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Implementation Of Adolescent Reproductive Health Application: A Comparative Study In Health And Non-Health Students

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Abstract
Limited access to information in adolescents may lead to risky behavior. The Generasi MANTABS Indonesia application is one of the alternative Android-based health promotion media with self-access learning to support student reproductive health improvement programs. This study aimed to analyze the improvement of knowledge after accessing the application between two groups (health and non-health students). This study used a pre-experimental design and a purposive sampling technique. The total number of participants was 601 (162 students in the health major and 439 in the non-health major). The study obtained data from questionnaires containing 7 topics of ARH knowledge that filled out by students in pre and post-tests, and from referral code in the Generasi MANTABS application. Data were analyzed using the Wilcoxon and Mann-Whitney test. The study revealed there is a difference in the level of knowledge before training between health students and non-health students (p = 0.003). After the training, there was a difference in the knowledge (p = 0.031). There was no significant difference in the knowledge improvement between health and non-health students. This indicates that the application is easily accessible to both groups. The Generasi MANTABS Indonesia application increases the knowledge of adolescents in both health and non-health students. Even though the knowledge is about reproductive health, the application is suitable for all students from health and non-health majors. This application can be used as a strategy to promote adolescent health.
Keywords: *health application, adolescent health, effectiveness, good health, well-being.*

INTRODUCTION

The COVID-19 pandemic has impacted social and economic changes, including social distancing, staying at home for a long time, and school closures in almost all areas, followed by financial insecurity. This widespread social and economic shift has disrupted adolescents' romantic and sexual relationships. Their limited access to health care facilities can put them at risk for adverse sexual health impacts (Li et al., 2020). Many adolescents are currently facing increased parental monitoring, resulting in limited privacy. It leads to reduced independence and physical interaction with peers, affecting adolescents' development (Lindberg et al., 2020). The community has currently been focusing on the COVID-19 treatment to ignore essential reproductive health services rev: The community has currently been focusing on the COVID-19 treatment and ignore other essential health services including reproductive health services which considered non-essential during the pandemic (Ngan et al., 2022). Individuals and groups, especially adolescents, are concerned about reproductive health problems because of the broad impact on various aspects of their lives in the future. Half of 63 million adolescents aged 10 to 24 years in Indonesia are vulnerable to unhealthy behavior. The three risks frequently associated with adolescents are sexuality (unwanted pregnancy, abortion, and infection with sexually transmitted diseases), drug abuse, and HIV-AIDS (Rini & Tjadikijanto, 2018).Adolescents tend to have a strong sexual desire, sex hormones, and mature reproductive organs (Ahmadi, 1999). Adolescent behavior changes with technological developments and these changes tend to be harmful due to limited information and unstable emotions. Adolescents face various demands of globalization influenced by technological developments (Wardhani

