

Effect of Stimulation with Animation Video on the Development of Stunted Children

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ABSTRACT

Background: Stunting is a condition of failure to thrive in children under five as a result of chronic malnutrition so the child is too short for his age which has an impact on child development disorders. The right stimulation will stimulate the toddler's brain. Learning/stimulation media that combines text learning instructions with model illustrations or visualizations in the form of figures will be better than just containing words. This study aimed to determine the effect of animated video stimulation applications on the development of stunted toddlers

Subjects and Method: This type of research is quantitative research with a quasi-experimental design. The sample size in this study was 30 people, 15 people in the animation video intervention group and 15 people in the standard method intervention group. The dependent variable was the development of stunted toddlers. The independent variable was animation video application. The data were collected by Functionality and Usability Questionnaire. Data analysis carried out in this research was univariate analysis and bivariate analysis using the paired t-test.

Results: The video group showed an increase in the mean developmental score from 6.80 to 9.20 (Mean difference = 2.40), and this result was statistically significant ($p= 0.007$). The standard group also demonstrated an increase in the mean score from 7.80 to 8.47 (Mean difference = 0.60), and this result was statistically significant ($p<0.001$). However, the increase in the mean score was greater in the video group compared to the standard group, suggesting that animated video stimulation had a greater effect on the development of stunted children than the standard method.

Conclusion: The application of animated video stimulation has an effect on the development of toddlers who experience stunting.

Keywords: child development, stimulation, stunting, animation video.

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BACKGROUND

Stunting is a condition of failure to thrive in children under five resulting from chronic malnutrition so that the child is too short for his age (Darmawan, 2019). The incidence of

stunting experienced by children under five is influenced by several factors. The first and most important factor that influences stunting is intervention during the First 1000 Days of Life (first day of life). the

success of 1000 first day of life is influenced by several factors, including the mother's knowledge about nutrition before and during pregnancy, giving exclusive breast milk to babies aged 0-6 months, giving complementary feeding to breast milk to children aged 6-24 months. Apart from that, there are several other contributing factors, namely the price of nutritious food, anemic/non-anemic mothers, latrine conditions, access to clean drinking water, early childhood education, child immunization, and compliance with iron supplement consumption (Tim Indonesiabaik.id, 2019).

Stunting has long-term impacts and short-term impacts. The short-term impact of stunting is that it can cause death, high morbidity rates, motor development disorders, verbal development disorders, and cognitive development disorders that are not optimal, health costs increase. Long-term impacts include increased risk of obesity, shorter body posture than it should, decreased reproductive health, and reduced learning capacity, decreased productivity and work capacity (Gordon and Maule, 1989). Stunting conditions can also cause children to be more susceptible to disease and experience delays in physical growth and cognitive development, which will affect the child's level of intelligence and productivity in the future.

The incidence of stunting in 2020 in the world reached 149.2 million children under 5 years. The continent that contributes to the highest incidence of stunting is the Asian continent at 53%. Indonesia contributed a fairly high figure, namely 24.4% in 2021 (World Health Organization, 2021). Yogyakarta Special Region is one of the provinces on the island of Java which occupies the top rank in terms of stunting incidence, namely 13.2% (Indonesian Ministry of Health, 2016). The incidence

rate in Yogyakarta City in 2019 was 11.30% and in 2020 it was 14.30%, so it is known that there has been a fairly high increase in the number of stunting cases in Yogyakarta. The city of Yogyakarta has several sub-districts or *kemantren*, where each *kemantren* contributes to the number of stunting incidents. However, there is one *kemantren* that is the locus of stunting cases, namely the Mantrijeron *Kemantren*, especially Gedongkiwo Village. Meanwhile, the palace *kemantren* is an area that is thick with cultural customs.

The government's efforts to overcome developmental problems include carrying out developmental checks through Stimulation, Detection and Early Child Development Intervention activities at Community Health Centers (Indonesian Ministry of Health, 2021). Proper stimulation will stimulate the toddler's brain so that the development of movement, speech and language skills, socialization and independence in toddlers takes place optimally according to the child's age. The flow of development monitoring and stimulation of toddlers' development starts from stimulation and monitoring of development at the family/community level, then early detection of developmental deviations is carried out at the officer level. If deviations are found, they are referred to higher health personnel (Indonesian Ministry of Health, 2014).

