

The Effectiveness of Video-Based Digital Educational Media In Increasing Guardians' Knowledge of Obesity Elementary School Children

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Abstract:

Obesity in children is an increasingly prevalent public health issue, including in Indonesia, and it adversely affects long-term health outcomes. Therefore, effective health education interventions are necessary to educate children and their guardians on adopting and maintaining a healthy lifestyle. This study aimed to evaluate the effectiveness of digital educational media in enhancing the knowledge of guardians of obese children in elementary schools.

The study employed a quasi-experimental design with a pretest-posttest approach. A total of 113 guardians were selected through a complex cluster sampling technique. The intervention involved children watching health education videos on the guardians' mobile phones, with guardians accompanying them during the viewing process.

Data were collected through a knowledge questionnaire completed by guardians before the intervention and after three months of intervention sessions. Descriptive statistics were used to measure the average knowledge scores, while paired t-tests assessed the statistical significance of knowledge improvement. Results showed an average knowledge score of 70 with an interquartile range (IQR) of 63–77, and the minimum–maximum value was in the range of 47–90. After the intervention, the median value increased to 87 (IQR 77–90), with a higher minimum–maximum value of 70–97.

Statistical analysis confirmed that the increase in knowledge scores before and after the interventions was significant ($p < 0.05$).

The study concludes that video-based digital educational media is an effective method for enhancing guardians' knowledge.

Keywords: Digital Media, Children, Obesity, Guardian, Knowledge

1. Introduction

Childhood obesity has become a growing public health problem in various countries, including Indonesia, with significant long-term impacts on physical, psychological, and social health. Obesity in childhood and adolescence is the most challenging public health problem of the twenty-first century because complications from obesity will affect the quality and duration of life.¹ WHO continues to encourage countries to take more obesity prevention measures, as obesity affects child growth and development. Causative factors: Obesity in children is caused by socioecological, environmental, genetic, and multifactorial influences.² An unhealthy diet and a lack of physical and psychosocial activity are significant factors.³ Therefore, it is necessary for families, especially parents or caregivers, to form healthy living habits in children, so that effective health education must involve them directly.

In the context of health education, digital media has shown great potential as a tool to convey information in an engaging, interactive, and easily accessible manner. Educational videos, in particular, can reinforce understanding through visual and narrative approaches that suit children's learning styles and allow for shared engagement between children and parents. However, the implementation of digital media in health education programs for families with obese children is still relatively limited, especially in elementary school environments in urban and rural areas in Indonesia, especially in the city of Bandung.

This study aims to assess the effectiveness of video-based digital health education in enhancing the knowledge of parents or guardians of elementary school children who are obese or overweight. A quantitative quasi-experimental pretest-posttest approach is used to assess changes in the knowledge of parents or guardians of children after three months of intervention. This is achieved through the screening of a short video on a healthy lifestyle, which is watched collaboratively with the children. The results of this study are expected to provide strong empirical evidence on the benefits of digital media in family health education, as well as provide practical recommendations for schools, local governments, and health institutions in designing technology-based interventions to reduce the prevalence of obesity in children.

2. Literature Review

2.1 Obesity

Obesity in childhood and adolescence is the most challenging public health problem of the twenty-first century because complications from obesity will affect the quality and duration of life.¹ Obesity in children is defined as the accumulation of excessive body fat that can lead to weight gain and harm overall health.⁴ In Indonesia, the assessment of the nutritional status of children aged 5 (five) years to 18 (eighteen) years following the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2020 is said to be obese if the results of the Body Mass Index by age (BMI/Age) show $>+2$ Standard.⁵

The prevalence of overweight and childhood obesity in the world increased from 4.2% in 1990 to 6.7% in 2010 and is expected to reach 9.1% by 2020. The rate decreased from 6.7% in 1990 to 6.7% in 2010 and is expected to reach 9.1% by 2020. The results of a 2016 survey conducted in Indonesia showed that 9.8% of boys and 7.1% of girls aged 5-9 years were obese, and 5.8% of boys and 3.9% of girls were obese aged 10-19. By 2030, it is estimated that 17.7% of Indonesian children aged 5-9 years will be obese, and 11.8% of Indonesian children aged 10-19 years will be obese. In Indonesia, the number of children aged 5-9 years who are obese is 9,076,426.⁶

The trend of increasing obesity in children must be closely monitored and intervened because it will experience long-term impacts such as metabolic syndrome, cardiovascular disease, hypertension, Type 2 Diabetes Mellitus (T2DM), and fatty liver in children and adults.⁷ Obesity at a young age increases the risk due to an increase in abdominal adipose tissue and fat in the organs.⁸ Children and adolescents who are obese should start screening for T2DM, insulin resistance, hyperinsulinism, dyslipidemia, and hypertension.⁹