et al., 2017). In 2010, the number of adolescents was around 63 million, or 26.8% of Indonesia's population (BKKBN, 2017)Sex, drugs, HIV, and AIDS are a trend of globalization and adolescents. Contrary to eastern customs, adolescents face culture and personality (BKKBN, 2009). The lack of information to overcome the growing problems of adolescents will limit their views and mindsets (BKKBN, 2012). Decisions and choices regarding reproductive health can either negatively or positively affect adolescents' lives. Adolescents need access to accurate information regarding reproductive health. The unavailability of accurate and correct information regarding reproductive health forces adolescents to explore independently through print, electronic media, or a circle of friends whose validity is uncertain. There are still many adolescents who do not know the information related to reproductive health especially in rural area (Devi et al., 2022). In this situation, they need to be given information about reproductive health to prevent risky behaviour. The information to provide can be about reproductive health as a 'shield' against the diverse demands of globalization. Through reproductive health education, adolescents get the opportunity to continue their education with more caution.A study showed that students of the Faculty of Medicine (health students) had a better level of knowledge (55.1%) regarding reproductive health than those of the Faculty of Social and Political Sciences (non health students), which only reached 5% (Bhramitasari et al., 2011). Another study showed that 55% of social sciences and economics students had sufficient knowledge before receiving intervention through education. However, students' knowledge increased by 90% after the intervention (Nurhamsyah et al., 2017).Students are educated people and have a more comprehensive level of knowledge when compared to the general public. Approximately 70% students who had a good knowledge also had good positive attitude 13. However, different scientific concentrations cause differences in students' understanding of something. Students who choose health as their major will undoubtedly have more expertise and experience in health sciences when compared to non-health students. Therefore, health students tend to have better acceptance regarding health information than non-health students. Health communication needs to be improved to increase adolescent reproductive health knowledge. Reproductive health communication requires adults' involvement to listen, guide, and observe behavior rather than just stating one-way facts that are not necessarily acceptable. We must also adjust reproductive health content to the acceptance in adolescents. Approval of health education is required as one of the outputs of increasing knowledge. A study stated that 20 out of 29 adolescents wanted to get information about sexual health on social media, especially Facebook (Selkie et al., 2011). They also showed interest in sexual education through social media. This indicates that social media which is part of technology can change the pattern of communication and health education that was previously in the form of face-to-face to through smartphones. The utilization of technological advances can facilitate and influence individuals on health problems.The internet continues to be one of the tools used by many people to access health information. The continued growth of the internet to access health information has created a unique environment for health promotion. Youth are born, and grow up, with pervasive information communication technology (ICT) and do not know how to live without it because of the high of social media exposure and cellphone-using. The condition becomes a common characteristic of the millennial generation (Gabarron & Wynn, 2016). However, a study found that there was no significant effect of using print module (non-technology) but there was a significant effect of self-efficacy after accessing a health promotion media by an application (Gabarron & Wynn, 2016).Android applications can be an alternative educational media to ease users to obtain information and knowledge. A study proved that the use of application-based technology was effective in increasing student knowledge about HIV-AIDS. Therefore, increasing the use of technology in educational efforts should be done (Utami & Hayurani, 2016). Previous studies examined a significant increase in knowledge after accessing reproductive health applications, but did not examine further the scientific background of the participants (Nurmala, Hargono, et al., 2020). Health students tend to have more knowledge about reproductive health than non-health students. so that it is hoped that this application can be accepted and utilized by all students, both from health and non-health backgrounds. In regards to the adolescent reproductive health (ARH), improving access of information will lead to the

improvement of knowledge. This study aimed to analyze the improvement of knowledge after accessing the application between two groups (health and non-health students).

METHODS

Design and Participants

The research was a quantitative study with a pre-experimental pre-post intervention design. The sampling technique used in this study was purposive sampling with criteria of college students in Surabaya (Universitas Airlangga and Universitas Surabaya), then differentiated between health and non-health students. The samples were students interested in peer education activities. The criteria for inclusion of participants are health and non-health students, currently in semester 4, domiciled in Surabaya and surroundings, and willing to participate in peer educator training, have an Android phone because the training was based on an application installed from the Google Play Store (an android-based application). The exclusion criteria is missing data because of incomplete filling of the questionnaire rev: exclusion criteria is missing data caused by incomplete filling out of the questionaire. All students were given peer educator training through an Android-based adolescent reproductive health education application. The author conducted the research from September to November 2021.There were 601 participants, 162 health students and 439 non-health students. The non-health students outnumber the health students because there were more non-health students than health students in both universities. Participants were divided into three groups (in stages) and named *Duta, Sahabat,* and peer educator (PE). *Duta* GENTABS were health students who accompanied *Sahabat* GENTABS to access the ARH application independently and got ARH training offline. Meanwhile, *Sahabat* GENTABS were non-health students who attended PE for GENTABS to access the ARH application independently and participated in the offline activity. PE for GENTABS were health and non-health students who accompanied other students to access the ARH application independently and participating in online training. The authors hoped that PE could reach all students at the university.

