, yet adolescents who relied on school and healthcare-based sources demonstrated superior literacy outcomes. This phenomenon reflects what may be described as a social media paradox, whereby greater exposure to information does not necessarily translate into better health literacy. Similar findings have been reported in previous research, which concluded that digital exposure alone is insufficient to improve sexual health literacy unless accompanied by critical evaluation skills and access to credible information sources.(33)

Recent evidence also suggests that adolescents with stronger digital health literacy are better able to distinguish reliable health information from misinformation and, as a result, demonstrate better health outcomes (33). Consequently, health promotion efforts should not focus solely on increasing the availability of information but should also strengthen adolescents' ability to critically evaluate digital health information. Evidence from adolescent sexual and reproductive health literacy studies also indicates that healthcare workers and formal educational sources remain important channels for improving accurate reproductive health knowledge among students.(33) These findings underscore the importance of strengthening collaboration between schools and healthcare providers in delivering comprehensive sexuality education. Integrating digital health literacy into school curricula may help adolescents navigate increasingly complex information environments and improve their sexual risk behavior literacy.

Table 4. Chi-Square analysis of factors associated with sexual risk behavior literacy among adolescents

Category	Good Sexual Risk Behaviour Literacy (%)	Poor Sexual Risk Behaviour Literacy (%)	χ^2	P-value
Sex				
Male	5 (12.2)	36 (87.8)	7.066	0.008
Female	18 (36.7)	31 (63.3)		
Mother's Educational Attainment				
Tertiary Education	6 (54.5)	5 (45.5)	5.685	0.058
Secondary Education	10 (23.3)	33 (76.7)		
Primary or Lower Education	7 (20.0)	29 (80.6)		
Father's Educational Attainment				
Tertiary Education	6 (46.2)	7 (53.8)	3.762	0.152
Secondary Education	10 (25.0)	30 (75.0)		
Primary or Lower Education	7 (18.9)	30 (81.1)		
Health Information Exposure				
Formal Sources	10 (47.6)	11 (52.4)	7.009	0.030
Family/Social Sources	4 (19.0)	17 (81.0)		
Social Media Sources	9 (18.8)	39 (81.2)		

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Table 5. Multivariable binary logistic regression analysis of factors associated with good sexual risk behavior literacy (n = 90)

Variable	B	SE	Wald	df	AOR	95% CI	P-value
Sex							
Male (Reference)	–	–	–	–	1.000	–	–
Female	1.538	0.594	6.714	1	4.654	1.454–14.896	0.010*
Health Information Exposure			6.598	2			0.037*
Social Media Sources (Reference)	–	–	–	–	1.000	–	–
Formal Sources	1.387	0.609	5.188	1	4.003	1.213–13.207	0.023*
Family/Social Sources	−0.240	0.693	0.120	1	0.787	0.202–3.059	0.729

Notes: The dependent variable was coded as 0 = poor literacy and 1 = good literacy. Male students and social media sources were the reference categories. AOR = adjusted odds ratio; SE = standard error; CI = confidence interval. *Significant at $p < 0.05$

Table 6. Logistic regression model performance

Indicator	Value
Omnibus Test χ^2	14.222
p-value	0.003
-2 Log Likelihood	88.082
Cox & Snell R^2	0.146
Nagelkerke R^2	0.215
Hosmer-Lemeshow χ^2	0.908
Hosmer-Lemeshow p-value	0.923
Classification Accuracy	76.7%

The final binary logistic regression model included sex and health information exposure. The model was statistically significant (Omnibus $\chi^2 = 14.222$; df = 3; $p = 0.003$), indicating that the predictors improved model fit compared with the intercept-only model. The Hosmer–Lemeshow test was non-significant ($\chi^2 = 0.908$; df = 4; $p = 0.923$), supporting adequate calibration.

After adjustment for health information exposure, female students had 4.654 times higher odds of demonstrating good sexual risk behavior literacy than male students (AOR = 4.654; 95% CI: 1.454–14.896; $p = 0.010$).