The WHO continues to encourage countries to take more obesity prevention measures, as obesity affects the growth and development of children. The causative factors of obesity in children result from socioecological, environmental, genetic, and multifactorial influences.² An unhealthy diet and a lack of physical and psychosocial activity are significant factors.³

Prevention, early recognition, and treatment of obesity are essential to avoid obesity morbidity in children, and increased body mass index during puberty is associated with a higher risk of T2DM.¹⁰ Other studies have shown that the effects of obesity, such as insulin resistance and dyslipidemia, may affect poorer cognitive function in adolescents with T2DM, and that obese children diagnosed with T2DM during prepuberty have

worrisome obesity.⁹ Children who are overweight or obese are 1.5 times more likely to exhibit different postures than their healthy counterparts, leading to mechanical stress and excessive muscle activation. All of these changes can make them susceptible to musculoskeletal disorders¹¹

Obesity prevention in Indonesia employs a comprehensive approach, which involves establishing a balanced diet. Regulation of the Minister of Health Number 41 of 2014 outlines the four main pillars of balanced nutrition: eating a variety of foods in sufficient and balanced amounts, practicing clean and healthy living behaviors, engaging in regular physical activities and exercise, and maintaining a normal weight. These¹² Pillars form the foundation of our obesity prevention efforts, with a focus on educating children about lifestyle changes.²

2.2 Health Education

Health education is vital to the healthcare system, significantly improving individual and community health. Numerous studies have demonstrated the positive impact of health education programs on physical and mental health.¹³ For instance, research has shown that health education can prevent chronic diseases, improve overall population health, and reduce the burden of obesity.¹⁴ With the right strategies and effective implementation, health education can raise awareness, change behavior, and ultimately enhance the overall quality of life.

Health education is a planned set of learning experiences that aims to influence voluntary health behaviors in individuals, groups, or communities to improve health. State that health education is a communication activity that aims to promote positive health and prevent or reduce disease in individuals and groups by influencing beliefs, attitudes, and behaviors.¹³ Health education aims to improve health literacy, health promotion, and sound public policies, ultimately positively impacting public health outcomes. Health education is not just about disseminating health information but also about motivating, building skills, and increasing the confidence of individuals to take actions that can improve their health. This includes communicating details on underlying social, economic, and environmental conditions that affect health, as well as individual risk factors and behaviors.¹⁵

Health education is a crucial element in the education system designed to improve health literacy and promote healthy living behaviors among students. Health education in schools aims to provide planned learning experiences that enable students to acquire the knowledge, attitudes, and skills necessary to adopt and maintain healthy behaviors. Health education covers various topics, including nutrition, hygiene, mental health, and infectious disease prevention. The emphasis on a skills-based approach helps students practice and advocate for their health needs, families, and communities.¹⁶

One of the main challenges in health education is integrating health literacy principles into existing school curricula. Health literacy is an individual's capacity to acquire, process, and understand basic health information and services needed to make informed health decisions. By improving health literacy among students, health education can help address chronic health problems and improve overall well-being. Studies have shown that students participating in health education curricula and other interventions, such as physical activity and improved nutrition, have lower obesity rates and better health behaviors.¹⁷ Most health education programs are based in schools or organizations and are taught in a standardized curriculum. There has recently been a shift towards more creative and digital approaches and an expansion into mental health, preventive care, and more.¹⁴

2.3 Digital Methods

Technology is developing rapidly along with the Industrial Revolution 4.0 that began in 2011. This revolution is a period of new development in which several technologies, including physical, digital, and biological, have made significant progress compared to the past. These three technologies can support primary technologies for the Industrial Revolution 4.0, such as health services, which transform technology, socio-economy, lifestyle, and the environment, as well as various innovations in the field of health services.¹⁸ In 2019, in Indonesia, 25.2% of children aged 5–9 years and 66.2 % of children aged 10–14 years were active Internet users of the Indonesian Internet Service Providers Association¹⁹

Using the internet in schools and online learning requires children to connect with the digital world. In the same year, most internet users in Indonesia accessed online media for educational and school content.¹⁹ Unlike a few decades ago, today's children are living a lifestyle that involves spending more time in front of the computer and watching TV.²⁰ In the last fifteen years, the Internet has grown very rapidly: 40% of the world's population uses the Internet, and children are no exception. This generation is called the post-millennial and digital generation because they grew up in wireless and hyper-networked environments that prefer communication over traditional methods. One relevant source is a report from the Pew Research Center that discusses how children and teens today use the internet and social media for a variety of purposes, including finding information, connecting with friends, and entertainment. The report shows that children under 12 years of age have started using digital devices and social media significantly, contributing to their communication patterns that differ from those of previous generations.²¹

Children use the Internet and social media to search for information, connect with friends (old and new), and entertain themselves.¹⁹ Social media is a form of science and technology development in the industrial era 4.0, and people often use it as a medium of interaction.²² Health education using digital technology is now essential. This can be achieved through computer games, smartphone apps, or online platforms to convey information about healthy lifestyles, nutrition, physical activity, and weight management. It is interesting and easy for children to understand. Choosing materials that are appropriate for children's development and understanding is essential for children's health education. One suitable health education material for children is creating educational videos. This short video conveys important messages about health in language that children can easily understand.

