



# The Effect of the Commander Application (Gender Equality-Based Adolescent Reproductive Health Education) on Knowledge, Attitudes, and Self-efficacy of High School Students in Yogyakarta City

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## Abstract

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**BACKGROUND:** Teenage dating behavior can lead to unsafe dating behavior. There has been an increase in the incidence of sexual violence, involving adolescent girls as victims of abuse. It is imperative to provide more proactive protection and violence prevention by gender equality-based reproductive health education through application media.

**AIM:** The aim of the study was to determine the effect of the Commander application (gender equality-based adolescent reproductive health education) on knowledge, attitudes, and self-efficacy of high school students in Yogyakarta, Indonesia.

**METHODS:** This quasi-experimental study was conducted with a non-equivalent design (pretest and posttest) and a control group. The intervention group received gender-based adolescent reproductive health education with the media application that was made by the research team, while the control group received routine reproductive health education with lectures organized by the local public health center (*Puskesmas*). The research population was all high school students in the Yogyakarta City, and the schools were selected based on those in the target area of the *Puskesmas* that had adolescent health services. School selection based on school characteristic type of school and number of students. Two schools were selected as the intervention and control groups with a minimum sample of 30 male and 30 female students from each school. The total sample was 170 people. The questionnaire used to measure attitude, knowledge, and self-efficacy was previously tested for validity and reliability and declared valid and reliable. Comparative analysis has been carried out in two paired groups using a dependent *t*-test, while for two unpaired groups using an independent *t*-test.

**RESULTS:** The mean values of knowledge in the intervention and control groups were 0.628 versus -0.183 and the difference between the two groups was not significant ( $p = 0.108$ ). The average attitude values of the intervention and control groups were 0.557 versus -2.283 and the difference between the two groups was significantly different ( $p = 0.000$ ). The average self-efficacy values of the intervention and control groups were 3.785 versus -3.350 and the difference between the two groups was significantly different ( $p = 0.012$ ).

**CONCLUSIONS:** Gender-based adolescent reproductive health education interventions with application media can improve adolescent attitudes and self-efficacy.

## Introduction

According to the World Health Organization, an adolescent is someone in the age range of 10–19-year-old [1]. Adolescence is a transition period from childhood to adulthood, when there are significant biological changes and the beginning of a major transition into adult social roles [2]. During this period of rapid growth, adolescents experience physical and sexual maturity, while also becoming more socially and economically independent. In the development process, they build their individual identity, acquiring the necessary skills and ability to negotiate the challenges and difficult decisions (abstract reasoning) they face to prepare for adulthood.

The number of adolescents in Indonesia is increasing. According to the Indonesian Ministry of

National Development Planning in 2018, the number of teenage boys aged 10–24 years in Indonesia reached 33 million and there were 33.5 million girls aged 10–24 years. Based on the 2019 Indonesia National Population and Family Planning Agency data, the number of teenagers aged 16–24 years in the City of Yogyakarta reached 701,444 people. According to data from the Indonesian Demographic Health Survey (IDHS), adolescents experience many preventable problems such as the lack of knowledge about reproductive health, unsafe premarital sexual behavior, unwanted pregnancy, dating violence, sexually transmitted infections, and abortion [3].

Based on data from the IDHS in 2018, most women and men admitted that their dating behavior included holding hands (64% women and 75% men), hugging (17% women and 33% men), kissing lips (30%

women 50% men), and petting (5% women and 22% men). Courtship behavior can lead to violence, unsafe sexual behavior or premarital sexual contact, unwanted pregnancy, sexually transmitted infections, and other unhealthy outcomes. IDHS data revealed that as many as 12% of women experienced unwanted pregnancies and 7% were reported by men who have partners with unwanted pregnancies that they attempted to abort.

Teenagers who are pregnant at the age of 10–19 years can be at risk for complications of early pregnancy and childbirth such as eclampsia and puerperal endometritis which are some of the common global causes of maternal death in addition to unsafe abortions [4]. As many as, 23% of women and 19% of men know someone who had an abortion, and 1% of them accompanied or influenced the mother to have an abortion [3].

