

# Assessing the effectiveness of rolling ball media on adolescents' knowledge of child marriage

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## Abstract

Child marriage is a form of violation of human rights. Child marriage remains a significant global issue, especially in Indonesia. Bengkulu Province is among the top 10 highest child marriages in Indonesia. Rolling ball is an interactive, interesting, and fun learning medium containing material about child mar-

riage. This study aimed to determine the influence of rolling ball media on the knowledge of child marriage among adolescents in Bengkulu City and Bandung City, Indonesia. This study used an experimental design with a Randomized Controlled Trial (RCT) involving 120 adolescent girls who were divided into two groups (60 participants each). The variables studied were girls' knowledge. Sampling was performed using block randomization. Data were analyzed using the Wilcoxon test. The respondents in the treatment group received education on rolling ball media for 30 minutes. The control group engaged with the disc as the learning medium for 30 minutes. Knowledge evaluation was conducted both before the start of learning and after one week. The research instrument utilized a questionnaire. The results of the analysis showed that the average knowledge score after intervention increased to 86.50, with a p-value of 0 (Wilcoxon signed rank test), while the average knowledge score in the control group increased to 77.42 with a p-value of 0.024. The results of the Mann-Whitney test showed a p-value of  $0.000 \leq 0.05$ . There was a significant difference in the effectiveness of rolling balls on knowledge about the impact of child marriage on adolescents. Health promotion activities are expected to use rolling ball media as an alternative health promotion medium to increase adolescent knowledge about the impact of child marriage and reduce the number of child marriages, with the hope of increasing the maturity of the age of marriage.

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## Introduction

Child marriage is widely recognized as a grave violation of human rights, affecting millions of children worldwide.<sup>1</sup> Data on child marriage in the world are most prevalent in Nigeria, reaching 76%, meaning that more than half of women in Nigeria experience early marriage. While the adolescent birth rate in Southeast Asia is still high, especially compared to the Asia-Pacific subregion, with an average of 38.2 births per 1000 women aged 15-19 years. In Latin America and the Caribbean, one in four girls was married under the age of 18.<sup>2</sup> In general, child marriage is more common in girls than in boys, and approximately 5% of boys are married before they are 19 years old. In addition, it was also found that girls were three times more likely to marry early than boys.<sup>3</sup> Early marriage is an important concern in Indonesia. Indonesia is among the 10 countries with the highest number of child marriages in the world, and in 2018, it was found that one in nine girls aged 20-24 years were married before the age of 18.<sup>4</sup> Bengkulu Province is included in the top 10 highest child marriages in Indonesia, with 178 cases of child marriage, followed by West Java, with 5,523 (8.65%) child marriages in Indonesia. This figure is higher than the national child marriage rate of 8.06%.<sup>4,5</sup>

The factors causing early marriage are coercion from parents, free association, curiosity about the world of sex, economic factors, and environmental factors, such as the lack of community

leaders' roles (village officials), the lack of health workers' roles, low education and knowledge.<sup>6,7</sup> The impact of a high number of child marriages is a threat to the fulfillment of children's basic rights. Early marriage by adolescents aged less than 16 years can affect the reproductive health readiness of mothers or prospective mothers in giving birth to children with low birth weight potential and is also a trigger for stunting in children, high divorce rates, poverty, and low education.<sup>2,8</sup> The risk of stunting is higher in children under five years of age of married mothers in adolescence.<sup>9</sup> Child marriage is risky for both the mother and the child.<sup>10</sup> Girls aged 10-14 years were five times more likely to die during pregnancy or childbirth.<sup>11</sup> Some efforts that have been made to prevent early marriage in Indonesia include early marriage maturation programs. This program sets a minimum age limit for marriage of 19 years for men and women.<sup>9</sup> Although regulations already exist, the marriage rate in Indonesia remain high. Therefore, more creative efforts are needed to provide guidance and education to teenagers regarding the impact and prevention of early marriage. The development of interesting educational media is needed to increase adolescents' understanding of the impact of early marriage, which has an impact on the maturity of their age at marriage.