The development of digital technology has paved the way for new approaches in health education. Digital educational media, particularly in the form of interactive educational videos, offers advantages in building deep understanding, increasing engagement, and facilitating access for families from diverse socioeconomic backgrounds.²³ Several studies have shown that visual content-based learning videos and story narratives are more effective in improving health literacy in parents than print methods. In addition, digital media that involves children and parents together (a family-centered approach) is more successful in shaping long-term behavior change. A study showed that an approach that integrated psychosocial support and family communication during digital media use resulted in a 32% increase in consistency in the implementation of healthy eating and physical activity at home, compared to

interventions without family involvement.²⁴

2.4 The role of parents

The role of the family in human development is a key concern in national development discourse, as the family serves as the primary environment determining the quality of an individual.²⁵ Parents play a vital role in health education at home. They act as the main companions, behavioral models, and sources of knowledge for their children. The role of parents or caregivers is indispensable in diet management. Diet management and physical exercise are components of effective treatment, and physiologists are most concerned about achieving changes in eating activities and behaviors.

Parents, family members, friends, and teachers should be involved in obesity management. The role of parents in caring for children is very effective in weight loss and treatment success. Parents provide balanced nutrition according to the rules of the food method. All family members participate in the diet program, change eating behaviors and activities that support the child's success, and become part of the overall comprehensive program.

Teachers and schoolmates are also expected to support obesity management, for example, by giving praise if an obese child successfully follows a diet program or loses weight, and vice versa, and not making fun of an obese child. Children imitate what their parents do. Therefore, a healthy lifestyle of parents greatly determines the formation of children's healthy habits. Children begin to learn and imitate what they see, especially the behavior of parents, because the family is one of the shapers of children's character and health.

3. Method

This study uses a Quasi-Experimental design, with a pre-test post-test approach for one group. The population in this study is parents or guardians who have obese or overweight children in grades 4 - 6 of elementary school in the city of Bandung. The study included 113 parents or guardians, with samples drawn using a Complex Cluster Sampling technique. The inclusion criteria are parents or guardians who have obese or overweight children, children who are studying in grades 4 – 6 of elementary schools in the city of Bandung, and who are willing to receive intervention for 3 (three) months.

The intervention in the form of providing health education using digital methods in the form of a health education video entitled "Learning Healthy with Obi" consists of 3 (three) parts with a total duration of 14 minutes. This health education video was created by the research team based on input from experts in the fields of medicine, nursing, psychology, and the creative digital team, and has a copyright issued by the Ministry of Law and Human Rights of the Republic of Indonesia as of November 21, 2024.

Before the intervention was given, the researcher and the school gathered 113 parents or guardians and their children who would receive the intervention, filled out a letter of consent willing to participate in the research data collection process, formed a whatsapp group based on the school, filled out a knowledge questionnaire through the goggle form and ended up watching a health education video.

Furthermore, the health education video was watched by 113 parents/guardians and their children who were obese or overweight for 3 (three) months through their parents' cellphones, laptops, or connected to home television. After watching the health video, 113 parents/guardians submitted information that they had watched the video to the WhatsApp group in the form of pictures or videos. Then the viewing information was recorded by the researcher.

The knowledge assessment of 113 parents or guardians was conducted before the intervention (pre-test) and after three months of intervention (post-test) using a validated knowledge questionnaire (r table $> 0,3961$) with a reliability value of 0.837 (> 0.7). In this study, there was no randomization to the control group; the analysis focused on changes in one group (paired t) using the Wilcoxon Test.

4. Findings and Discussion

Table 1. Guardian Characteristics of Primary School Children Receiving Health Education Using a Digital Media Model for Three Months

Variable	n=113
Guardian age (years)	42 (27 – 78)
Final Education	
SD	17 (15)
JUNIOR	29 (25.7)
SMA	46 (40.7)
D3	7 (6.2)
S1	13 (11.5)
S2	1 (0.9)
Work	
ASN/Teacher	9 (8)
Private Employees	22 (19.5)
Self employed	19 (16.8)
Laborer	8 (7.1)
Housewives	53 (46.9)
Retired civil servants	9 (8)

A total of 113 parents/guardians of children who participated in the three-month intervention were analyzed in this study. Based on the descriptive results, it is known that the median age of parents/guardians is 42 years, with an age range between 27 and 78 years, indicating participation from the early adult to the elderly age group.

