

Application-based Reproductive Health Education on Reproductive Health Risk Behavior among Adolescents in Ternate City

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ABSTRACT

Background: The current era of digitalization is encouraging public health literacy to increase, especially among teenagers who are close to gadgets, so that the term e-health literacy is known, namely digital health literacy is defined as the ability to search, find and understand health information available in resources. electronically and use information obtained from these resources to overcome health problems.

Objective: To determine the effectiveness of application-based reproductive health education to increase positive behavior of adolescents in Ternate City. **Method:** This research uses a Quasi-experimental method (Pre-post Control Design). The number of samples in this study was 300 teenagers aged 12-15 years, in Ternate City. The measurement uses a questionnaire to measure knowledge, attitudes, actions, subjective norms, perceived behavioral control, and health literacy. The analysis used is the mean difference test, namely the Wilcoxon test and the Mann-Whitney test. **Research Results:** The distribution of respondents based on age groups in the control group and in the intervention group was mostly in the 13 year age group, namely 119 people (79.3%) and 111 people (74.0%), the most common gender was female. The results of the analysis showed that there were no differences between the control and intervention groups before treatment, there were differences between the control and intervention groups after treatment, there were differences before and after treatment in the variables knowledge (p value = 0.000), action (p value = 0.000), and health literacy (0.007) (p value < 0.05). However, there is no difference for the variables Attitude, Subjective Norms, Behavioral Control. There are differences before and after treatment in the variables knowledge (p value = 0.000), attitude (p value = 0.000), action (p value = 0.000), subjective norms (p value = 0.000), behavioral control (p value = 0.000) and health literacy (p value = 0.000) (p value < 0.05). **Conclusion:** Application-based reproductive health education has a good impact in increasing positive behavior among teenagers in Ternate City, this is based on changes in knowledge, attitudes, subjective norms, behavioral control and health literacy.

Keywords: Application, Reproductive Health, Risk Behavior, Adolescents.

INTRODUCTION

Concern regarding premarital sexual behavior of teenagers is clearly illustrated in the 2017 Indonesian Demographic and Health Survey (SDKI), which shows that 80% of teenage girls and 84% of teenage boys have been dating and generally start dating at the age of 15-17 years, 8% of teenagers have sexual relations 49% used condoms, while 12% of unwanted pregnancies occurred. Experiences about abortion among friends were found by 23% of teenagers knowing that a friend they knew had an abortion and 1% of them accompanied/influenced a friend/someone to abort their pregnancy. Exposure to information obtained among teenagers in this survey was 88% of active internet users¹.

The impact of risky behavior such as premarital sex is indeed a serious problem, physical and psychological impacts can be experienced by teenagers, high risk of cervical cancer, risk of contracting venereal disease, HIV/AIDS which can cause infertility and even death, unwanted pregnancies, abortions. causes fertility problems, uterine cancer, permanent disability and even death. Meanwhile, the psychological impact of premarital

sex is the emergence of feelings of guilt, sadness, anger, regret, shame, loneliness, having no help, confusion, stress, self-loathing, hatred of the people involved, fear of being unclear, insomnia (difficulty sleeping), loss of self-confidence, mental disorders, loss of concentration, depression, grief, not being able to forgive oneself, fear of God's punishment, nightmares, feeling empty, hallucinations, difficulty maintaining relationships, and all of this certainly reduces the quality of life of a teenager²⁻⁴.

The current era of digitalization is encouraging public health literacy to increase, especially among teenagers who are close to gadgets, so that the term e-health literacy is known, namely the digital health iteration defined as the ability to search, find and understand health information available in electronic resources and use it. information obtained from these resources to overcome health problems⁵

This is because e-health literacy has become more important in promoting healthy lifestyles in recent years, especially towards teenagers and young adults, the higher the students' e-Health literacy, the higher their level of healthy lifestyle behavior. Research results show that e-Health literacy is an important parameter in encouraging healthy living behavior in adolescents⁶⁻⁸

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This research applies the Theory of Planned Behavior (TPB) which states that behavioral beliefs, normative beliefs and individual control beliefs each determine behavior. This model includes three main factors that influence user intentions and behavior, namely attitudes, subjective norms, and perceived behavioral control. Attitudes reflect an individual's evaluation of application use, including perceptions of the benefits and harms obtained from such use. Subjective norms refer to the social influence felt by individuals, such as the opinions of family, friends and the surrounding community on the use of e-commerce applications. Perceived behavioral control is an individual's perception of his or her ability to adopt and use an application, including factors such as availability of internet access and ease of use.

Adolescent reproductive health interventions in the digital era are very diverse, starting from social media⁹⁻¹⁸. Social media has the potential to be used as a means of promoting reproductive health in increasing knowledge, attitudes and reproductive health behavior in adolescents. The results of this literature study show the effective results of social media as a health promotion medium to increase knowledge, attitudes and health behavior in adolescents related to reproductive health¹⁸. The development of previous research is to build a social media application, where social media is very close to teenagers, namely integrating several social media, including using Android applications about teenagers, YouTube, Instagram and Facebook.