Research conducted by Abidah revealed that giving stimulation once in the form of lectures and videos referring to the Child Development Pre-screening Questionnaire can increase the mother's ability to stimulate the development of her child, but all of this is influenced by the mother's age and education level (Abidah and Novianti, 2020). This reinforces the limitations of implementing ongoing monitoring and

stimulation of developments using the Child Development Pre-screening Questionnaire, where its use is intended for health workers, so it is only relevant for use by health workers (Indonesian Ministry of Health, 2014). Rambe's research concluded that early detection activities for child development should be provided by health workers in the form of training for parents so that parents understand how and what child development needs to be paid attention to. So, even with the Android-based KPSP application, it still requires education and training for parents or caregivers to explain the accuracy of each assessment indicator (Rambe and Sebayang, 2020).

Learning media that combines text learning instructions with model illustrations or visualizations in the form of figures will be better than just containing words (Castro-Alonso et al., 2021). In order to improve existing methods of stimulating the development of toddlers, especially to deal with the development of stunted children, this research was designed to develop a method in the form of an animated video-based developmental stimulation application. This method makes it easier for parents to provide developmental stimulation to their children, seeing that the current method still involves delivering the stimulation provided when parents visit. So it is hoped that this video-based stimulation application will shorten the handling of developmental delays in toddlers.

SUBJECTS AND METHOD

1. Study Design

This type of research is quantitative research with a quasi-experimental design. This research will later be divided into two groups of respondents, namely the standard stimulation intervention group and the experimental group with animated videos.

Sample selection for the two groups was carried out by taking into account equality in terms of age, gender, mother's education, caregiver, history of exclusive breastfeeding, history of infectious diseases (TB, HIV, Diarrhea, Malaria). The control group will be given the general method used by health workers in handling stunting, namely by telling them the assessment indicators that will be assessed, and the experimental/intervention group will be given a developmental stimulation method using an animated video-based application. After the application has gone through the development stage and a quality analysis has been carried out, the next step is to test the effect of the application on stimulating the development of stunted toddlers aged 2-4 years. Table 1 show that the research plan in this study.

2. Population and Sample

The population in this study were all children who experienced stunting in the Puskesmas in the working area of Yogyakarta in 2022. The population of this study was 1127 children. For the sample used, 15 people were used in each group, namely 15 people in the animation video intervention group and 15 people in the standard method intervention group. The location of this research is in the Mantrijeron Kemantren and Kraton areas of Yogyakarta city and the time taken is April-May 2023.

3. Study Variables

The dependent variable in this study is the development of children aged 2-4 years who are stunted. The independent variable was the development application for stunted children aged 2-4 years to stimulate the development of stunted toddlers based on animated videos. The development indicators that will be assessed are gross motor skills, fine motor skills, speech and language skills, as well as socialization and

independence.

4. Operational Definition of Variables

The development of stunted was assessment of development in stunted children aged 2-4 years using the KPSP development measurement tool which is measured according to age group. The instruments used consist of an instrument functionality test sheet using the test case method, a usability instrument questionnaire using the USE Questionnaire, an application instrument, and a dependent variable instrument using a questionnaire taken from the KPSP (Child Development Pre-screening Questionnaire) sheet and supplemented with data on the characteristics of the mother or caregiver, the baby's health history from pregnancy and a history of exclusive breastfeeding.

The animated video stimulation applications was stimulation in the form of animated videos that demonstrate all indicators to stimulate the development of stunted children aged 2-4 years.

5. Study Instrument

The data collection method in this research uses secondary and primary data. Types of secondary data obtained from the Family Planning Office in Yogyakarta. The type of data obtained comes from primary data, where data is obtained directly from respondents through height for age measurements adjusted to the z-score value and developmental status of toddlers aged 2 - 5 years.

6. Data analysis

The data in this study were analyzed using a paired t-test. To determine the differences in the development of stunted toddlers before and after the provision of stimulation with animation video.

7. Research Ethics

The research has received Ethical Clearance approval from the School of Health Sciences

of Guna Bangsa Ethics Commission with number 456/STIKES-GB/Eks/III/2023.

RESULTS

1. Steps for making animated videos

a. Requirements

This stage obtains the required information and obtains a concept regarding the developmental stimulation application that will be created. The first information was obtained from the progress inspection mechanism which still uses a standard education system using the KPSP sheet as a reference. This method still relies heavily on health workers. The video learning method was found to be more efficient in delivering the material. The animated video became a reference in creating the method used for this research. Next, look for information related to more modern technology information systems that can be used using smartphones to become a forum for animated video-based stimulation.

b. Verification

The process of creating this application requires collaboration with several experts, namely programmers, software developers and lecturers. The expert who collaborated in making this application was a programmer named Hilarius Wira Widya Iswara, M.Pd as the application maker. Based on the analysis and calculation of the functionality test feasibility presentation, a percentage of 100% is obtained. According to the eligibility criteria table, the stimulation application is included in "Very Appropriate" for use in stimulating children's development. The feasibility test of the material is carried out by showing the application and content of the material in animated videos which are used to stimulate development in children. The score obtained from the material test results is 100%. Meanwhile, in the final stage of application testing in this research,

a usability test was carried out on 20 respondents with 22 questions with the results showing that the usability test percentage was 96.4%. In accordance with the criteria table used as an assessment reference, the Usability test results are included in the "Very Appropriate" category for use in stimulation. development of stunted children aged 2 – 4 years.