Cases of violence against teenagers include physical, mental, and even sexual abuse. The abuses against teenagers are usually done by those closest to the victim, such as family members, relatives, teachers, friends, and also their playmates. The result is trauma to the victim, which can also cause long-term mental as well as physical injury. Sexual violence is defined as sexual acts (including seduction, unwanted touching, cyber violence in the form of threats of sexually nuanced photos or videos, peeking, and taking naked photos) that are done by someone to another person without that person's consent. Sexual violence can be experienced by all ages and races regardless of their socioeconomic status. Women who are victims of sexual violence consistently report negative physical, mental, and reproductive impacts [5], [6].

Based on the 2018 National Survey of Child and Adolescent Life Experiences by the Indonesian Ministry of Women's Empowerment and Child Protection, one in 17 boys and one in 11 girls have experienced sexual violence. The most reported perpetrators of sexual violence, both contact and non-contact, were peers (47%–73%) and girlfriends (12%–29%) [7]. Based on surveys from the IDHS in 2017, the data showed that teenagers ranging in age from 11 to 14-year-old start dating with the majority having dating experiences including holding hands, kissing lips, and engaging in sexual relations. In addition, at this age, they also begin to have premarital sex. Gender equality and empowering women and girls create the basis for achieving the sustainable development goals which have been mutually agreed on by all United Nations (UNs) members as the common global goals for humanity in the 21<sup>st</sup> century [8].

Through the advances in technology and digital media in recent years, information is becoming easier to access, including through the Internet, social instant messaging services, and other means of communication. Information through digital media offers a more interactive communication pattern compared to conventional media, and in the last decade, the use

of digital media has become part of the lifestyle of most adolescents [9]. Concerning the use of mobile-applications in intervention-based health promotions in the United Kingdom in 2017, a comprehensive study that reviewed several journal articles which were published in the PubMed, Embase, and CINAHL databases stated that media applications are effective media to improve health promotion behavior in the general population without disease [10].

According to Iqbal's research, the perception of adolescents about sexual and reproductive health is still low, so urgent efforts are needed in the form of educational programs that are aimed toward the prevention of sexual abuse and violence [11]. Accordingly, it is imperative to provide more proactive protection through reproductive health education for both young women and men. Research related to gender-based adolescent reproductive health education with booklet media was recently conducted by Nisman on junior high school students in the city of Yogyakarta. The results of the study found that there was no significant difference in adolescents with gender-based reproductive health education interventions with booklets compared to regular reproductive health education conducted by local health centers (puskesmas). The use of booklets is evaluated to be less attractive to adolescents because they are more interested in using cellphones to access various information, for this reason, an application for reproductive health education based on gender equality (commander) was developed [12]. To explore this issue in more depth, this research aimed to implement an application of gender-based adolescent reproductive health education as an alternative approach in adolescent reproductive health education.

## Methods

This quasi-experimental study was conducted with a non-equivalent research design (pretest and posttest) and a control group in July–November 2020. The research was conducted at two high schools in Yogyakarta, Indonesia. The research population was all high school students in the Yogyakarta area, and the schools were selected based on the following diagram (Figure 1). Based on the sample calculation for the estimated number of samples in the unpaired group with 95% and 90%, the results obtained that the minimum sample size is 29.05 or a minimum of 30 samples in each group. To get the same proportion between the number of male and female students, a minimum of 30 samples for male students and 30 samples for female students in the intervention group and control group was set. Furthermore, the research subjects were chosen without randomization. Subjects were selected using a purposive sampling technique with

