

## Enhancing Children's Self-Awareness in Diabetes Prevention through Digital Picture Books

*Lely Surya Wardani<sup>1</sup>, Faldi Hendrawan<sup>2</sup>,  
Nicholaus Wayong Kabelen<sup>3\*</sup>*

\*wayong@asia.ac.id

Asian Business Technology Institute Malang,  
Malang, Indonesia

---

### File info

*Received:*

12/01/2026

*Final Revision:*

22/04/2026

*Accepted:*

23/04/2026

**DOI:**

[doi.org/10.37715/vcd.v11i1.6346](https://doi.org/10.37715/vcd.v11i1.6346)

---

### Keywords

Childhood obesity, picture book, health education, self-awareness, visual communication design

---

### ABSTRACT

Childhood obesity persists as a significant global public health challenge, influenced not only by dietary factors but also by parental perceptions that frequently associate objectively overweight children with good health. This prevalent misconception can severely impede early prevention efforts and negatively impact children's physical and psychological development.

This study aimed to develop and evaluate a digital picture book as an educational medium to enhance self-awareness among children aged 9–12 years concerning obesity prevention and the adoption of healthy lifestyles. Using a direct research method, data were systematically collected through structured interviews with parents, questionnaires administered to the target children, and direct observations during the intervention.

The comprehensive evaluation specifically assessed children's understanding of health concepts, their engagement with the visual content, and their overall acceptance of the educational material.

The developed digital picture book, titled "Aku Terlindungi dari Obesitas!" (I Am Protected from Obesity!), achieved a 'very good' effectiveness rating of 89% based on responses from 30 child participants in Malang City. These findings robustly indicate that the integrated visual and narrative approach effectively supports children's comprehension of obesity risks

---

Published by: [School of Creative Industry, Universitas Ciputra](#)

© 2026 Lely Surya Wardani, Faldi Hendrawan, Nicholaus Wayong Kabelen.

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License (CC BY-SA 4.0).

and actively promotes the adoption of healthy behaviors.

This study significantly contributes to the field of visual communication design, demonstrating the potent capability of engaging visual storytelling in digital picture books to serve as an effective and accessible educational medium for the early prevention of childhood obesity.

---

## INTRODUCTION

Childhood obesity is a serious problem because it can persist into adulthood. Obesity can also lead to diabetes. Diabetes mellitus is a growing global health problem, including in children. Overweight and obesity among children are becoming a crucial public health issue in lower-middle-income countries (LMICs) such as Indonesia, which has lagged behind high-income countries (HICs) where overweight and obesity began to increase significantly from as early as the mid-1980s (Oktaviani et al., 2023). However, strategies to prevent or delay type 1 diabetes in youth remain elusive, and meanwhile, the number of affected children continues to grow (Chiang et al., 2018). An unhealthy lifestyle, such as an unbalanced diet and lack of physical activity, is a major factor in increasing the risk of diabetes from an early age. Therefore, it is important to instill self-awareness in children so they can understand, recognize, and implement healthy lifestyle behaviors as a preventative measure. Obesity can also reduce metabolism and disrupt children's growth and development. Various health problems caused by obesity can be detrimental, such as asthma, high cholesterol, diabetes, and psychological disorders. A questionnaire distributed to 70 children aged 9-12 years showed that 85% had unhealthy eating habits that can contribute to the onset of obesity. Further clinical signs can also include an impaired general state of health, shortness of breath, abdominal pain, or vomiting (Ziegler & Neu, 2018). Obesity can also occur due to an imbalance between the energy from food intake being greater than the energy used by the body (Sumarni, & Bangkele, 2023).

Obesity is a chronic health condition characterized by excess fat accumulation beyond the body's needs. (Soetjningsih., 2012). Symptoms of obesity in children require more attention regarding education and early prevention so that children can understand the early symptoms of obesity and know how to prevent it. So it does not have a negative impact on the child's health and growth in the future. Obesity is determined from the body mass index (BMI) by dividing body weight (kg) by height (M) (Frietag, 2010). Diabetes in children and adolescents is not easy to control for people with diabetes (Pertivi et al., 2021).