The results of this study indicate that efforts are needed to overcome the problem of knowledge by empowering children with health and reproductive information.<sup>12</sup> Unfortunately, many people still consider reproductive health education to be taboo, so reproductive health material in schools is only used as an insert in one subject or local content, even though the impact is extraordinary.<sup>13</sup> Knowledge is a very important domain for the formation of actions (over behavior) in a person. Based on experience and research, it turns out that behavior based on knowledge lasts longer than behavior that is not based on knowledge.<sup>14,15</sup> Knowledge is part of the dynamic process of behavioral change that can be improved through health education. The knowledge possessed by an individual or group can provide awareness of something that can cause behavioral change.<sup>14,16</sup> Research conducted by Sharratt *et al.* explains that deeper and continuous learning from an intervention requires a concept to process activities that can impact meaningful and sustainable change, and variations are needed in learning delivery to increase the interest and understanding of respondents.<sup>17</sup> Media in providing health education play a very important role in optimizing the information message delivered so that it can stimulate the feelings, attention, thoughts, attitudes, and behavior of individuals. Creative media can improve the learning process to be more effective and facilitate the audience in the learning process.<sup>18-21</sup> Rolling ball media is a learning medium using ball games that can create more lively and interactive class dynamics to increase students' interest and motivation in learning. The application of this media makes learning more interesting, fun and can change students' perspectives to be creative, enthusiastic and confident in learning so that it is easier to understand the concept.<sup>22</sup> The use of rolling ball learning media creates student involvement in learning activities so that learning is more fun, interactive, and effective in improving understanding of grammar systems.<sup>20</sup> Other research evidence suggests that the class action is in the form of implementing the TGT cooperative model with media assistance, rolling ball can improve students' creative mathematical thinking abilities, especially in social arithmetic material. From the other evidence, providing audiovisual health education had a significant effect on adolescent knowledge.<sup>23</sup> The results of the study showed that playing games had a simple short-term positive impact on girls and boys regarding attitudes towards early marriage and feelings of empowerment to prevent early marriage.<sup>17</sup> Thus, this study aimed to analyze the effectiveness of rolling ball educational

media on adolescents' knowledge of the impact of child marriage.

## Materials and Methods

### Research design

The research design used in this study was experimental and employed a Randomized Controlled Trial (RCT). The research involved two groups: a treatment group that received Rolling Ball educational media, and a control group that participated in conventional health education. The samples were girls adolescent who fulfilled the inclusion and exclusion criteria. The sample in this study were 120 respondent, consisting of 60 respondent in the treatment group and 60 respondent in the control group. The sampling technique used block randomization, to determine each sample in the treatment and control groups. This study assessed the knowledge levels of adolescents in both the treatment and control groups before and one week after the intervention. This research was conducted in Bengkulu and Bandung, West Java, Indonesia, focusing on adolescent girls. The research was conducted at junior high schools in Bengkulu and Bandung West Java, Indonesia.

### Study participants

The participants in this study were adolescent girls who met the inclusion and exclusion criteria and voluntarily agreed to participate by signing an Informed Consent form. The target population for this study comprised adolescent girls in the cities of Bengkulu and Bandung West Java, Indonesia. The study population included adolescent girls who were junior high school students in Bengkulu and Bandung West Java, Indonesia.

The sample for this study consisted of adolescent girls who studied in junior high schools in Bengkulu and Bandung West Java, Indonesia, and met the inclusion criteria. The sample size was determined using a formula for unpaired numerical categorical research. In this study, a confidence level of 95% ( $Z\alpha=1.96$ ) and power test of 90% ( $Z\beta=1.28$ ) were selected. The sample size comprised 120 adolescent girls divided into two groups: Rolling ball educational media and conventional health education, with 60 individuals in each group. Block randomization was used to assign each sample to either the treatment or the control group. The treatment group was given rolling ball media while the control group was given disc media.