RESEARCH METHODS

This research aims to evaluate the application using quantitative methods with a Quasi-experimental design, pre and post-test with control group. The intervention group was given the use of the application and the control group was given education using the counseling method using e-books related to reproductive health in adolescents. The number of samples in this study was 300 teenagers aged 12-15 years at SMP 1 Ternate City and SMP 7 Ternate City who were taken using the following formula:

$$n_1 = n_2 = \left[\frac{(Z \alpha \sqrt{2PQ} + Z\beta \sqrt{P_1Q_1 + P_2Q_2})^2}{(P_1 - P_2)} \right]^2$$

Based on this formula, the number of samples obtained was 150 respondents for each group, totaling 300 respondents. The samples taken were based on the inclusion and exclusion criteria of having a cellphone, accessing the internet, and being willing to be a respondent, while the exclusion criteria were if they were not willing to be a respondent. This research uses a questionnaire that was created by the researcher himself, measuring, among other things, knowledge, attitudes, actions, subjective norms and health literacy. The analysis used is the mean difference test. The data obtained was not normally distributed, so the tests used were non-parametric, namely the Wilcoxon test and the Mann-Whitney test.

RESULTS

Characteristics of Respondents

The characteristics of respondents in both the control and intervention groups in this study included age, number of children, gender and reproductive health information.

Table 1 shows that the distribution of respondents based on age groups in the control group and intervention group was mostly in the 13 year age group, namely 119 people (79.3%) and 111 people (74.0%). The number of respondents in the age category for the control group and intervention group was greater in the first child category, 54 people (36%) in the control group and 65 people (43.3%) in the intervention group.

Table 1. Distribution based on Respondent Characteristics.

Characteristic	Control Group		Intervention Group	
	n	%	n	%
Age				
12 year	15	10	24	16
13 year	119	79,3	111	74
14 year	13	8,7	15	10
15 year	3	2	0	0
Child				
1	54	36	65	43,3
2	47	31,3	50	33,3
3	35	23,3	24	16,0
4	7	4,7	10	6,7
5	5	3,3	1	7
6	2	1,3	0	0
Sex				
Male	69	46	56	37,2
Female	81	54	94	62,7
Reproductive Health Information				
Yes	78	52	80	53,3
No	72	48	70	46,7
Total	150	100	150	100

Source: Primary Data, 2023

The most common gender was female for both groups, namely the education of the parents of respondents in the treatment group and the control group, 81 people (54%) in the control group and 94 people (92.7%) in the intervention group. More information about reproductive health had received this information for the control group and intervention group, namely 78 people (52%) in the control group and 80 people (53.3%) in the intervention group, while the rest did not know this information.

Prerequisite Test (Normality Test)

The normality test is a prerequisite test before a multivariate test is carried out. Based on the number of samples exceeding 100 samples, the normality test used was *Kolmogorov-Smirnov*. The results of the normality test showed a *p* value <0.05, which means that all data is not normally distributed.

Significance Test

a. Differences between the Control Group and the Intervention Group before and after treatment (Knowledge, Attitudes, Actions, Subjective Norms, Behavioral Control, and Health Literacy)

The results of the Mann Whitney significance test to see knowledge, attitudes, actions, subjective norms, behavioral control, and health literacy before and after treatment are presented in Table 2 below:

Table 2 shows the Mean+ SD values before treatment, namely the variable knowledge (Control: 26.92 3.095, Intervention: 26.65 3.953), Attitude (Control: 57.73 7.818, Intervention: 58.43 7.950), Action (Control: 21 .53 1.047, Intervention: 21.41 1.750), Subjective Norms (Control: 23.78 6.057, Intervention: 25.26 7.149), Behavioral Control (Control: 34.03 5.623, Intervention: 33.90 6.930), Health literacy (Control: 25.79 4.918, Intervention: 25.47 6.044). After the treatment was carried out, the results showed Mean+ SD values for the knowledge variables (Control: 37.75 1.076, Intervention: 37.28 2.165), Attitudes (Control: 57.04 6.624, Intervention: 65.51 8.916), Actions (Control : 23.30 1.174, Intervention: 21.24 1.744), Subjective Norms (Control: 23.00 5.668, Intervention: 31.45 7.165), Behavioral Control (Control:

Table 2. Significance Test Results of Differences in Knowledge, Attitudes, Actions, Subjective Norms, Behavioral Control, and Health Literacy Before and after treatment.