Visual communication plays a crucial role in delivering health education effectively, particularly for children who tend to respond better to engaging and illustrative media such as picture books. Through visual storytelling, complex health information can be simplified into narratives that are easier to understand and more relatable for young audiences. In the context of diabetes prevention, picture books can serve as an educational medium that integrates visual elements, characters, and storytelling to promote healthy lifestyle awareness from an early age.

Diabetes itself is a chronic disease that requires comprehensive management, especially in individuals with type 1 diabetes, who must follow structured self-management practices such as insulin administration, blood glucose monitoring, physical activity, and a balanced diet (Patterson et al., 2019). However, beyond clinical management, preventive efforts are equally important, particularly for children who are at risk due to both unhealthy lifestyles and hereditary factors.

Previous studies have shown that access to education regarding healthy behaviors, including diet, physical activity, and lifestyle management, plays a significant role in reducing the risk of diabetes (Li, et al., 2020). Moreover, genetic predisposition also contributes to increased risk, as children of mothers with diabetes tend to have higher systolic and diastolic blood pressure compared to those without such a background (Lu et al., 2019).

Therefore, integrating visual communication design into health education for both children and parents is essential to enhance understanding,

foster self-awareness, and support the development of a family environment that promotes early diabetes prevention.

The increasing prevalence of childhood obesity has become a major public health concern, as it significantly increases the risk of developing chronic diseases, including type 2 diabetes, at an early age. This condition is often exacerbated by limited access to effective and age-appropriate health education for children, as well as misconceptions among parents regarding healthy body weight. Therefore, early preventive efforts are essential, particularly through educational approaches that are engaging and accessible to children.

Visual communication media, such as picture books, offer a promising approach to delivering health education. Through the integration of illustrations, colors, and visual storytelling, picture books are able to simplify complex health information and make it more understandable for children (Pertiwi et al., 2021; Sutanto & Wardaya, 2020). In addition, visual narratives not only support cognitive understanding but also influence children's attitudes and behaviors toward adopting a healthy lifestyle. Picture books are also considered accessible and cost-effective, enabling interaction between children and caregivers during the learning process (Agustina et al., 2018). Illustrations can help readers who have difficulty understanding abstract and intangible narratives (Sutanto et al., 2024).

However, previous studies have primarily focused on the general use of visual media for education and have not specifically addressed the integration of visual storytelling in picture books as a medium for increasing children's self-awareness in the context of obesity-related diabetes prevention. Furthermore, the connection between obesity as a risk factor and early diabetes prevention has not been consistently explored within visual communication design studies.

Therefore, this study aims to develop and evaluate a picture book as an educational medium that integrates visual storytelling to enhance children's self-awareness of healthy lifestyles and support early prevention of obesity-related diabetes.

## **RESEARCH METHOD**

The research approach is identified as design research; however, its stages are not yet systematically structured within a clear methodological framework. Therefore, this study adopts a Research Through Design (RtD) approach, which explicitly organizes the research process into sequential and interconnected stages, including needs analysis, design development, prototyping, and evaluation. This structured framework ensures that the design process is not only creative but also grounded in systematic research procedures.

The research subjects at this stage involved experts (child health experts, education experts, and graphic designers) to provide content validation and input on the design. Data were obtained through literature reviews and interviews with teachers and parents. Descriptive qualitative analysis guided the iterative refinement of the media design, culminating in a digital storybook prototype precisely tailored to meet children's educational needs for diabetes prevention.

## **RESULT AND DISCUSSION**

### **Design Process**

This picture book contains educational content on understanding childhood obesity, the characteristics and symptoms of childhood obesity, and how to prevent it. Several demographic segments can be used for this picture book about childhood obesity, including children aged 9–12 who are overweight.