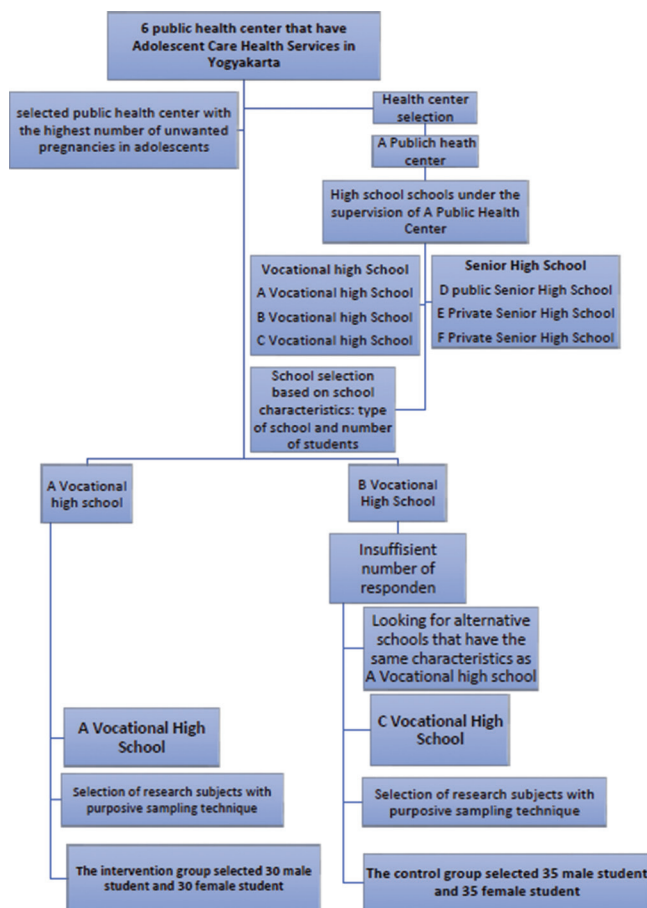


Figure 1: Sampling technique

the following inclusion criteria, namely: High school students in Grades X, XI, and XII, teenagers who have cellphones with Android applications, teenagers who are willing to take part in the research and get permission to participate in the research from their parents or guardians. While the exclusion criteria are: Students who do not attend or complete all reproductive health education. Health education media in this study used an Android-based application.

The Commander application media contains material prepared in modules that have been compiled in the previous research. The modules were originally compiled by the research team, and later refined and developed into more general modules that can be used by young women and young men, based on the National Guidebook for Comprehensive Sexuality Education from the Indonesia, National Population and Family Planning Agency in collaboration with UNESCO in 2012, the modules refer to the International Technical Guidance on Sexuality Education book produced by UNESCO, UNICEF, UNFPA, WHO, and UNAIDS in 2009 (UNs Educational, Scientific, and Cultural Organization [13]. The modules were compiled by the research team [12]. In addition to the research modules, comics were also compiled which were used as an introduction to understand each of the topics contained in these modules. These comics and modules were designed as an educational application media to be

tested in this research. The questionnaire used to measure knowledge, attitude, and self-efficacy was previously tested for validity and reliability and declared valid and reliable.

After all respondents agreed to be involved in this research, the intervention group of the research team gave an explanation of how to install the commander application on each student's android phone until the application was installed and the program could run properly. The researcher then assisted in filling out the pre-test questionnaire which was also included in the commander application. Respondents can use this application for 3 weeks with the remainder each week to read and complete the modules in this application and then do a post-test. Meanwhile, in the control group, the pre-test was carried out using a Google form, then they received education about reproductive health using the lecture method from the Puskesmas staff for 2 h. Three weeks later, a post-test was conducted using a Google form.

Comparative analysis has been carried out in two paired groups using a dependent *t*-test, while for two unpaired groups using an independent *t*-test.

## Results

This study aimed to determine the effect of gender-based adolescent reproductive health education with the Commander application using informative, educational comics on the level of knowledge, attitudes, and self-efficacy of high school students in the city of Yogyakarta. The intervention group was given gender equality-based reproductive health education with the Commander application while the control group was given routine interventions that are usually provided by the local *Puskesmas*, namely, reproductive health education with the lecture method.

Table 1 shows that the number of women and men in the control group was 30 women and 30 men, while in the intervention group, there were 35 women and 35 men. The majority of respondents live with their parents, and are Javanese. In the intervention group, as many as, 54 (77.10%) of respondents and 41 (68.30%) in the control group had received information about reproductive health. The most of the respondents had dating experience and only a small number of respondents had experienced an invitation to engage in sexual activity. After analyzing for any difference between the intervention group and the control group on all the characteristics of the respondents, the results showed that there were no significant differences. Likewise, the initial values (baseline) of knowledge, attitudes, and self-efficacy in the intervention and control groups were homogeneous.