Group	Pre Test		Post Test		p value
	Mean SD	Min-Maks	Mean SD	Min-Maks	
Knowledge					
A. Control	26,92 ± 3,095	21 – 37	37,75± 1,976	30 – 41	0,187
B. Intervention	26,65±3,953	20 – 42	37,28± 2,165	32 – 42	0,047
Attitude					
A. Control	57,73 ± 7,818	20 – 80	57,04± 6,624	38 – 76	0,100
B. Intervention	58,43±7,950	23 – 74	65,51 ± 8,916	28 – 100	0,000
Action					
A. Control	21,53 ± 1,047	17 – 22	23,30 ± 1,174	19 – 25	0,477
B. Intervention	21,41 ± 1,750	11 – 22	21,24 ± 1,744	11 – 22	0,000
Subjektive norm					
A. Control	23,78 ± 6,057	10 – 40	23,00± 5,668	12 – 40	0,078
B. Intervention	25,26± 7,149	10 – 46	31,45 ± 7,165	14 – 50	0,000
Behavior Control					
A. Control	34,03 ± 5,623	12 – 48	33,27± 6,446	15 – 45	0,818
B. Intervention	33,90± 6,930	12 – 48	38,73 ± 5,071	22 – 48	0,000
Health Literasi					
A. Control	25,79 ± 4,918	10 – 40	27,25± 4,756	12 – 40	0,958
B. Intervention	25,47 ± 6,044	10 – 40	30,69 ± 5,271	10 – 42	0,000

Mann Whitney test

Source: Primary Data, 2023

Information:

A. Control Group: Providing standard treatment and e-books from researchers

B. Intervention Group: Providing standard treatment and application

Table 3. Significance Test Results of Differences in Knowledge, Attitudes, Actions, Subjective Norms, Behavioral Control, and Health Literacy Before and After Treatment.

Group	Control (N=150)		Intervention (N=150)		p value
	Mean SD	Min-Maks	Mean SD	Min-Maks	
Knowledge					
A. Pre	25,92 ± 3,095	21 – 37	26,65 ± 3,953	20 – 42	0,000
B. Post	37,75 ± 1,976	30 – 41	37,28 ± 2,165	32 – 42	0,000
Attitude					
A. Pre	57,73 ± 7,818	20 – 80	58,43 ± 7,950	23 – 74	0,418
B. Post	57,04 ± 6,624	38 – 76	65,51 ± 8,916	28 – 100	0,000
Action					
A. Pre	21,53 ± 1,047	17 – 22	19,78 ± 1,966	11 – 22	0,000
B. Post	23,30 ± 1,174	19 – 25	21,34 ± 1,496	11 – 22	0,000
Subjektif Norm					
A. Pre	23,78 ± 6,057	10 – 40	25,26 ± 7,149	10 – 46	0,236
B. Post	23,00 ± 5,668	12 – 40	31,45 ± 7,165	14 – 50	0,000
Behavior Control					
A. Pre	34,03 ± 5,623	12 – 48	33,90 ± 6,930	12 – 48	0,371
B. Post	33,27 ± 6,446	15 – 45	38,73 ± 5,071	22 – 48	0,000
Health Literasi					
A. Pre	25,79 ± 4,918	10 – 40	25,47 ± 6,044	10 – 40	0,007
B. Post	27,25 ± 4,756	12 – 40	30,69 ± 5,271	10 – 42	0,000

Wilcoxon test

Source: Primary Data, 2023

Information:

A. Pre Group: Pre Test before giving standard e-book and application treatment

B. Post Group: Post Test after giving standard e-book and application treatment

33.27 6.446, Intervention: 38.73 5.071), Health literacy (Control: 27.25 4.756, Intervention: 30.69 5.271).

The results of the Mann Whitney significance test in Table 2 (alternative T Independent Test) show that there was no difference between the control and intervention groups before treatment, including knowledge (p value = 0.187), attitude (p value = 0.100), action (p value

= 0.477).), Subjective Norms (0.078), Behavioral control (0.818) and health literacy (0.958) (p value > 0.05), while the test results show that there are differences between the control and intervention groups after treatment, both knowledge (p value = 0.047), Attitudes (p value = 0.000), Action (p value = 0.000), Subjective Norms (0.000), Behavioral control (0.000) and health literacy (0.000) (p value < 0.05).

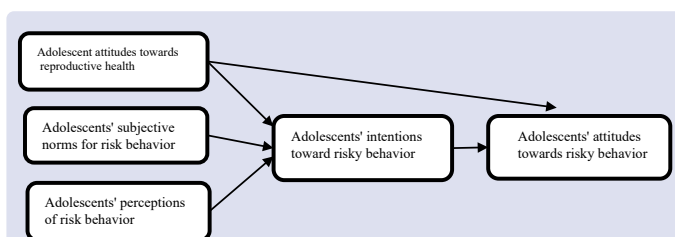


Figure 1. Theory of Planned Behavior based on the relationship between attitudes, subjective norms and perceived behavioral control with adolescent risk intentions and behavior towards reproductive health.

a. Differences Before and After Treatment in the Control and Intervention Groups (Knowledge, Attitudes, Actions, Subjective Norms, Behavioral Control, and Health Literacy)

The Wilcoxon test results were carried out as an alternative T dependent sample test, to determine differences in Knowledge, Attitudes, Actions, Subjective Norms, Behavioral Control and Health Literacy before and after being given treatment.