Health information exposure was significant overall (Wald = 6.598; df = 2; $p = 0.037$). Adolescents obtaining information from formal sources had approximately four times higher adjusted odds of good literacy than those relying primarily on social media (AOR = 4.003; 95% CI: 1.213–13.207; $p = 0.023$). Family/social sources were not significantly different from social media sources (AOR = 0.787; 95% CI: 0.202–3.059; $p = 0.729$).

The Hosmer–Lemeshow goodness-of-fit test yielded a non-significant result ($\chi^2 = 0.908$, $p = 0.923$), indicating that the model's predicted probabilities were consistent with the observed data. Therefore, the final model demonstrated satisfactory calibration and was considered appropriate for interpretation.

The model explained 14.6% of the variation according to Cox and Snell R^2 and 21.5% according to Nagelkerke R^2. Overall classification accuracy was 76.7%; the model correctly classified 92.5% of students with poor literacy and 30.4% of students with good literacy. Together, the findings indicate that adolescent sexual risk behavior literacy is shaped by two connected pathways: individual engagement with sexual health information and the credibility and structure of the information environment. The discussion therefore focuses on the principal findings, plausible mechanisms, comparison with previous evidence, and implications for health promotion.

Gender matters: female adolescents exhibit superior sexual risk behavior literacy

Sex remained significantly associated with sexual risk behavior literacy in both the bivariate and multivariable analyses. Female adolescents had a higher proportion with good literacy than male adolescents (36.7% vs. 12.2%; $\chi^2 = 7.066$; $p = 0.008$). After adjusting for health information exposure, female students had 4.654 times the adjusted odds of achieving good sexual risk behavior literacy compared with male students (AOR = 4.654; 95% CI: 1.454–14.896; $p = 0.010$). This finding indicates that the sex-related difference persisted independently of the primary health information source. However, the relatively wide

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confidence interval suggests that the magnitude of the association should be interpreted cautiously, given the modest sample size.

The present finding is consistent with recent Indonesian evidence. A cross-sectional study involving 438 adolescents in Jakarta reported that poor reproductive health knowledge was more prevalent among male than female adolescents, and males had 1.66 times higher odds of poor knowledge. The study also recommended strengthening reproductive health promotion specifically for male adolescents.(34) Similarly, a survey of 3,123 adolescents participating in India's National Adolescent Health Program found that girls had higher median sexual and reproductive health knowledge scores than boys, although sex differences were relatively limited across the other health domains assessed.(35) These findings suggest that female superiority may be particularly evident for information that is directly related to sexual and reproductive health rather than representing a general cognitive difference between female and male adolescents.

The observed association should therefore not be interpreted as an inherent cognitive advantage among female adolescents. Reproductive health issues such as menstruation, reproductive maturation, pregnancy prevention, and the consequences of unintended pregnancy may be perceived as more immediate and personally relevant by girls, encouraging greater attention to and engagement with reproductive health information. Nevertheless, stronger literacy among female adolescents does not mean that all girls have achieved functional mastery. A 2025 study among 694 female adolescents in Banda Aceh found that although approximately two-thirds had adequate reproductive health literacy, 20.5% still had difficulty understanding reproductive health information and 28.1% had difficulty applying it.(36) This demonstrates that access to information and factual knowledge do not automatically ensure the ability to evaluate and use information appropriately.

Gender related differences may also reflect unequal opportunities for structured learning and confidential discussion. A qualitative assessment among young adolescents in Ghana identified poor sexual and reproductive health knowledge, restricted access to structured and safe information, and a discrepancy between abstinence-focused messages and the sexual experiences reported by several male participants.(37) This evidence suggests that boys may be exposed to sexual risk while receiving information that is incomplete, overly normative, or insufficiently applicable to real-life decisions. The present finding may consequently reflect differences in perceived relevance, communication opportunities, information-seeking behaviour, and the capacity to translate information into practical risk evaluation rather than biological differences between the sexes.

The programmatic response should not merely involve providing male students with more information. Schools and healthcare providers should develop gender-responsive learning environments that increase male adolescents' engagement, perceived relevance, confidence to ask questions, and opportunities to discuss sensitive concerns without judgment. This is particularly important in Indonesia, where an evaluation of Indonesian school textbooks found that reproductive health education remained fragmented across subjects and included material that was incomplete or inconsistent with current medical evidence.(38) Interactive case discussions, risk-assessment exercises, anonymous question channels, peer education, and referral to adolescent-friendly healthcare services may help students move beyond remembering information toward evaluating and applying it in sexual health decisions. Such interventions should actively engage boys while continuing to strengthen girls' critical appraisal and application skills, thereby avoiding deficit-based assumptions and reinforcing equitable sexual health literacy development.