ARH Application (*Generasi MANTABS Indonesia*)

The research designed an android-based application called "*Generasi MANTABS Indonesia*" to improve the development of reproductive health implementation models for students. Generasi MANTABS stands for Independent *(Mandiri),* Active *(Aktif),* Nationalist *(Nasioanlis),* Totality *(Totalitas),* Fun *(Asyik),* Brilliant *(Brilian)* and Success *(Sukses).* Everyone can download the application for free through the Google Play Store which can be seen in Figure 1. It is an app on reproductive health consultation for millennials (Generation Z). Moreover, adolescents were involved in planning and monitoring the Generasi MANTABS Indonesia application.This application facilitates Indonesian adolescents to obtain information services related to reproductive health, consultation on reproductive health, and increasing knowledge and awareness of reproductive health quickly and reliably. This application consists of four main features, namely *"Kepoin Yuk!"* (Find out guys!), *"Curhatin Aja!"* (Just talk!), *"Cek Kesehatanmu!"* (Please check your health!), and *"Undang Temanmu"* (Invite Your Friends). The *"Kepoin Yuk"* feature contains seven reproductive health materials for adolescents to study. These seven reproductive health materials are about who are teenagers; sex, gender, and sexuality; speak up about sexual violence around us; teenage pregnancy; narcotics, psychotropics, and other addictive substances; STIs and HIV-AIDS; preparing for the future of youth. The study asked adolescents to do a pre-test and receive an educational video in each material. After watching the video, the study asked them to do a post-test. In addition to broadening the horizons related to reproductive health, this feature will show how much their understanding increases. The second feature is *"Curhatin Aja!"*. It facilitates adolescents to conduct counseling related to the problems they are experiencing. The third feature is *"Cek Kesehatanmu!"*. This feature enables adolescents to conduct personal health checks. The health checks function to measure BMI (Body Mass Index), MUAC (Mid Upper Arm Circumference), daily calorie needs, physical activity, body image assessment, stress levels, and types of coping stress. The last feature is *"Undang Temanmu."*.

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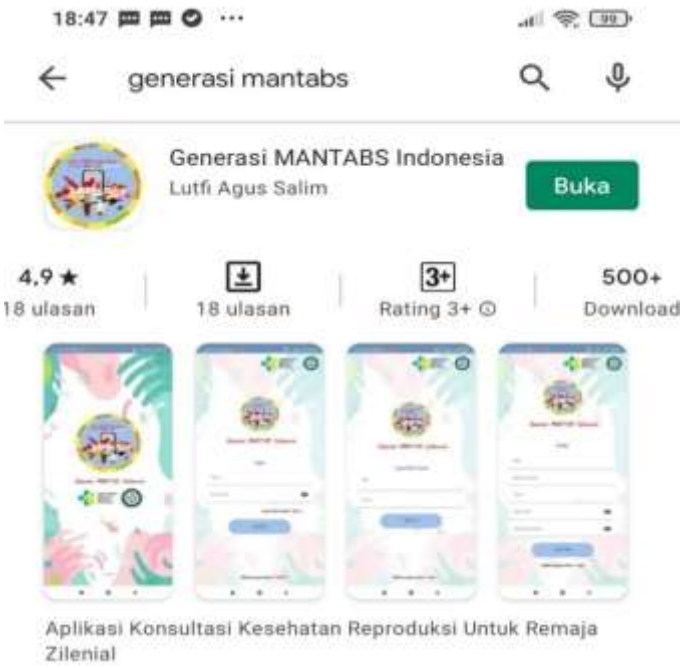

Figure 1. Generasi MANTABS Indonesia Application on Playstore

Data Collection

The study obtained data from questionnaires before and after training through the adolescent reproductive health application, namely the *Generasi MANTABS Indonesia*. The research got data from questionnaires before and after accessing each topic of ARH materials through this application. It was created based on the needs of students and recommendations from stakeholders regarding adolescent reproductive health. The author designed training materials in this application to be inaccessible before filling out the online questionnaire (pre-test). During the 3 months of research, 19 duta monitored 67 sahabat and 67 sahabat monitored 515 peer educators. The research team has coordinated with the target population through online and offline meetings. The questionnaire had been validated by expert review (statistics, population studies, health promotion, and Ministry of health) before the research was conducted.