Table 3 shows that in the control group the Mean SD value there was an increase in the mean value for the knowledge variable (Pre: 25.92 3.095, Post: 37.75 1.076), Action (pre: 21.53 1.047, post: 23.30 1.174) Subjective Norm (pre: 21.78 6.057, Post: 23.00 5.668), and Health Literacy (pre: 25.79 4.918, post: 27.25 4.756), however, there was a decrease in the Behavior Control variable (pre: 34.03 5.623, post: 33.27 6.446) and Attitude (pre: 57.73 7.818, post: 57.04 6.624), while the results in the intervention group showed that the Mean SD value had an increase in the mean value of the knowledge variable (Pre: 26.65 3.953, Post: 37.28 2.165), Attitudes (Pre: 58.43 7.950, Post: 65.51 8.916), Actions (Pre: 19.79 1.966, Post: 21.34 1.496), Subjective Norms (Pre: 25.26 7.149, Post: 31.45 7.165), Behavior Control (Pre: 33.90 6.930, Post: 38.73 5.071) and Health Literacy (Pre: 25.47 6.044, Post: 30.69 5.271).

The results of the Wilcoxon significance test in Table (dependent alternative T test) in the control group show that there are differences before and after treatment in the variables knowledge (p value = 0.000), action (p value = 0.000), and health literacy (0.007) (p value < 0.05), but there is no difference for the Attitude variable (0.418), Subjective Norms (0.236), Behavioral control (0.371) (p value > 0.05), while the intervention group shows that there are differences before and after treatment in the knowledge variable (p value = 0.000), Attitude (p value = 0.000), Action Norms (p value = 0.000), Subjective (p value = 0.000), Behavioral control (p value = 0.000) and health literacy (p value = 0.000) (p value < 0.05).

DISCUSSION

This study was divided into two groups, namely control and intervention groups. The control group was given standard treatment and e-books from researchers, and the intervention group was given standard treatment and applications. The research results will be discussed below:

Analysis of Differences in Knowledge, Attitudes, Actions, Subjective Norms, Control and Health Literacy in the Control Group and Intervention Group

The results of the assessment in the first treatment show that there are differences in knowledge, attitudes, actions, subjective norms, behavioral control and health literacy between the control group (ebook) and the intervention group (application). The results of this research show that reproductive health education for adolescents through ebooks and applications is effective in increasing knowledge,

subjective norms and health literacy. The mean SD value of the comparison between the two groups shows that the intervention group tends to have higher scores in both attitude variables, subjective norms, behavioral control and health literacy. However, this is not the case for the knowledge and action variables, where the control group's mean score is higher, but the difference in scores between the two groups is not significant (only a difference of 0.47), in contrast to action the difference is quite significant difference 2.06.

The differences between the two groups are due to significant changes in the Mean SD values in both groups before and after treatment, where both there were decreases and increases in several different variables (comparison of Table 2 and Table 3). For actions, there was a decrease in the intervention group, while the control group decreased in attitude and behavioral control variables. However, the decline was not that significant. Meanwhile, other variables experienced an increase in mean values in both groups (knowledge, subjective norms, and health literacy).

The use of education through ebooks and applications in this research was proven to increase knowledge, subjective norms and health literacy. Choosing the right teaching materials will help students in the learning process so that it will affect student competence. Student competency is the student's ability that is produced during learning, meaning how far the student absorbs the material presented by the teacher and how much material the student masters^{19,20}. Electronic book teaching materials are books in electronic version. E-books are books in interactive format that use electronics to contain information which can be in the form of text, graphics, images or videos²¹.

Several studies have proven that e-books are effective in increasing knowledge^{22,23}. In the current era of digitalization, creating an interesting application is presented to educate teenagers regarding reproductive health. In line with previous research that the presentation of health information and access is very effective in increasing reproductive health knowledge as it has been developed with attractive content and design, mobile phone penetration among young adults is almost 100% in line with national trends²⁴. The results of the systematic review showed that 100% of the research stated that there was a change in students' level of knowledge after being given education using the application. The use of Android-based media in an effort to increase students' knowledge about health²⁵.

This research shows that there is no significant difference in the level of knowledge between groups given ebooks and applications. However, if we look at the knowledge index value of the intervention group (application) it is higher when compared to the control group (ebook). Research from Hatini in 2021 shows that there was a significant change in knowledge in students who were given intervention based on the "Rumah Midwife My" website application after previously being given a simulation of using the application and manual book, then students used the application independently for 2 weeks²⁶.