**AQ8 Table 1: Characteristics of respondents in the intervention group and control group**

Respondent characteristic (n = 130)	Intervention group (n = 70), n (%)	Control group (n = 60), n (%)	p		
Sex					
Women	35 (50.00)	30 (50.00)	1.000		
Men	35 (50.00)	30 (50.00)			
Respondent's place of residence					
Live with parents	69 (98.60)	58 (96.70)	0.471		
Live not with parents	1 (1.40)	2 (3.30)			
Ethnic group					
Java	68 (97.10)	60 (100)	0.187		
Not Java	2 (2.90)	0			
Experience in getting information about reproductive health					
Yes	54 (77.10)	41 (68.30)	0.259		
No	16 (22.90)	19 (31.70)			
Dating experience					
Yes	29 (41.40)	34 (56.70)	0.083		
No	41 (58.60)	26 (43.30)			
Experience solicitation of sexual activity					
Yes	3 (4.30)	5 (8.30)	0.338		
No	67 (95.7)	55 (91.7)			
Respondent characteristic	Mean	SD	Mean	SD	p
Knowledge pre-test	21.84	1.67	21.91	1.54	0.794
Attitude pre-test	106.92	1.06	107.85	1.19	0.567
Self-efficacy pre-test	122.22	12.66	120.83	12.22	0.525

SD: Standard deviation.

Table 2 shows that the average value of knowledge in the intervention group between pre-test and post-test scores increased from 21.84 to 22.47 and this increase was significant ( $p = 0.000$ ). Meanwhile, the average value of the pre-test and post-test in the control group was 21.91 vs. 21.90, which actually showed a decrease between pre-test and post-test and the difference was not significant ( $p = 0.945$ ). For the mean values of attitude scores in the pre-test and post-test in the intervention group (106.92 vs. 107.48), there was a slight increase, although it was not significant ( $p = 0.438$ ). Meanwhile, in the control group, the pre-test and post-test scores of 107.85 versus 105.56 actually decreased and the decline was significant ( $p = 0.010$ ). The average value of self-efficacy in the intervention group between pre-test and post-test scores showed an increase from 122.22 to 126.01 and the difference was significant ( $p = 0.001$ ), while the average value of self-efficacy in the control group between pre-test and post-test scores showed a decrease from 120.83 to 117.48 and the decrease was significant ( $p = 0.009$ ).

**Table 2: Differences in the value of pre- and post-test knowledge, attitudes, and self-efficacy**

Group	Pre-test		Post-test		Value	p*
	Mean	SD	Mean	SD		
Knowledge intervention group	21.84	1.67	22.47	1.31	Increased	0.000
Knowledge control group	21.91	1.54	21.90	1.63	Decreased	0.945
Attitude intervention group	106.92	8.92	107.48	10.21	Increased	0.438
Attitude control group	107.85	9.27	105.56	10.41	Decreased	0.010
Self-efficacy intervention group	122.22	12.66	126.01	13.61	Increased	0.001
Self-efficacy control group	120.83	12.22	117.48	13.96	Decreased	0.009

\*Paired t-test. SD: Standard deviation.

Table 3 shows the differences in the values of knowledge, attitudes, and self-efficacy between the

**Table 3: The difference in the value of knowledge, attitudes, and self-efficacy in the two groups**

Variable	Intervention group (n = 70)		Control group (n = 60)		p
	Mean	SD	Mean	SD	
Delta post- and pre-knowledge	0.628	1.42	-0.183	3.63	0.108
Delta post- and pre-attitude	0.557	5.97	-2.283	6.65	0.000
Delta post- and pre-self-efficacy	3.785	8.99	-3.350	9.54	0.012

Unpaired t-test. SD: Standard deviation.

intervention group and the control group. The average knowledge values of the intervention and control groups were 0.628 versus  $-0.183$  and the difference between the two groups was not significant ( $p = 0.108$ ). The average attitude values of the intervention and the control groups were 0.557 versus  $-2.283$  and the difference between the two groups was significantly different ( $p = 0.000$ ). The average self-efficacy values of the intervention and the control groups were 3.785 versus  $-3.350$  and the difference between the two groups was significantly different ( $p = 0.012$ ).