The inclusion criteria were girls, junior high school students, and willingness to participate as a respondent. Simultaneously, the exclusion criteria included respondents who did not fully participate in the research activities. Research subjects were excluded if they withdrew from the study before completion.

### Variable, instrument and data collection

#### Variable

The independent variable in this study was the provision of educational media with rolling balls to the adolescent girls in the treatment group. These interventions were conducted once weekly for 30 minutes. The control group engaged in health education using a disc card for the same duration and frequency. The dependent variables included knowledge levels of adolescent girls. The knowledge levels of adolescent girls were assessed using a questionnaire. Knowledge levels were measured both before and one

week after the intervention in both the treatment and control groups.

### Instrument

The questionnaire used to measure knowledge about the impact of child marriage included knowledge about the definition of child marriage, ideal age for marriage, function of marriage, impact of early marriage, efforts to prevent early marriage, and maturity of marriage age. The questionnaire was tested for validity and reliability with Cronbach's alpha value of 0.758 and an r table of 0.444; thus, the questionnaire was proven to be valid and reliable.

### Data collection

The research procedure began by selecting participants based on the inclusion and exclusion criteria. Subsequently, the researcher provided information by describing the research objectives and procedures of the participants. Following this, consent to participate in the study was sought through the signing of an informed consent sheet.

The next step involved collecting knowledge data using a questionnaire as a pre-test. The subjects were then randomly assigned to either the treatment or the control group. The treatment group received education with rolling ball media, while the control group received lectures with discs as the learning media. Knowledge was measured again after one week using a questionnaire as a post-test.

### Intervention

All respondents in the treatment group received education on rolling ball media for 30 minutes. Rolling ball media is an innovative learning medium that uses the principle of the game. A rolling ball is a learning medium shaped like a suitcase, inside which there is wood with a slanted board and nails that are used to slide the ball. It was placed in a hole that was fixed in the hole material will be studied.

This medium uses a board, one ball, and five bowls containing material and questions about the impact of teenage marriage. Rolling ball media contains information about early marriage, the impact of early marriage, and all information related to the maturity of the age of marriage, including the goals, program framework, and benefits of the maturity of the age of marriage. Making learning more interesting and fun. It is hoped that the material can be delivered more effectively and easily understood by respondents. The control group attended lectures with discs as learning media for 30 min. Knowledge evaluation was carried out before the start of learning to determine the basic knowledge possessed by respondents and then re-measured after one week with the hope that there would be a process of knowledge retention and understanding of concepts. The duration of education was 30 min, which was adjusted to the study material given to respondents and to maintain the respondents' concentration in receiving information.

### Data analysis

Data were analyzed using univariate and bivariate analysis. Data normality test using Shapiro Wilk test showed that the data were not normally distributed and continued with bivariate analysis of nonparametric test to compare two groups of paired data with Wilcoxon and to compare two groups of unpaired data with Mann Whitney test in assessing the Effectiveness of Rolling Ball Educational Media on Adolescent Knowledge about the Impact of Early Marriage with a significance value of  $p < 0.05$ .

### Ethical clearance

The research was approved by the Health Research Ethics Committee of the Health Polytechnic of the Ministry of Health in Bengkulu, with ethical approval number No.KEPK.BKL/106/03/2024. Throughout the study, the researcher adhered to ethical principles, including obtaining informed consent, promoting beneficence, respecting human rights, and ensuring non-maleficence.

### Results

This study, conducted in July 2024 at a Public Junior High School in Bengkulu and Bandung West Java, aimed to assess the effectiveness of rolling ball educational media on adolescents' knowledge of the impact of child marriage. A total of 120 participants were included in the study. Table 1 below provides an overview of the characteristics of the study participants.