Maintenance

After all the stages have been carried out, the next step is to maintain and repair the device until finally an application to stimulate children's development is created. The following is the link to the child development stimulation application: https://bit.ly/APLICACION_STIMULASI_PERKEMBANGAN_ANAK.



Figure 1. The homepage of the application stimulation

2. Sample Characteristics

Based on Table 2, most respondents had mothers with a low level of education (73.3%), while 26.7% had higher education. The majority of respondents had a history of breastfeeding (86.7%), and most had no history of disease (93.3%). The distribution

of characteristics in the developmental stimulation groups (video and control group) was relatively similar, indicating that both groups had comparable baseline conditions.

Table 2. Sample Characteristic

Variables	Developmental Stimulation			
	Videos		Control group	
	N	%	N	%
Mother's Education				
Low	11	73.3	11	73.3
High	4	26.7	4	26.7
Breast milk history				
Not breast milk	2	13.3	2	13.3
Breast milk	13	86.7	13	86.7
Disease History				
No	13	86.7	14	93.3
Yes	2	13.3	1	6.7

3. Bivariate Analysis

Based on Table 3 the bivariate analysis results, the video group showed an increase in the mean developmental score from 6.80 (pretest) to 9.20 (posttest) with a p-value of 0.007, indicating a statistically significant difference. The standard group also demonstrated an increase in the mean score

from 7.80 to 8.47 with a p-value of <0.001, which was also statistically significant. However, the increase in the mean score was greater in the video group compared to the standard group, suggesting that animated video stimulation had a greater effect on the development of stunted children than the standard method.

Table 3. Effect of the animated video stimulation applications on the development of stunted toddlers

Group	N	Mean	p
Video animation			0.007
Pretest	15	6.80	
Posttest	15	9.20	
Standard stimulation			<0.001
Pretest	15	7.80	
Posttest	15	8.47	

DISCUSSION

1. Characteristic sample

Most respondents had mothers with low educational levels. However, this study did not specifically analyze the association between maternal education and developmental outcomes. According to Mentari and Hermansyah, education is not related to the incidence of stunting in children, this happens because mothers with low education do not necessarily have no knowledge about nutrition. A high level of maternal education does not guarantee that the child will avoid malnutrition because a high level of education does not mean that the mother has sufficient knowledge of good nutrition (Mentari and Hermansyah, 2018). The results of this study are different from the results of Setiawan's research which stated that there was a significant relationship between the mother's education level and the incidence of stunting. The level of education will influence food consumption through the way food is chosen. People with higher education tend to choose food ingredients that are better in terms of

quality and quantity of dishes than those with low or medium education. The higher the level of education, the better the nutritional status of the child (Setiawan et al., 2018).

One study stated that maternal education is very important in relation to fulfilling family nutrition, especially children, because mothers with low education will find it difficult to absorb information. A higher level of education will make it easier for a person or community to absorb information and implement it in daily behavior and lifestyle in terms of health and nutrition, especially women's education. It also states that increasing education will increase knowledge of health and nutrition which will then lead to positive attitudes and behavior (Beal et al., 2018). Mothers who have good care practices such as feeding children according to the child's needs, providing growth stimulation to children according to age have been proven to be able to minimize the incidence of stunting in children (Kasjono and Suryani, 2020).

Research by Victora (2010) shows that

maternal height is seen as an important indicator that reflects genetic factors and environmental factors that play a role in a child's growth. Apart from that, this journal also discusses that the mother's height affects the growth of the fetus during pregnancy and the supply of nutrients to the child through breast milk. The results of this study have important implications for public health policy and nutritional interventions. In an effort to reduce the incidence of stunting in children, attention to improving maternal nutritional status and increasing maternal height are relevant factors to consider. Steps such as improving maternal nutritional status during pregnancy and breastfeeding as well as increasing access to good nutritional intake can help reduce the risk of stunting in children. However, it is important to remember that maternal height is not the only factor that contributes to the incidence of stunting. There are other factors such as nutritional intake, environmental sanitation, maternal education, and socioeconomic factors which also play an important role in children's growth. Therefore, a holistic approach involving these various factors is needed in efforts to prevent stunting and improve children's overall health (Victora et al., 2010).