## Discussion

Based on the results of the study, the average value of knowledge in the intervention group between the pre-test and post-test scores showed a significant increase ( $p = 0.000$ ). Meanwhile, the average value of the pre-test and post-test scores in the control group actually showed a decrease but the decrease was not significant ( $p = 0.945$ ). After analyzing the difference between the average post-test and pre-test scores in the intervention and the control groups (0.628 vs.  $-0.183$ ), the difference between the two groups was not significant ( $p = 0.108$ ). As a result, it can be concluded that there was no significant effect from the gender-based adolescent reproductive health education with the commander application on the level of knowledge of adolescents.

MacPherson *et al.* found that gender inequality is common in various aspects of life including sexuality and reproductive health. Since most of the victims of sexual abuse are women, this can lead to increased vulnerability to gender-based violence [14]. Gender inequality in sexuality and reproductive health requires a special approach to achieving equality, in the form of specific interventions that can change the environment. One of these approaches is by providing gender equality-based reproductive health education. The health education method chosen in this study uses an application that is provided through an Android-based smartphone. The choice of this method is expected to increase the interest of teenagers to take part in this health education, because most teenagers spend considerable time accessing their Android smartphones. Based on the results of this study, after being given to the intervention group, the respondents' knowledge increased significantly, while in the control group, their knowledge actually decreased. Although it was concluded that there was no significant effect of gender-based adolescent reproductive health education with the application of comics in the Commander application on the level of knowledge of adolescents. However, based on the mean value of the knowledge value, there was a higher tendency to increase in the intervention

group than in the control group. This difference shows that the provision of gender-based reproductive health education was able to increase the value of adolescent knowledge, although the difference was not statistically significant.

According to Bloom's taxonomy theory, there are three levels of domains identified in educational activities to design learning goals and outcomes, namely, the cognitive domain, affective domain, and psychomotor domain. Knowledge about reproductive health in Bloom's taxonomy is at the first level of the cognitive domain which is interpreted as contemplation of memory and demonstration of what has been previously learned [15]. In this study, it is hoped that teenagers will be able to reflect on and remember the material that has been learned through this application and after that demonstrate it in their daily lives.

The results of this study are different from the previous studies which stated that education using application media can increase knowledge [16], [17], [18], [19], [20]. However, there were several differences, for example, in the research of Vanestanagh *et al.*, which found smartphone-based education can increase knowledge about reproductive health. The difference was in the time of the intervention in their research which provided the intervention for 8 weeks, whereas in this study, the intervention was only given for 2 weeks [16]. This shorter time can also be the reason, there was not a significant increase in knowledge. In the research of Brayboy *et al.*, the use of smartphone applications to provide sexual health education to young women could increase the knowledge of young women about anatomy, physiology, sexuality and relationships, and prevention of sexually transmitted diseases. In addition, the design of this study was a pre- and post-test one group only [17].

For the average value of attitudes in the pre-test and post-test scores of the intervention group, there was a slight increase but it was not significant ( $p = 0.438$ ). Meanwhile, in the control group, the pre-test and post-test scores actually decreased and the decrease was significant ( $p = 0.010$ ). After analyzing the difference between the average post-test and pre-test scores in the intervention and control groups (0.557 vs. -2.283), the difference between the two groups was significantly different ( $p = 0.000$ ). It can be concluded that there was a positive effect of the gender-based adolescent reproductive health education with the application of comics in the Commander application on adolescent attitudes. Adolescent attitude is a response that is still closed to a stimulus or object because there is no real action or activity in everyday life. Reproductive health attitude is a condition when a person after getting information through the learning process, one of which is from reproductive health education.

After implementing gender-based reproductive health education with the Commander application, the attitude of adolescents in the intervention group was

higher than the control group, although they had not yet performed the behavior, the responses given by these teenagers already described the tendency to behave. McCarthy *et al.* conducted an intervention in the form of mobile phone instant messaging to increase acceptability and use of effective contraception [21]. The results of this study indicated that this intervention could not improve the attitudes in the use of effective contraception and the researchers recommended to further increase the effect of this intervention by offering the study material in this application for a longer time and downloading the application. Vanestanagh *et al.* also found that education with smartphone-based software in addition to increasing knowledge can also improve behavior about reproductive health care [16]. The Commander intervention was only given for a short time, namely, 2 weeks, while the intervention given for a longer time is expected to increase knowledge and knowledge retention so that it has a better effect on changing adolescent attitudes.