The results showed no differences in terms of gender and age. In this study, all respondents were girls, adolescent with an age range of 13-15 years. The results of the normality test of the knowledge data of the treatment and control groups before the intervention were not normally distributed, so the analysis was continued with the Wilcoxon signed ranks and Mann-Whitney tests. As shown in Table 2, after the implementation of rolling balls in the intervention group, the results showed that adolescents had knowledge with a minimum score of 60 and a maximum score of 100. The average knowledge score after the implementation of the rolling ball media increased to 86.50. Furthermore, the results of the implementation using disc media in the control group showed that after the implementation of the adolescent knowledge score about the impact of child marriage with a minimum score of 40 and a maximum score of 100, the average knowledge score after the implementation of the disc media increased to 77.42. The results of the knowledge variable data were analyzed using the Mann-Whitney test. The test results showed a  $p$ -value of  $0.000 \leq 0.05$  (Tables 3 and 4).

**Table 1.** Characteristics of respondents.

Characteristic N (%)	Treatment group N (%)	Control group N (%)
Age (years old)		
13	17 (28.3)	19 (31.6)
14	14 (23.3)	15 (25.0)
15	29 (48.4)	26 (43.4)
Total	60 (100)	60 (100)
Gender		
Girl	60 (100)	60 (100)
Boy	0 (0)	0 (0)
Total	60 (100)	60 (100)

**Table 2.** Data normality test.

Knowledge	p
Treatment Group	
Pre	0.11
Post	0.001
Control Group	
Pre	0.006
Post	0.000

## Discussion

This study aimed to investigate the impact of rolling ball educational media on adolescents' knowledge of the impact of child marriage. The results demonstrate these results indicate that there is a significant difference in the effectiveness of rolling balls on knowledge of the impact of child marriage on adolescents in Bengkulu City and Bandung City. This happens because the rolling ball medium is a medium that is modified with games so that adolescents do not feel bored in learning and understanding the material presented. A rolling ball is a learning medium such as a suitcase, inside which there is wood with a sloping board and nails that are used to slide the ball. It was placed in a hole that was fixed in the hole material will be studied. Rolling ball media is a medium that contains many questions and simple tools that aim to convey learning materials to students in a fun way, like a question and answer game, but has the aim that the material delivered through the rolling ball game media can be conveyed to students and they can understand the learning material.<sup>24</sup>

The results of the study concluded that the use of rolling ball media had a significant influence on the cooperation skills of children aged 5-6 years at Tri Insani Oermata Kindergarten, Pekanbaru.<sup>25</sup> Rolling ball media are an innovative medium used to attract children's interest because this game is in the form of a team so that learning becomes fun. Learning media have various forms and variations that are delivered in the form of educational games. Rolling ball media is a medium developed with the aim of changing students' mindsets in learning and creating learning as something fun.<sup>12</sup>

Whether educational goals are achieved is largely determined by the learning process experienced by the students. In other words, from the entire educational process in schools, student learning activities are the most basic and need more attention.<sup>26</sup> The results of this study are in accordance with the opinion that games should be used. Learning media are educational games because they can improve cognitive skills, motor skills, reasoning skills, memory, learning outcomes, concentration, and training patience.<sup>27</sup> The use of Rolling Ball media as an innovation in educational media is in line with the results of the study by Harwito *et al.*<sup>28</sup> which concluded that the Rolling Ball game media is feasible and suitable for use as a school learning media.