Analysis of Differences in Knowledge, Attitudes, Actions, Subjective Norms, Control and Health Literacy Before and After Treatment in the Control Group

The increase in knowledge, actions, subjective norms and health literacy resulting from the treatment of giving ebooks has a positive impact on teenagers which will have an impact on their reproductive health behavior. The content of the material in the ebook is tailored to the needs of teenagers. This 72-page ebook is structured with 12 material contents, including increasing teenagers' self-confidence to become the best version of themselves, planning for the future, my family, my inspiration, taboo talking about reproductive health, reproductive organs, puberty, menstruation, reproductive health, teenage pregnancy, sexually transmitted diseases, when I fall in love and sexual education.

The success of ebooks in increasing knowledge, actions, subjective norms and health literacy proves that the material contained is interesting, informative and easy for teenagers to understand. For example, the first material related to being the best version of you explains that a positive self-concept can make teenagers think that they are too valuable for themselves and their future to be involved in risky things. The second material is related to future plans. It is hoped that teenagers will have good future plans, be able to determine life goals, identify their potential and be aware of things within themselves that need to be improved. The third material, my family, my inspiration is material that instills that family is the most comfortable place and also a place for children's development to grow from an early age. Fourth material, talking about reproductive health is still taboo. This material contains that there is a lot of inaccurate information and myths circulating regarding reproductive health. In fact, it is explained in this module that quality reproductive health education will take into account morals and cultural values.

As for the next material, namely the fifth material, reproductive organs, this material explains the parts of the female and male reproductive organs both externally and internally. The sixth material, Puberty, is explained in the module that puberty is a phase in your life where you transition from child to adult. Seventh material, Menstruation, in this material the definition of menstruation, cycles and the causes of irregular menstrual cycles are explained. Eighth material, breast health, this material explains breast anatomy both externally and internally, provides guidance on how to check breast health with BSE, and why women should check BSE. Ninth material, teenage pregnancy, in this material it is explained that teenage pregnancy can cause depression, physical impacts, and various other impacts on babies born to teenagers such as an increased risk of poor development. The tenth material, sexually transmitted diseases, in this material it is discussed that STDs are infections that are mostly transmitted through sexual contact. The eleventh material, when I fell in love, in this section discusses that falling in love is a process of searching for identity in teenagers. The twelfth material, sexual education, in this material explains more closely the importance of sex education.

Hidayat's ²⁷ research results state that interactive e-book teaching materials can be implemented very well in learning activities on reproductive system material. The average results of the student response questionnaire were 82.20% and the teacher response questionnaire was 95.55% with very good criteria. This shows that the practicality of interactive e-books is ease of use for students in learning ²⁸.

According to Wulandari et al ²⁹, the presentation of interesting learning media is structured systematically, equipped with images, videos and hyperlinks which can foster student interest and make it easier to understand concepts. Learning using electronic books or e-books is very appropriate for students today because they can be accessed anywhere and anytime³⁰. According to Aisyah et al ³¹, using e-book media can improve the ability to understand concepts. Interactive e-book teaching materials are easier to use in learning activities compared to conventional books. So interactive e-books are suitable for use in learning activities because they can increase student competence.

Analysis of Differences in Knowledge, Attitudes, Actions, Subjective Norms, Behavioral Control and Health Literacy Before and After Treatment in the Intervention Group

The application of one theory that explains adolescent sexual attitudes and behavior is the Behavioral Action Theory explained by Ajzen and Fishbein in 1980, where changing behavioral intentions is believed to lead to positive behavioral results. Therefore, for effective education programs regarding safe sex and sexual risk reduction interventions, it

is important to understand the sexual intention patterns of the target population ³¹. One application of behavioral theory in this research is the Theory of planned behavior which emphasizes the rationality of human behavior as well as the belief that the target of behavior is under the conscious control of the individual. This research provides a source of knowledge related to reproductive health that has succeeded in changing the components of knowledge, attitudes and subjective norms that influence adolescent behavior in Ternate City.

The Youth Care for Reproductive Health application is made responsive, dynamic and interactive and can be run on mobile phones. The application will be run using an Android application. The application site will be downloaded via Playstore. With Android, protection is carefully built into every activity you take, such as downloading apps, browsing the web, and choosing to share data. If something looks suspicious, such as a dangerous application or link, Android will notify you and provide tips regarding what action to take. Strong internal security will protect the device and data, in addition to that, Google Play Protect helps users download applications without worrying about whether the application will damage the cellphone or steal data. The initial display of the application is a log in menu by entering an email address and password for those who already have an account or clicking "tab here if you don't have an account" as the first step to create an account which is then directed to enter email/cellphone number and OTP code as a step account verification. displays information related to the account owner, this menu can be used to edit the profile, view preferences and add or log out the account from the application.