The average value of self-efficacy in the intervention group between pre-test and post-test scores showed a significant increase ( $p = 0.001$ ), while the average value of self-efficacy in the control group between the pre-test and post-test showed a significant decrease ( $p = 0.009$ ). After analyzing the difference between the average post-test and pre-test scores in the intervention and control groups (3.785 vs. -3.350), the difference between the two groups was significant ( $p = 0.012$ ). It can be concluded that there was a positive effect of the gender-based adolescent reproductive health education with the Commander application on adolescent self-efficacy. Health education with commanders is more interesting, easy to access with android phones that all students already have. The frequency of youth interaction with their gadgets in one day is quite high, so it needs to be used properly to do positive things, one of which is to provide health education. The research team also often gives reminders to students to access this commander application so that in the end health education with a commander can increase self-perception that he is capable and competent to behave safely in sex, which includes the efficacy of doing safe sexual activities, the efficacy of maintaining self-esteem, the efficacy of complying with sexual norms, the efficacy of communicating and making decisions in relationships with the opposite sex, and the efficacy of upholding gender equality in relationships. The effect of the use of mobile phone intervention for adolescent sexual health did not show the same good results in the research of Nielsen *et al.*, where the outcome measured in this study was the behavior of using condoms. The comparison between the group given mobile intervention and the control group did not show a significant difference in the behavior change of the two groups [22]. Suggestions from this study for the future researchers include selecting groups from groups that are more at risk for experiencing sexual problems and using more adapted

media. Providing education using an application or mobile phone intervention about sexual health actually depends on the consistent use of this application, since among teenagers, this method is still considered interesting and in accordance with the characteristics of adolescents, namely, understanding the use of technology. The choice of using media applications or mobile phone interventions is also considering that reproductive health and adolescent sexuality education services have not been routinely provided in public health services [22]. In the study of Manlove *et al.*, giving a pulse reproductive health application could also increase adolescent self-confidence in using contraception [18].

Based on a systematic review of the literature conducted by Lee *et al.*, the mobile application interventions from this study were useful for increasing various health promotions that can change behavior, especially diet behavior, and physical activity in the general population [10]. They also stated that application programs will be more effective when there is social support. Mobile applications are recommended for the development of health promotion programs in developing countries. The use of applications to promote sexual health in adolescents is still important, since they are familiar with technology and sexual problems are a very sensitive issue [22]. Accordingly, further research is still needed to develop more interesting applications for sexual and reproductive health education for adolescents.

Based on the results of the research, the relationship between the characteristics of the respondents and the variables of knowledge, attitude, and self-efficacy indicated only the gender variable was related to knowledge about reproductive health with  $p = 0.019$ . Meanwhile, the other variables, which were the respondent's residence, ethnicity, experience in getting information about reproductive health, dating experience, and the experience of an invitation to sexual activity, were not significantly related to the respondent's knowledge, attitude and self-efficacy about reproductive health. The influence of gender on adolescent knowledge about reproductive health can also be seen in the previous research which stated that education on gender equality-based reproductive health could only increase the knowledge of female adolescents, while the male adolescent knowledge did not increase. The difference in knowledge between male and female adolescents was attributed to the male respondents who tended to be less serious in receiving reproductive health education [12].

## Conclusions

Gender-based adolescent reproductive health education interventions with application media

(commander) can improve adolescent attitudes and self-efficacy. Gender equality-based reproductive health education with the commander application can be recommended as an education to improve adolescent knowledge, attitudes, and self-efficacy because most teenagers spend considerable time accessing their Android smartphones. For further researchers, they can conduct research with a larger sample size and a more varied population of adolescents.

## Authors' Contributions

Principal investigator designed and managed the research, conducted the analysis, and wrote the manuscript. Other researchers coordinated and conducted the trial recruitment and follow-up and contributed to planning discussions regarding the trial. All authors revised the work, approved the version to be published, and agree to be accountable for all aspects of the work.

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## Ethics Approval and Consent to Participate

Ethical approval was granted from the Medical and Health Research Ethics committee (MHREC) Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada – Dr. Sardjito General Hospital, Ethical Committee approval Ref. Number: KE/FK/1188/EC/2020.

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