Data Measures

Table 1

The Topics of Questionnaire Items for Knowledge of ARH

No	Topics	Number of the items
1	Characteristics of adolescent	10
2	Sex, gender, and sexuality	10
3	Sexual violence	10
4	Adolescent pregnancy	10
5	Drugs	10
6	STDs and HIV-AIDS	10
7	Healthy and ideal adolescent	10

The measured variable is knowledge of ARH which consists of 7 topics, they are: (i) characteristics of adolescent, (ii) sex, gender, and sexuality, (iii) sexual violence, (iv) adolescent pregnancy, (v) drugs, (vi) STDs and HIV-AIDS, and (vii) healthy and ideal adolescent (Table 1). Each question was answered by a true or false that indicated the participants' knowledge. The score of each true answer is 10 points. Due to the 10 items in each topic, the range of scores is 0 – 100.

Data Analysis

Data were analyzed using univariate and bivariate analysis. The study presented univariate analysis descriptively to identify the characteristics of participants in this study. Meanwhile, bivariate analysis was carried out using the Mann-Whitney and Wilcoxon statistical tests on the reasons that the data were normally distributed. The study employed the Wilcoxon test to analyze the increase in knowledge of the pre-post test. Furthermore, the study used the Mann-Whitney test to examine the difference in acceptance between health and non-health students. The alpha value was at 5% to determine the significance.

RESULT

Characteristics of Participants

There were 601 students involved in this study. Most of them were 19 years old. The *Duta, Sahabat*, and PE members were primarily female (89.5%; 80.6%; 73.6%, respectively). In addition, most of the *Duta and Sahabat* members are domiciled in Surabaya (78.9%; 73.1% respectively). Meanwhile, the percentage of PE domiciled in Surabaya was only at 36.7% because PE was reached using an online system which thus covers a broader domicile, unlike Duta and Sahabat, who were involved in offline training.

Analysis of Differences in Knowledge Improvement after Accessing ARH Application between Health and Non-Health Students

Tabel 2

Wilcoxon Test Identifying Differences in Knowledge Before and After the Intervention Among Duta, Sahabat, and Peer Educator Group of GENTABS

Variable	Mean	Minimum	Maximum	Standard Deviation	P-value
Duta					
Pre-Test	84.06	30	100	17.19	***<0.001
Post-Test	91.05	80	100	8.55	
Sahabat					
Pre-Test	80.77	10	100	17.39	***<0.001
Post-Test	89.02	80	100	8.47	
PE					
Pre-Test	85.98	0	100	17.07	***<0.001
Post-Test	92,52	80	100	8.65	

Note: * P < 0.05; ** P < 0.01; *** P < 0.001.

Table 2 shows the significant difference in improvement of knowledge (pre-post) on separately three groups, namely *duta* (health students), *sahabat* (non-health students), and PE (both of health and non-health students) group (p < 0.001). Meanwhile, Table 3 shows a difference in knowledge before training between the health students and non-health students (p = 0.003). After the training, there was a difference in understanding between students from the health faculty and non-health faculty (p = 0.031). However, there was no difference between health students and non-health students in the knowledge change at pre-post.

Table 3

Mann-Whitney Test for Identifying the Differences Between Health and Non-Health Students

Variable	Mean	Minimum	Maximum	Standard Deviation	P-value
Pre-Test	84.09	0	100	17.341	**0.003
Post-Test	91.23	80	100	8.725	*0.031
Pre-Post Changes	7.14	-20	90	15.025	0.206

Note: * P < 0.05; ** P < 0.01; *** P < 0.001.