The social media paradox: formal health information sources outperform digital media in predicting sexual risk behavior literacy

Health information exposure was significantly associated with sexual risk behavior literacy. In the bivariate analysis, adolescents obtaining information from formal sources demonstrated the highest proportion of good literacy compared with those relying on family or social sources and social media sources (47.6%, 19.0%, and 18.8%, respectively; $\chi^2 = 7.009$; $p = 0.030$). The association remained significant after adjustment for sex. Health information exposure was significant overall (Wald = 6.598; df = 2; $p = 0.037$), and adolescents who obtained information primarily from teachers and healthcare professionals had approximately four times higher adjusted odds of good literacy than those relying primarily on social media (AOR = 4.003; 95% CI: 1.213–13.207; $p = 0.023$). Meanwhile, family and social sources did not differ significantly from social media sources. The relatively wide confidence interval indicates uncertainty regarding the precise magnitude of the association and should be interpreted considering the modest sample size.

These findings illustrate a "social media paradox": social media was the most frequently reported health information pathway, yet its widespread use was not associated with a higher probability of good sexual risk

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behavior literacy. This pattern suggests that information availability and information mastery are distinct. A recent study among 842 Italian high-school students similarly found that social media was the most frequently reported source of sexuality information, whereas school and scientific materials were used much less frequently. Nevertheless, students initially demonstrated limited sexual and reproductive health knowledge, and their knowledge scores increased significantly after receiving structured education from a multidisciplinary professional team.(39) This evidence supports the interpretation that frequent exposure to sexual health content does not necessarily produce accurate understanding unless information is systematically organized, explained, and reinforced by credible educators.

The advantage associated with formal sources may reflect differences in the quality, structure, and interactivity of the information environment rather than differences in the quantity of information received. Teachers and healthcare professionals are more likely to provide evidence-based explanations, organize information according to adolescents' developmental needs, correct misunderstandings, and offer opportunities for questions and clarification. By contrast, social media content is often encountered incidentally, presented in brief or fragmented formats, and selected through engagement-driven algorithms rather than educational relevance. Consequently, adolescents may recognize sexual health terminology without being able to evaluate source credibility, understand relationships between risk and consequences, or apply information to health-related decisions.

This interpretation is supported by a mixed-methods study of adolescents' digital health literacy, which showed that confidence in searching for online health information did not always correspond with demonstrated ability to assess its credibility and relevance. The study emphasized that effective use of online health information requires critical appraisal, analytical skills, and the ability to distinguish trustworthy information from misinformation.(40) Similarly, adolescent-serving clinicians reported that social media content may be more accessible and engaging than institutionally produced resources, but online sexual and reproductive health materials vary considerably in medical accuracy, developmental suitability, inclusiveness, and usability.(41) These findings suggest that the association observed in the present study may result from the stronger credibility and opportunities for clarification provided by formal information sources. This proposed mechanism remains an interpretation rather than a causal conclusion because the present study used a cross-sectional design.

However, the present findings should not be interpreted as evidence that digital media are inherently ineffective for adolescent sexual health promotion. The relevant distinction is between unstructured social media exposure and purposefully designed digital education. A randomized controlled trial of the Media Aware program demonstrated that a web-based sexual health intervention combining medically accurate information with media-literacy training improved adolescents' sexual health knowledge, corrected inaccurate normative beliefs, and strengthened their ability to critically analyze media messages.(42) Another randomized trial found that a structured online sexual health program improved HIV and sexually transmitted infection knowledge, sexual communication intentions, condom attitudes, sexual assertiveness, and safer sex self efficacy.(43) Digital platforms can therefore support functional literacy when content is evidence-based, developmentally appropriate, interactive, and designed to strengthen appraisal and decision-making skills rather than merely increase exposure.