The application homepage displays various categories of information and education to increase adolescent literacy, social media to make it easier to share educational materials and special services in the form of consultations with doctors, midwives, psychologists and even coaching mentors. display of educational materials for adolescent health in the application in the form of articles or videos which are used as media to increase adolescent literacy in preventing premarital sex and help adolescents to recognize themselves. Basically, the content of the material in the application is the same as an ebook, but it is displayed more simply in the application menu and can be clicked on to obtain the required information. There is also a my favorite menu to save the desired articles/reading material. The application also has features, the latest articles, consultations with experts and integration with youth social media.

The appearance and content of the application material in this research is a solution for teenagers to get up-to-date reproductive health information and maintain their privacy, so that teenagers no longer feel embarrassed about getting reproductive health information, as well as minimizing teenagers getting the wrong information. This study sought to establish proof of concept for the use of mobile applications to raise awareness and increase use of SRH tools and services among youth in Uganda. The study results will lead to the development of demand-driven, culturally relevant, and easy-to-use mobile applications to increase the uptake of SRH services among youth in Uganda and globally ³²⁻³⁴

Today, technology is increasingly being incorporated into healthcare for safe and efficient service provision. While this can be attributed to the benefits that can be harnessed, digital technologies have the potential to exacerbate and strengthen existing health inequalities ³⁵. This is the basis for equal distribution of the increase in the usefulness of technology in areas far from cities.

A theory states that audio-visual media has a significant role in increasing knowledge of sexual reproductive health in adolescents. In line with this, Notoatmodjo revealed similar evidence that the eyes and ears are the most functional tools for gaining a good understanding ³⁶⁻⁴². From these facts it can be concluded that our audio visuals can

be used as an educational medium to increase teenagers' knowledge about reproductive health. From these facts it can be concluded that our audio visuals can be used as an educational medium to increase teenagers' knowledge about reproductive health.

Conveying information about safer sex using social media is a very good idea because almost every day teenagers open these social media sites and suggest that content from social media be more trendy with different messages every day, for example, social media messages with videos can be sent one day, and pictures with messages can be sent another day. The message or image conveyed is proposed to be more real and more realistic. Social media delivery formats can be insightful because someone is always connecting and responding. The ability to deliver content using multimedia formats such as videos, images and messages exceeds face-to-face platforms. It is therefore advantageous in disseminating risk reduction information to young people when compared with face-to-face interventions that are limited in time and location.

CONCLUSION

The results of this study conclude that the use of reproductive health applications has a good impact in preventing risky behavior in adolescents in Ternate City, this is based on changes in knowledge, attitudes, subjective norms, behavioral control and health literacy.