Meanwhile, for the disc media group after the Wilcoxon signed-rank test analysis, a p-value of 0.024 was obtained, which

means that there is an influence of disc media on increasing adolescent knowledge about the impact of marriage. This is because disc media is in the form of a flat round plate containing information about the impact of marriage in a small size that is easy to carry so that students can open it whenever needed. The results of this study are supported by previous research, which a significant influence between disc media and knowledge about the maturity of the age of marriage in adolescents at SMPN Kota Bengkulu.<sup>29</sup> This study also mentioned the influence of nutritional disc media on fruit and vegetable consumption in adolescents.<sup>30</sup> Nutrition Disc is a practical and easy-to-use tool for nutrition and health education. Based on previous research, the results of the study showed that the use of color and media shape is known to attract the attention of users.<sup>31</sup> Other studies concluded that there was a significant increase in knowledge after being given disc media regarding long-term contraceptive methods in women of childbearing age.<sup>32</sup> However, when compared to rolling ball media, disc media has limitations, including being less interactive so that it is boring and reduces user interest, which will affect the understanding of the material concept. This differs from Rolling Ball, which involves users in health education activities. From the results of the study, it is proven that the use of rolling ball learning media can create a more lively, interesting, and interactive class dynamic, so that it can increase interest and motivation in learning. The application of creative media can make the audience enthusiastic and confident in learning, making it easier to understand the concept.<sup>18-20,22</sup> The level of student involvement in participatory learning affects the retention of material memory reaching 70-90%. The level of memorization in participatory learning is higher than that in learning using visual media, which only reaches 50%.<sup>33</sup> With participatory learning, playing games has a simple short-term positive impact on teenagers regarding attitudes towards early marriage and feelings of empowerment to prevent early marriage.<sup>17</sup> However, rolling ball learning media in its implementation still requires educators as facilitators. Facilitators are required to provide reinforcement and motivate students to participate in the game.

Teenagers need to obtain accurate and complete information about the impacts and dangers of early marriage so that they can understand the risks and make the right decisions. Lack of knowledge can lead to risky sexual behaviors in adolescents, which ends in early marriage. A person's level of knowledge greatly affects their critical thinking skills and psychosocial maturity. A good level of knowledge makes it easier to think rationally, describe

**Table 3.** Differences in knowledge between Rolling Ball Media and Dis Card Groups.

Knowledge	n	Sum of Ranks	Diference of Mean	p
Treatment group				
Pre	60	37.40±11.66	49.1	0.000*
Post	60	86.50±8.80		
Control group				
Pre	60	72.10±14.47	5.32	0.024*
Post	60	77.42±16.91		

**Table 4.** The effectivity of rolling ball media on knowledge about the impact of child marriage.

Characteristics	n	Mean± Standard Deviation	p
Rolling ball Media	60	25.74±21.4	0.000 <sup>b</sup>
Disc Card Media	60		

<sup>b</sup>Mann Whitney test

problems, solve problems, and make decisions. The availability of various educational media about the impacts of early marriage for adolescents, will increase their knowledge to maintain their reproductive health and prepare themselves to delay the age of marriage.<sup>34,35</sup>

A limitation of this research was that the respondents were restricted to adolescent girls. Therefore, further research is needed to determine the effectiveness of rolling ball media in all adolescents. The limitation of this study is that the respondents involved were limited to young women, so that exposure to information about the impact of early marriage has not been evenly distributed to all young men and families. In addition, a limitation of rolling ball media is that it still requires education as a facilitator to provide reinforcement and motivation in the game. Understanding the impact of early marriage should be disseminated more widely in the community. Thus, further research is needed to determine the impact of providing education with rolling ball media in all communities, including young men and families.

## Conclusions

The results showed an increase in the average knowledge of the impact of child marriage on adolescents in Bengkulu City and Bandung City after the intervention. Differences were found in the variable of knowledge about the impact of child marriage in the rolling ball media intervention and disc media groups. Rolling ball media after the intervention had an influence on knowledge about the impact of child marriage on adolescents in Bengkulu City and Bandung City. Rolling ball media can be developed based on needs, flexibility, and adjustment to the material of the learning objectives, so that it can be used as a medium to provide any health education by simply replacing the material. A facilitator is needed to provide reinforcement and motivation for participants to participate in the game session, and the use of rolling ball media is recommended as an alternative medium for health promotion.

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