Within the study's integrated conceptual interpretation, sexual risk behavior literacy develops through the interaction of two pathways: adolescents' engagement with health information and the credibility and structure of the information environment. Social media may facilitate rapid access and repeated exposure, but formal sources may be more effective in transforming exposure into usable literacy because they provide guided interpretation, contextual explanation, feedback, and opportunities to resolve uncertainty. Thus, the observed social media paradox concerns not the digital medium itself but the gap between exposure to information and the skills required to understand, evaluate, and apply it.

The programmatic response should therefore integrate formal and digital communication rather than treating them as competing approaches. Schools and healthcare institutions should collaborate to produce verified digital content, involve healthcare professionals in school-based education, provide links from social media posts to trusted services, and teach adolescents how to identify authorship, examine supporting evidence, compare claims across reliable sources, and recognize misleading content. Anonymous question channels, teacher-facilitated discussions, digital case scenarios, and adolescent-friendly professional consultations could combine the accessibility of social media with the credibility and interactivity of formal education. Such a hybrid approach may help convert

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adolescents' extensive digital exposure into functional sexual risk behavior literacy.

CONCLUSION

This study demonstrates that sexual risk behavior literacy among high school students in Central Kalimantan remains suboptimal, with nearly three-quarters of respondents exhibiting poor literacy. Despite the widespread availability of health information and the predominance of digital media as an information source, adequate literacy regarding sexual risk behaviors was achieved by only a minority of adolescents. These findings indicate that information accessibility alone is insufficient to ensure adequate understanding of sexual and reproductive health issues.

The bivariate analysis revealed that sex and health information exposure were significantly associated with sexual risk behavior literacy, whereas parental educational attainment was not significantly associated with literacy outcomes. Subsequent multivariable logistic regression analysis confirmed that both sex and health information exposure remained independent predictors of sexual risk behavior literacy after adjustment for potential confounding factors.

Female adolescents were significantly more likely to demonstrate adequate sexual risk behavior literacy than male adolescents. This finding highlights the existence of gender disparities in adolescent sexual health literacy and suggests that male adolescents constitute a particularly vulnerable group requiring greater attention within health promotion and sexuality education programs. The persistence of this association after multivariable adjustment indicates that gender related differences extend beyond simple disparities in information access and may reflect differences in health-seeking behavior, risk perception, and engagement with reproductive health information.

Health information exposure also emerged as a significant determinant of literacy outcomes. Adolescents who obtained information from teachers and healthcare professionals demonstrated substantially higher literacy than those who relied primarily on digital media sources. This finding underscores the importance of information quality and source credibility in shaping adolescent health literacy. Although social media was the dominant source of information among respondents, reliance on digital media alone was not associated with superior literacy outcomes. This phenomenon reflects a "social media paradox," whereby increased exposure to health information does not necessarily translate into improved understanding or critical appraisal of sexual health information.

Taken together, the findings suggest that improving adolescent sexual risk behavior literacy requires a shift from strategies focused solely on information dissemination toward approaches that emphasize information quality, source credibility, and critical health literacy skills. Schools and healthcare institutions should strengthen their collaboration in delivering evidence-based sexuality education, while simultaneously enhancing adolescents' capacity to evaluate digital health information critically. Particular attention should be paid to male adolescents and students who rely predominantly on social media as their primary source of health information.

The present study contributes to the growing body of evidence demonstrating that adolescent health literacy is increasingly shaped by information environments and gender-related factors rather than traditional family educational characteristics alone. Future studies should incorporate a broader range of psychosocial, behavioral, and digital literacy variables to better understand the complex determinants of sexual risk behavior literacy among adolescents. Such evidence will be essential for developing more effective and contextually relevant interventions aimed at promoting adolescent sexual and reproductive health in Indonesia.