#### **1. Target Audience Analysis**

Psychographically, the target audience consists of children with limited awareness of healthy lifestyles, particularly regarding obesity and its associated risks. Findings from the needs analysis indicate that children in this group tend to show higher engagement with visual and story-based learning media, especially illustrated books.

Behaviorally, the target audience is characterized by unhealthy eating habits and sedentary lifestyles, which increase their risk of obesity. These

behavioral patterns highlight the need for educational interventions that are both engaging and easy to understand. Based on these characteristics, the target audience is defined as children aged 9–12 years who are at risk of or experiencing obesity and require appropriate educational support to improve their health awareness.

In terms of positioning, the illustrated book is designed as an alternative educational medium that integrates visual storytelling to support children's understanding of healthy lifestyles and promote early awareness of obesity prevention.

## **2. Design Draft**

The draft of educational media design in the form of an illustrated book with a theme about the healthy body in children, especially obesity, has an objective to make children understand basic guidelines for their healthy body, as well as prevent the occurrence of obesity in children. Obesity is a dangerous disturbance to health. If it is not handled appropriately, lifestyle will become one of the causes.

With the existence of a research problem, the design of educational media in the form of an illustrated book with a theme of a healthy body in children, especially obesity, with the title " I Protect from Obesity !". Choosing the title of the book because it represents the meaning of an invitation for protecting the body from health disturbances, which becomes the main problem, which is obesity. The contents presented are about basic material on children's health. The materials cover understanding of obesity, characteristics of obesity symptoms, and how to prevent obesity. Each content point will be illustrated by nearby activities in which most children like playing, sports, and learning.

Our visual materials for obesity prevention avoid depictions that could incite stigma or shame, in line with obesity prevention programs that emphasize healthy habits and caution against labels like "fat," which can lead to shame, bias, and isolation (Kolokouri, 2025).

The visual materials for understanding obesity depict children engaging in physical activity and eating healthy foods, accompanied by

explanatory text. In the characteristics section, the visuals depicting symptoms of obesity show conditions such as bloating or a lack of energy in children playing, focusing on physical condition rather than the label "fat." Furthermore, the materials depicting obesity prevention methods are illustrated with visuals of children engaging in various types of physical exercise and other active activities. This approach aims to instill positive, healthy habits and build self-awareness without stigma, which is essential in children's health education.

The design used in the picture book uses the style of cartoon illustration. Illustrations are intended to support the concept of children's thinking, which is imaginative and simple (Nyolinda & Hartanti, 2016). Cartoon style that has the form of anatomy of 6 heads sized and a little short, with the head standing out more. Use bright colors like yellow, light blue, light green, and pink that will create a cheerful atmosphere and be pleasant. It still gives an impression of health. A cartoon can be used to highlight an impression of funny entertainment and also strengthen the imagination of children. Cartoon style was chosen Because cartoon own form of funny packaging and are easy to understand. This allows children to easily identify and understand the picture as well as the information conveyed.

In a sequential way, the picture book is arranged on the front cover, in which this section uses a big type layout. With the title "Aku Terlindungi dari Obesitas !" with a visual of a little boy who is fat eating greedily up to the title page, introduction page, content, and cover. The back cover uses a big type layout. The layout used in the contents has a dynamic nature, and is adaptable with the content, and also the existence of a continuous visual ornament.

The picture book is designed to be a printed book with a size of 23 cm x 23 cm. The size was chosen because own exact dimensions for children's reading activity, big enough for displaying visuals and text clearly. Using type of 190gr Art Paper for content, while for the front and back cover use hardcover with matte layer.