REFERENCES

- BKKBN (2017) 'Survei Demografi Dan Kesehatan', *Badan Kependudukan dan Keluarga Berencana Nasional*, pp. 1–606.
- Ladi Mustapha, M., Adeola Odebode, A. and Omotosho Adegboyega, L. (2017) 'Impact of Premarital Cohabitation on Marital Stability as Expressed by Married Adults in Ilorin, Nigeria', *Asia Pacific Journal of Multidisciplinary Research*, 5(1), pp. 112–121.
- Candrastuti, D., Messakh, L. and Sari, M. (2021) 'Gambaran Perilaku Seks Pranikah Pada Remaja Di Indonesia'. Universitas Pelita Harapan.
- Realita, F., Kusumaningsih, M.R. and Wiwi, W.M. (2022) 'Korelasi Penggunaan Media Sosial Terhadap Perilaku Seks Pranikah pada Remaja: Literature Review', *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 5(6), pp. 605–611.
- Tümer, A. and Sümen, A. (2022) 'E-health literacy levels of high school students in Turkey: results of a cross-sectional study', *Health Promotion International*, 37(2), p. daab174.
- Gürkan, K.P. and Ayar, D. (2020) 'The impact of e-health literacy on health promotion behaviors of high school students', *J Pediatr Res*, 7(4), pp. 286–292.
- Korkmaz Aslan, G. et al. (2021) 'Association of electronic health literacy with health-promoting behaviours in adolescents', *International Journal of Nursing Practice*, 27(2), p. e12921.
- Turan, N. et al. (2021) 'The effect of undergraduate nursing students'e-Health literacy on healthy lifestyle behaviour', *Global Health Promotion*, 28(3), pp. 6–13.
- Byron, P., Albury, K. and Evers, C. (2013) "'It would be weird to have that on facebook": Young people's use of social media and the risk of sharing sexual health information', *Reproductive Health Matters*, 21(41), pp. 35–44. Available at: [https://doi.org/10.1016/S0968-8080\(13\)41686-5](https://doi.org/10.1016/S0968-8080(13)41686-5).
- Ippoliti, N.B. and L'Engle, K. (2017) 'Meet us on the phone: Mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries', *Reproductive Health*, 14(1), pp. 1–8. Available at: <https://doi.org/10.1186/s12978-016-0276-z>.
- Agu, C.I. (2018) 'Assessing Current And Preferred Sources Of Information On Adolescents ' Sexual And Reproductive Health In Southeast Nigeria : Improving Adolescent Health Programming', pp. 1–29.
- Aventin, Á. et al. (2020) 'Engaging parents in digital sexual and reproductive health education: Evidence from the JACK trial', *BMC*, 17(1), pp. 1–18. Available at: <https://doi.org/10.1186/s12978-020-00975-y>.
- Brayboy, L.M. et al. (2020) 'HHS Public Access', 30(5), pp. 305–309. Available at: <https://doi.org/10.1097/GCO.0000000000000485>.The.
- Nuwamanya, E., Nuwasima, A., Babigumira, Janet U., et al. (2018) 'Study protocol: Using a mobile phone-based application to increase awareness and uptake of sexual and reproductive health services among the youth in Uganda. A randomized controlled trial', *Reproductive Health*, 15(1), pp. 1–12. Available at: <https://doi.org/10.1186/s12978-018-0642-0>.
- Kurebwa, J. (2020) 'The Capacity of Adolescent-Friendly Reproductive Health Services to Promote Sexual Reproductive Health among Adolescents in Bindura Urban of Zimbabwe', 18(1), pp. 61–72. Available at: <https://doi.org/10.3968/11619>.
- Hussein, H. et al. (2019) 'An iterative process for developing digital gamified sexual health education for adolescent students in low-tech settings', *Information and Learning Sciences*, 120(11/12), pp. 723–742. Available at: <https://doi.org/10.1108/ILS-07-2019-0066>.
- Seif, S.A., Kohi, T.W. and Moshiro, C.S. (2019) 'Sexual and reproductive health communication intervention for caretakers of adolescents: A quasi-experimental study in Unguja- Zanzibar', *Reproductive Health*, 16(1), pp. 1–13. Available at: <https://doi.org/10.1186/s12978-019-0756-z>.
- Leonita, E. and Jalinus, N. (2018) 'Peran Media Sosial Dalam Upaya Promosi Kesehatan: Tinjauan Literatur', *INVOTEK: Jurnal Inovasi Vokasional dan Teknologi*, 18(2), pp. 25–34. Available at: <https://doi.org/10.24036/invotek.v18i2.261>.
- Mallongi, A., Rauf, A., Astuti, R., Palutturi, S., & Ishak, H. (2023). Ecological and human health implications of mercury contamination in the coastal water. *Global Journal of Environmental Science and Management*, 9(2), 261-274. doi: 10.22034/gjesm.2023.02.06
- Sunarsih, T. et al. (2020) 'Health promotion model for adolescent reproductive health', *Electronic Journal of General Medicine*, 17(3), pp. 1–7. Available at: <https://doi.org/10.29333/ejgm/7873>.
- Rina Tiya Lestari, Eka Pramono Adi, dan Y.S. (2018) 'E-Book Interaktif', *Universitas Malang* [Preprint].
- Hidayat, N. et al. (2023) 'Pengembangan E-Book Interaktif untuk Meningkatkan Kompetensi Kognitif Siswa', 8(1), pp. 14–21.
- Mardeyanti, M. et al. (2023) 'The Effectiveness of the E-Book "Aku Siap Pubertas (ASiAP)" in Improving the Role of Mothers and Children's Readiness for Puberty', *Jurnal Ilmu dan Teknologi Kesehatan*, 10(2), pp. 229–241.
- Alhassan, R.K. et al. (2019) 'Determinants of use of mobile phones for sexually transmitted infections (STIs) education and prevention among adolescents and young adult population in Ghana: Implications of public health policy and interventions design', *Reproductive Health*, 16(1), pp. 1–11. Available at: <https://doi.org/10.1186/s12978-019-0763-0>.
- Oktaria, R. and Martha, E. (2023) 'Analisis Penggunaan Media Belajar Pendidikan Kesehatan Reproduksi Berbasis Aplikasi Android dan Website: Sistematis Review', *Media Publikasi Promosi Kesehatan Indonesia*, 6(12), pp. 2397–2404.
- Hatini, E.E. (2021) 'Edukasi Tentang Kesehatan Reproduksi Remaja Dengan Media Aplikasi Rumah Bidanku', *LOGISTA-Jurnal Ilmiah Pengabdian kepada Masyarakat*, 5(1), pp. 95–101.
- Mallongi, A., Stang., Ernyasih., Palutturi, S., Rauf, A. U., Astuti, R. D. P., Birawida, A. B. (2023). Calculating Health and Ecological Risks of Pm2.5, and Lead Pollutants Exposure Among Communities Due to Cement Plant Emission, Maros Indonesia 2023. *Journal Of Law And Sustainable Development.*, Miami, v.11, n. 9, pages: 01-19, e01048