This study has several limitations. First, the cross-sectional design does not establish temporal or causal relationships. Second, the study was conducted in a single public vocational high school, limiting generalizability to adolescents in other educational, geographical, and sociocultural settings. Third, the modest sample size produced relatively wide confidence intervals and limited the precision of subgroup estimates. Fourth, the self-administered questionnaire addressed a sensitive topic and may therefore be affected by recall and social desirability biases. Fifth, health information exposure was measured using the primary information source and did not capture frequency, duration, simultaneous use of multiple sources, content quality, or adolescents' actual digital appraisal skills. Sixth, combining the original sufficient and poor categories into a binary outcome reduced variation in the literacy measure. The final model explained 21.5% of the variation, indicating that relevant factors such as peer norms, parent-adolescent communication, socioeconomic conditions, digital health literacy, and access to youth-friendly services were not measured. Finally, the source protocol documented written informed consent from participating students. Future studies should use larger multisite samples, longitudinal designs, and more comprehensive measures of information exposure and digital health literacy

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Conflict of Interest

No potential conflicts of interest relevant to this article were reported.

REFERENCES

1. World Health Organization. Adolescent sexual and reproductive health fact sheet. Geneva: World Health Organization; 2024.
2. World Health Organization. Global health sector strategies on HIV, viral hepatitis and sexually transmitted infections 2022–2030: progress update. Geneva: World Health Organization; 2024.
3. United Nations Children's Fund. Adolescent health and well-being report. New York: UNICEF; 2024.
4. Ministry of Health of Indonesia. Indonesia Health Survey 2023 (Survei Kesehatan Indonesia 2023). Jakarta: Ministry of Health of Indonesia; 2024.
5. Badan Pusat Statistik. Statistik telekomunikasi Indonesia 2024. Jakarta: Badan Pusat Statistik; 2024.
6. Stauch L, Dadaczynski K, Okan O. Digital health literacy of children and adolescents and its association with sociodemographic factors. J Med Internet Res. 2025;27:e69170.
7. Nutbeam D. Health literacy as a public health goal: 25 years on. Health Promot Int. 2025.
8. Kelecha YT, Tura G, Dabala M, Gemechu D. Reproductive and sexual health literacy and associated factors among late-adolescent high school students in Arba Minch and Sawla towns, Southern Ethiopia: a cross-sectional study. BMJ Open. 2024;14(8):e086034.
9. Debella A, Getachew A, Tura AK, Bekele H. Sexual and reproductive health literacy and its associated factors among adolescents in Harar town public high schools, Harari, Ethiopia, 2023: a multicenter cross-sectional study. Front Reprod Health. 2024;6:1358884.
10. Power J, Lim MSC, Turner D. Digital sexual literacy: the potential for online spaces to support sexual health literacy. Front Educ. 2024;9:1401252.
11. Halipah S. Gambaran tingkat pengetahuan remaja putri tentang kesehatan reproduksi di SMA Muhammadiyah 1 Palangka Raya. Palangka Raya: Politeknik Kesehatan Kemenkes Palangka Raya; 2020.
12. Arikunto S. Prosedur penelitian: suatu pendekatan praktik. Jakarta: Rineka Cipta; 2013.
13. Notoatmodjo S. Ilmu perilaku kesehatan. Jakarta: Rineka Cipta; 2014.
14. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. Health Promot Int. 2000;15(3):259–67.
15. Sawyer SM, Azzopardi PS, Wickremarathne D, Patton GC. The age of adolescence. Lancet Child Adolesc Health. 2018;2(3):223–8.
16. Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs (NJ): Prentice-Hall; 1986.
17. Goldfarb ES, Lieberman LD. Three decades of research: the case for comprehensive sex education. J Adolesc Health. 2021;68(1):13–27.
18. World Health Organization. Comprehensive sexuality education. Geneva: World Health Organization; 2026.
19. Wickramaarachchi H, Perera S, Wijesekara T, Wickramaarachchi WU, Tennakoon SUB. Sexual health literacy level and associated sociodemographic factors among Sri Lankan adolescents: a cross-sectional analysis of selected urban and rural areas in Kandy District. Asian J Soc Health Behav. 2024;7(1):44–50.
20. Çelik N, Yeşildere Sağlam H. Sexual health literacy and sexual and reproductive health service seeking among young people in Türkiye: levels and determining factors. BMC Public Health. 2026;26(1):454–64.
21. Suratana S. Health literacy and prevention behavior for preventing premature pregnancy among ethnic students in Northern Thailand. Front Public Health. 2025;13:1489021.
22. United Nations Children's Fund. Adolescent development and participation. New York: UNICEF; 2026.
23. Batubara JRL. Adolescent development. Sari Pediatr. 2010;12(1):21–9.
24. Rutgers WPF Indonesia, Center for Reproductive Health Universitas Gadjah Mada. Adolescent sexual and reproductive health in Indonesia: the unfinished business. Jakarta: Rutgers WPF Indonesia; 2020.
25. World Health Organization. Social determinants of health. Geneva: World Health Organization; 2025.
26. Bronfenbrenner U. The ecology of human development: experiments by nature and design. Cambridge (MA): Harvard University Press; 1979.
27. Motiejunaite K, Kuzmarskiene G, Sukys S. Digital health literacy of adolescents and its association with vaccination literacy: the first evidence from Lithuania. Epidemiologia. 2025;6(4):73–84.
28. Johnson JD, Case DO. Health information seeking. New York: Peter Lang; 2012.
29. Silva S, Romão J, Braz Ferreira C, Figueiredo P, Ramião E, Barroso R. Sources and types of sexual information used by adolescents: a systematic literature review. Healthcare. 2024;12(22):2291.
30. Walsh-Buhi ER, Javidi H, Macapagal K. Sexual health information online. In: Christakis DA, Hale L, editors. Handbook of children and screens. Cham: Springer; 2024. p. 349–56.
31. World Health Organization. Health misinformation and digital health communication. Geneva: World Health Organization; 2024.