The majority of subjects had no history of illness (93.3%). Infectious diseases, which can cause diarrhea, vomiting, and even dehydration, disrupt nutrient metabolism and lead to nutrient loss. Diarrhea that can be treated promptly and does not last long will not disrupt growth and negatively impact development. This is especially true for children who are still growing and developing, as it will be easier for them to quickly improve their nutritional status (Fadilah et al., 2020).

The majority of respondents had a history of breastfeeding (86.7%). Foods

containing milk are only associated with physical growth in children in developing countries. Drinking milk can be used to increase children's linear growth. On average, children who consume more than 600 ml of milk per day have a height of 0.9 and 0.67 higher than children who drink milk less than a day or even do not drink milk. The main factor that influences the increase in children's developmental abilities is the family or home environment where the environment does not provide stimulus (Senbanjo et al., 2022).

2. Analysis Bivariate

The results of the analysis show an average increase in stimulating the development of stunted children aged 2-4 years. The results of the average difference test can be seen in the output above where the mean pre-test score for the video group was 6.80 and the post-test experienced an increase in the score, namely 9.20. Likewise, in the standard group, the mean pre-test score was 7.80 and in the post-test it increased to 8.47. However, the improvement in the intervention group with animated videos was higher than in the standard group.

This study has important implications in efforts to improve the development of stunted children. A specially designed developmental stimulation program can be an effective strategy to help reduce developmental delays in stunted children. By increasing the average post-test score, this study provides evidence that this intervention can provide real benefits and has the potential to improve the quality of life of stunted children. Indirectly, this method of stimulating children's development also helps parents or child caregivers to know how to stimulate the children they care for. In short, teaching parenting methods from parents to children is more effective than lectures or other educational methods.

Parents become more aware of their child's development. Stimulating activities for children must be based on a calm and emotionless attitude to achieve maximum results (Leyton et al., 2021).

Based on the results of the analysis, there is an effect of providing stimulation on the development of stunted children aged 2-4 years using the animated video stimulation application compared to using the standard method. The research results showed that stunted toddlers who received video stimulation experienced significant improvements in various aspects of development compared to the control group. They show greater progress in cognitive, motor, language, and social-emotional abilities. The use of videos as a stimulation tool appears to be effective in facilitating the development of stunted children. Videos can provide engaging visual and auditory stimulation for children, broadening their horizons, and increasing engagement with the material presented. Through appropriate video stimulation, stunted children can experience improvements in cognitive abilities, language, motor skills and social interactions (Dulal et al., 2021). This is in line with the results of this research, where providing stimulation using video is much more effective than the standard method using the KPSP method. These results confirm that stimulation using animated videos is very effective in improving development, especially in children. Delivery of material using animated videos can improve the cognitive and gross motor development of young children. Children at this early age are at a very good stage in their sense of memory and hearing (Munawar, 2020).

Overall, playing using video media, especially in the form of games, can be associated with increased visual attention which plays an important role in more

efficient information processing. When videos in the form of games are accessed for a long period of time it will activate important networks involved in the detection of visual stimuli such as the anterior cingulate cortex and anterior insula) and central executive networks. Accessing videos in the form of games will result in increased and special working memory. Video games in particular can improve working memory which is important for learning and gaining knowledge (Choi et al., 2020).

The advantage of this research is that it refers to the theory of information and communication technology development, and applies stimulation theory with a method of stimulating the brain's nerves with audio-visuals and is modified with a modern display, namely animation, so the stimulation method using animated video applications becomes a more interesting method. Apart from that, this research was carried out in collaboration with IT experts so it can be ensured that it is in accordance with their expertise. However, this research also still has several shortcomings, namely that it only uses material tests, either technology material or IT expert tests, and tests of content material or the content of stories which are said to use content material only consist of one examiner per subject. It would be better if material testing, both IT and story content, was carried out by two expert examiners and then the results of the two examiners were tested. The second shortcoming in selecting variables does not focus on factors that influence development but those that influence stunting.

The conclusions in this research are there is an influence of the animated video stimulation application on the development of stunting toddlers, the innovation of a new stimulation method to improve the

development of toddlers who experience stunting, namely in the form of an animated video-based stimulation application, there was an increase in the development of Stunting toddlers before and after being given the video animation stimulation application, as shown by a significant average increase in the pre-test and post-test results.

AUTHORS CONTRIBUTION

Ika Agustina designed the research, collected and analyzed data, and drafted the article manuscript; Yuni Kusmiati and Sunartono controlled the quality of the research and article manuscript; data analysis and interpretation were corrected by Fatimah Sari and Ika Agustina.

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CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

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