28. Sari, F.F. and Budijastuti, W. (2023) 'The Development of Interactive E-Book Media on Protist Topic to Improve Learning Outcomes for 10th Grade of Senior High School', *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, 12(1), pp. 157–167.
29. Wulandari, T.A.J., Sibuea, A.M. and Siagian, S. (2019) 'Pengembangan media pembelajaran berbasis multimedia interaktif pada mata pelajaran biologi', *Jurnal Teknologi Informasi & Komunikasi Dalam Pendidikan*, 5(1).
30. Alwan, M. (2018) 'Pengembangan multimedia e-book 3D berbasis mobile learning untuk mata pelajaran geografi SMA guna mendukung pembelajaran jarak jauh', *At-Tadbir: Jurnal Manajemen Pendidikan Islam*, 2(1), pp. 26–40.
31. Abdullah, F. et al. (2020) 'Association between social-cognitive factors and intention towards sexual activity among school-going late adolescents in Kuantan, Malaysia', *International Journal of Adolescence and Youth*, 00(00), pp. 1–9. Available at: <https://doi.org/10.1080/02673843.2020.1828111>.
32. Nuwamanya, E., Nuwasiima, A., Babigumira, Janet U, et al. (2018) 'Study protocol: Using a mobile phone-based application to increase awareness and uptake of sexual and reproductive health services among the youth in Uganda. A randomized controlled trial', *Reproductive Health*, 15(1), pp. 1–12. Available at: <https://doi.org/10.1186/s12978-018-0642-0>.
33. Kreniske, P. et al. (2023) 'Mobile Phone Technology for Preventing HIV and Related Youth Health Problems, Sexual Health, Mental Health, and Substance Use Problems in Southwest Uganda (Youth Health SMS): Protocol for a Pilot Randomized Controlled Trial', *JMIR Research Protocols*, 12(1), p. e49352.
34. Logie, C.H. et al. (2023) 'Findings from the Tushirikiane mobile health (mHealth) HIV self-testing pragmatic trial with refugee adolescents and youth living in informal settlements in Kampala, Uganda', *Journal of the International AIDS Society*, 26(10), p. e26185.
35. Chidambaram, S. et al. (2024) 'An introduction to digital determinants of health', *PLOS Digital Health*, 3(1), p. e0000346.
36. Basri H, Hadju V, Zulkifli A, Syam A, Ansariadi, Stang, Indriasari R, Helmiyanti S. Dietary diversity, dietary patterns and dietary intake are associated with stunted children in Jenepono District, Indonesia. *Gac Sanit.* 2021;35 Suppl 2:S483-S486. doi: 10.1016/j.gaceta.2021.10.077. PMID: 34929881.
37. Palimbo A, Salmah AU, Amiruddin R, Syam A. An overview of the implementation of the continuity of care model in maternal health services: A literature review. *Gac Sanit.* 2021;35 Suppl 2:S388-S392. doi: 10.1016/j.gaceta.2021.10.058. PMID: 34929858.
38. Muhith A, Winarti E, Perdana SSI, Haryuni S, Rahayu KIN, Mallongi A. Internal Locus of Control as a Driving Factor of Early Detection Behavior of Cervical Cancer by Inspection Visual of Acetic Acid Method. *Open Access Maced J Med Sci [Internet]*. 2020 Apr. 20 [cited 2022 Nov. 10];8(E):113-6.
39. Hasmi and Mallongi, A. 2016. Health Risk Analysis of Lead Exposure from Fish Consumption among Communities along Youtefa Gulf, Jayapura. *Pakistan Journal of Nutrition*, 15. 929-935.
40. Posmaningsih, S., Aryasih, S. K. M., Made, I. G. A., Choirul Hadi, M., Marwati, S. P., & Mallongi, A. (2018). The influence of media booklet in behavior change of waste management in elementary school students, South Denpasar, Bali. *Indian Journal of Public Health Research & Development*, 9(8), 1506-1511.
41. Lopo, C., Razak, A., Maidin, A., Amiruddin, R., Palutturi, S., Suarayasa, K., ... & Ngemba, H. R. (2021). Evaluation of Undata Public Hospital Service Quality and Performance Using SERVQUAL Method: Post Multi Disaster (Earthquake, Tsunami, and Liquefaction) in Palu, Central Sulawesi, Indonesia. *Malaysian Journal of Medicine & Health Sciences*, 17.
42. Napirah, M. R., Amiruddin, R., Palutturi, S., Syam, A., Mallongi, A., Nur, R., ... & Anshary, A. (2021). Implementing a Non-Smoking Regional Policy to Prohibit Childrens' Smoking Habits In Palu City, Indonesia: A Systematic Review. *Malaysian Journal of Medicine and Health Sciences (eISSN 2636-9346)*.

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