In terms of the last level of education, most parents/guardians are secondary, with the highest proportion being high school graduates (40.7%), followed by junior high school (25.7%) and elementary school (15%). A small number have higher education backgrounds, namely D3 (6.2%), S1 (11.5%), and S2 (0.9%). These findings suggest that the majority of parents/guardians have a sufficient level of formal education to understand basic health materials, especially when delivered through digital media that are designed and communicated.

In terms of job type, most parents/guardians are housewives (46.9%), followed by private employees (19.5%), self-employed (16.8%), civil servants/teachers (8%), and retired civil servants (8%). A small number of others work as labourers (7.1%). The high proportion of homemakers suggests that most parents/guardians have more flexible free time, which has the potential to support their involvement in the childcare process during the intervention.

The characteristics of guardians in the intervention group showed the dominance of middle age, secondary education, and informal or non-working jobs. This is important to consider in designing a digital media-based health education model, so that the approach and content can be adjusted to the diverse social characteristics and education of guardians.

Table 2 Changes in the Knowledge Level of Primary School Children's Guardians Before and After Their Children Receive Health Education Using the Digital Media Model

Variable	Before Intervention	After Intervention	p-value
Knowledge of Guardians of Children			
Median (IQR)	70 (63 – 77)	87 (77 – 90)	<0.001*
Min- Max	47 – 90	70 – 97	

The results of the analysis showed that there was a statistically significant improvement in the level of knowledge of the child's guardians after their children participated in a health education intervention using a digital media model for six months.

Before the intervention, the median value of guardian knowledge was 70 with an interquartile range (IQR) of 63–77, and the minimum–maximum value was in the range of 47–90. After the intervention, the median value increased to 87 (IQR 77–90), with a higher minimum–maximum value of 70–97.

The Wilcoxon test showed a p-value of 0.001, which indicates that the increase was statistically significant. Thus, health education interventions provided to children through digital media have a positive indirect impact on the knowledge of children's guardians. These findings underscore that digital media-based health education programs aimed at primary school children are not only beneficial to direct participants, but can also contribute to improving the knowledge of parents or guardians. This is important to harness in family-based health promotion programs, where children can be agents of change that encourage increased awareness in the home environment. These findings reinforce the child's role as agents of change in the family environment, where interactive digital media—such as videos, quizzes, and educational games—allow for the effective transfer of knowledge from school to home. These results support a family-centered - approach to health promotion, suggesting that child-focused programs can indirectly increase parental health awareness.

A digital media-based health education intervention given to elementary school children for 6 months resulted in a statistically significant increase in guardian knowledge (median increased from 70 to 87, $p < 0.001$). All indicators (IQR, maximum, and minimum value-) show a shift towards higher values, indicating that the benefits are felt by almost all guardians, not just a few.

Thus, children can function as agents of change in the family, so that health education programs that are focused on children at the same time have a positive impact on parents' knowledge. These findings support a-family-centered approach in health promotion and affirm the value of integrating digital media in school education programs. This paper highlights the crucial role parents play in helping children learn about health through digital media, making them the primary companions who significantly enhance family knowledge.²⁶

5. Conclusion and Recommendation

5.1 Conclusion

Health education programs aimed at elementary school children through digital media not only increase children's knowledge but also provide benefits to parents/guardians. Children act as agents of change in the family, expanding the reach of health promotion.

5.2 Recommendation

1. Escalation of programs at the school level

- Implement similar digital media models in more primary schools, with easily accessible modules (mobile apps, interactive videos, quizzes).
- Provide support materials for parents (user guides, content summaries) in PDF or short videos.

2. Strengthening the role of parents

- Organize a workshop for parents to introduce how to use digital media with their children at home.
- Involve parents in monitoring(e.g., weekly reports on app usage) to increase engagement.

3. Integration with public health policies

- Propose the program as an official component of the family-based health promotion policy at the regional or national level.
- Cooperation with the health and education offices for shared resources (teacher training, digital infrastructure).

4. More contextual content development

- Adapt the material to local needs (language, culture, prevalent health issues).
- Add elements of "gamification" and "real-time feedback" to keep kids and parents motivated.

5. Advanced research

- Investigate the psychological mechanisms why the child can be an effective agent of change at home (social learning theory, child-to-parent model).
- Test moderator variables such as parents' digital literacy level, socio-economic status, or school support.

By implementing the above recommendations, digital media-based health education programs can "expand their impact" not only on direct participants (children) but also on the entire family unit, thereby contributing to improving public health more holistically.

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