DISCUSSION

Reproductive health education activities are important for adolescents because adolescents are vulnerable to reproductive health problems. In 2014 the Surabaya City Education Office held a peer educator program which was implemented in several senior high schools in Surabaya. The program was made on the assumption that with the formation and training of peer counselors, it can be an effort to fortify children or adolescents from the harmful effects of drugs. Based on information obtained from peer educators at the school, the program only lasted for one year. Then after that, there was no follow-up from the agency, so the peer educator program that was still running was a follow-up program and on the initiative of the school (Nurmala, Pertiwi, et al., 2020). Previous studies in Surabaya, Indonesia have shown that gender has a significant effect on the intention to participate in health education activities, female students (74.95%) were more likely to participate in health education activities than male students (57.02%) (Nurmala et al., 2022). This study found that more female joined the training program that we provided. The result showed the need for adolescent girls to stay connected to their social networks. Other study also showed that adolescent were more closely connected to the internet through their gadget for different purposes rev: Other study showed that adolescents use the internet through their smartphones for different purposes. Boys often use their gadget to engage in games online, while girls use the gadgets for online communication with their social (Purwaningsih & Nurmala, 2021). Previous studies also showed that adolescent girls have more mental toughness than boys, especially by having a good social network that can provide social support in learning during the COVID-19 pandemic (Sholihah et al., 2022). The results of the study showed an increase in knowledge in both the health and non-health students after accessing the *Generasi MANTABS Indonesia* application. Other research showed that 55% of non-health students had a sufficient level of knowledge before being given an intervention through ARH education. After having an intervention, 90% of them had better knowledge (Nurhamsyah et al., 2017). The condition follows the previous research proving a significant increase in knowledge of sexual reproductive health (SRH) after accessing the SRH application (Nuwamanya et al., 2018). The results of other studies showed a significant difference between adolescent reproductive health knowledge before and after receiving health promotion through the Android application ($p = 0.001 < 0.05$). In conclusion, juvenile reproductive health programs must be carried out based on their needs, characteristics, and capacities. The android application is one of the health promotion methods that can be developed to increase knowledge and used for primary adolescents' health data (Siswantara et al., 2019).The results of other studies indicated that adolescents expect health programs that fit their characteristics, needs, and capacities. For example, they can be done using media that adolescents are familiar with, such as social media or Android-based applications. Since the beginning, adolescents have been involved in designing youth health programs (Muthmainnah et al., 2019). The results of other studies also show that adolescent participation in health programs through peer education is the key to the program's success (Nurmala et al., 2021). Students' health behavior also depends on the existing facilities on campus to increase the availability and access of health information (Deliens et al., 2014). The ARH application is designed to help students access the required health information. Reducing the system's complexity and increasing the accessibility of technology to health information and media content will help society (Levin-Zamir & Bertschi, 2018). However, it is important to keep paying attention to reliable health information. A study showed that trust in health information sources depends on students' health literacy. Students having better health literacy have more access to medical websites. However, students with poor health literacy tend to have less trust in doctors and more trust in television and social media information (Chen et al., 2018).The results showed significant difference between health and non health students before accessing the application. It is in line with other study which found that health students had a better level of knowledge (55.1%) regarding reproductive health than the non health students which only reached 5% (Devi et al., 2022). In addition, the results showing no difference in knowledge change in pre-post between health students and non-health students. Therefore, the implementation of this application has the same effect and easily accessible on both of health and non health students. This application is able to increase