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32. UNESCO. Sexuality education in a digital environment. Paris: United Nations Educational, Scientific and Cultural Organization; 2023.
33. Aguilar-Quesada A, Sierra-Yagüe A, Sánchez-Ojeda MA, García-Sánchez MR. Effectiveness of digital interventions to reduce school-age adolescent sexual risks: a systematic review. J Nurs Scholarsh. 2025;57(2):180–92.
34. Pristya TYR, Karima UQ, Chaniago H. The comparison of reproductive health knowledge between male and female adolescents in Jakarta. J Ilm Kesehat Masy. 2024;16(1):38–49.
35. Nayak G, Bahl D, Bassi S, Maity H, Mason-Jones AJ, Arora M, et al. Knowledge, attitude, and practices of adolescents and peer educators in relation to the components of the National Adolescent Health Program in India: findings from a cross-sectional survey. Front Public Health. 2024;12:1385412.
36. Wardiati W, Septiani R, Ariscasari P, Mairani T, Arlianti N, Naimah N, et al. Reproductive health literacy among female adolescents in Banda Aceh: a descriptive study. Media Publikasi Promosi Kesehatan Indonesia. 2025;8(9):899–909.
37. Nkrumah J, Abuosi AA, Baku AAA, Yarney L, Abekah-Nkrumah G, Tettey CR. Adolescent sexual and reproductive health literacy needs: a sub-national level assessment in Ghana. Health Promot Int. 2024;39(3):daae042.
38. Diarsvitri W, Utomo ID. Medical perspective of reproductive health education in Indonesian schoolbooks. Front Public Health. 2022;10:852312.
39. Zamponi V, Mazzilli R, Nimbi FM, Ciocca G, French D, Limoncin E, et al. Sexual and reproductive health: level of knowledge and source of information in adolescence. J Sex Med. 2024;21(10):872–7.
40. Taba M, Allen TB, Caldwell PHY, Skinner SR, Kang M, McCaffery K, et al. Adolescents' self-efficacy and digital health literacy: a cross-sectional mixed methods study. BMC Public Health. 2022;22(1):1228.
41. Scull TM, Dodson CV, Geller JG, Reeder LC, Stump KN. A media literacy education approach to high school sexual health education: immediate effects of Media Aware on adolescents' media, sexual health, and communication outcomes. J Youth Adolesc. 2022;51(4):708–23.
42. McCrimmon J, Widman L, Javidi H, Brasileiro J, Hurst J. Evaluation of a brief online sexual health program for adolescents: a randomized controlled trial. Health Promot Pract. 2024;25(4):689–97.
43. Smith C, Rebbeor S, Pleasants E, Frerichs L, Allison BA. Clinician perspectives on commonly used online sexual and reproductive health resources for adolescents: qualitative analysis. JMIR Pediatr Parent; 2026;9:e89643.

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