the knowledge of teenagers even though today's teenagers have received health information from other sources. Adolescents access health information through mass media and peer educators more than health organizations or institutions (Tran et al., 2020). Adolescents' lives are increasingly intertwined with technology. Around 92% go online every day, and 95% report owning a smartphone (Anderson & Jiang, 2018). Based on a survey from We Are Social, internet users in Indonesia in January 2019 reached up to 56% of the total population (268.2 million). Most of them were active on social media. Also, 91% of internet users used mobile phones, and 150 million were active on social media. Most internet users are adolescents (Kemp, 2019). The 2018 research survey of the Indonesian Internet Service User Association or *Asosiasi Pengguna Jasa Internet Indonesia* (APJII) noted that the most significant internet users (91%) were adolescents aged 15-19 years old. The survey also reported that the duration of internet use in a day exceeding 8 hours was recorded at 19.6% (APJII, 2019). Students are a group of late adolescents who are more sophisticated in getting health information. Thus, this application was designed for students using the online peer educator method (a referral code feature provided). Adolescents were involved in developing this application. An application was also developed to accommodate the needs of adolescents regarding the information on sexual health services, including delivery control services, prevention and treatment of STIs, pregnancy tests, abortion services, HIV tests, mental health counseling, and special LGBTQ services (Steinberg et al., 2018). The target of adolescent health programs should be given to all levels of education, from primary education to higher education. Adolescents should have the same right to acquire health knowledge as the initial formation of a positive attitude. Therefore, stakeholders need to periodically monitor and evaluate the implementation of standardized adolescent health programs in all educational facilities (Muthmainnah et al., 2021).The Android-based application *"Remaja Cerdik Mobile"* is adopted through the CERDIK program by the Indonesian Ministry of Health. It gives information on regular health checks, disposal of cigarette smoke, regular physical activity, a balanced diet, adequate rest, and stress management. The Android-based application *"Remaja Cerdik Mobile"* has increased the knowledge, attitudes, and self-efficacy to prevent prediabetes (Novianto et al., 2019). In addition, the media application called "RANAR" standing for Android-based Anti-Drug Youth or *Remaja Anti Narkoba Berbasis Android* was also developed. This android application contains information about drug abuse in adolescents aged 14-15 years in junior high school. An expert has also validated that the "RANAR" application can be used. This study requires further research to be tested directly on adolescents to get maximum final results and determine the effect of the "RANAR" application on adolescents aged 14-15 years (Giffari et al., 2020).This study has not included the control group. However, this study involved two groups with different educational backgrounds and quite a number of them later found out that the app was easy to use for different educational backgrounds. A study to analyze the mental health in young women with community peers based also conducted, a pre-experimental with no control group (Mathias et al., 2018). The limitation of this study was that it was only conducted on students from universities in one city. However, this research can be used as a pilot study for further research. Another limitation of this study is the sampling method used is non-probability sampling (purposive sampling). We designed to explore the causal effects of an intervention on a unit of study. They lack the benefits of the random assignment of treatments across a population that is often necessary for broad generalisability. Yet purposive sampling also has its benefits, especially when assessing small sub-groups that random sampling can miss. This study will convince stakeholders to use this application in the ARH program because the results show that there was an increase in knowledge of both health and non-health students. This application also uses the referral code feature to make it easier for stakeholders to monitor the success of the peer educator program.

CONCLUSIONS

The study concludes that accessing the *Generasi MANTABS Indonesia* application can increase the knowledge of adolescent reproductive health. We assumed that there was no significant difference in pre-post change between health and non-health students, so the application is easily accessible to the different educational backgrounds, health or non-health. This application is recommended to relevant stakeholders

to develop reproductive health programs such as peer educator program for all students from health and non-health majors by utilizing technology. This application can be used as a youth health promotion strategy so it needs to be included in the youth health program policy.

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Conflict of Interest
There is no conflict of interest.

Ethics approval and consent to participate
This study received ethical approval from the Health Research Ethics Committee of the Faculty of Nursing Universitas Airlangga, ref: 2228-KEPK (April 26, 2021). The analysis deletes from the sample the names of respondents rev the analysis process did not list the names of the respondents. For their participation in the report, respondents gave written informed consent. All methods were performed by the relevant guidelines and regulations.

Availability of data and materials
Data are available on reasonable request. The data set used is available from the corresponding author on reasonable request.

Authors' contributions
LAS and IN developed the proposal, analyzed data, and interpreted the patient information. MM was a significant contributor in conducting the study, interpreting the data, and writing the manuscript. YPD and ADL were substantial contributors in conducting the research, analyzing the data, and writing the manuscript. All authors read and approved the final manuscript.

Abbreviations
MANTABS: ***M****andiri, **A**ktif, **N**asionalis, **T**otalitas, **A**syik, **B**rilliant, **S**ukses* (Independent, Active, Nationalist, Totality, Fun, Brilliant, Success); COVID: Coronavirus Disease; RANAR: *Remaja Anti Narkoba* (Anti-Drug Adolesce); APJII: ***A****sosiasi **Pe**nyelenggara **J**asa **I**nternet **I**ndonesia* (the Indonesian Internet Service User Association); ARH: Adolescent Reproductive Health.

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