### **3. Synopsis**

The digital picture book addresses the multifaceted causes of obesity, which include insufficient fruit and vegetable consumption, sedentary

lifestyles (laziness), excessive intake of sugary drinks, emotional disturbances, and hereditary factors. Each identified cause is elaborated through a concise, one-page story. These narratives convey critical information by integrating it into age-appropriate activities familiar to children, such as playing, studying, and communal eating. Following this, the fourth section of the book meticulously outlines the potential health consequences of obesity, specifically detailing conditions such as diabetes, heart disease, high blood pressure, and sleep apnea. The picture book titled “Aku Terlindungi dari Obesitas!” is designed as an educational medium to introduce children to obesity and promote healthy lifestyle awareness through visual storytelling. The structure of the book is systematically organized into five sections: introduction, characteristics, causes, consequences, and prevention.

In the introductory section, the concept of obesity is presented through a central character, allowing children to engage with the content through narrative identification. This approach is based on the principle of visual relatability, where familiar characters help children connect emotionally with the message. The depiction of eating behavior is intentionally emphasized to provide an accessible entry point for understanding obesity-related habits.



Figure 1. Rough layout  
Source: author's documentation

The section on characteristics presents visual cues such as a round face, chubby cheeks, and a protruding abdomen. These features are highlighted within a unified illustration to support contextual visualization, enabling children to recognize physical signs without isolating them from real-life

situations. This approach helps translate abstract health concepts into concrete visual representations.

In the causes section, each factor, such as low fruit and vegetable intake, sedentary behavior, and excessive sugar consumption, is conveyed through short narrative scenes reflecting children's daily activities. This use of narrative-based visualization supports comprehension by embedding information within familiar contexts, making the message more meaningful and easier to recall.

The consequences of obesity are illustrated through depictions of health conditions such as diabetes, heart disease, and hypertension. Rather than merely presenting negative outcomes, the visuals are designed to build awareness of long-term health risks. This aligns with behavioral learning principles, where visualizing consequences can influence attitudes and encourage preventive thinking.

Finally, the prevention section emphasizes positive behaviors, including regular physical activity, balanced nutrition, and emotional regulation. These messages are delivered through scenes of healthy daily routines, aiming to model desirable behaviors. This strategy reflects the concept of observational learning, where children are more likely to adopt behaviors that are clearly demonstrated through relatable actions.

Overall, the design integrates visual storytelling, character-based narratives, and contextual illustrations to enhance communication effectiveness. These design decisions are supported by visual communication and learning theories, ensuring that the book not only presents information but also facilitates understanding and behavioral awareness among children.

## **Pre-Production Process**

### **1. Character Design**

The main character, Budi, is depicted with a stocky build and curly hair. This character serves as the central figure for information delivery throughout the story.

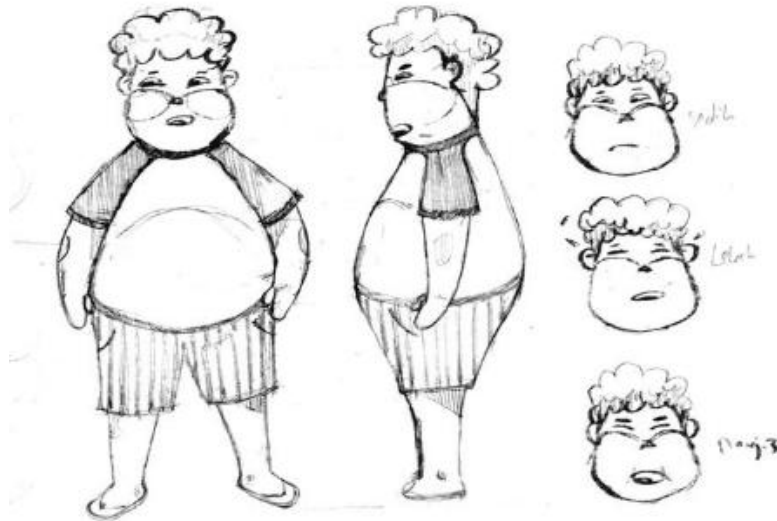


Figure 2. Budi the main character  
Source: author's documentation

## 2. Layout

Layout used using big type with the title " Aku Terlindungi dari Obesitas!". The layout used in the contents is naturally dynamic, adaptable with content, and also maintains visual continuity.

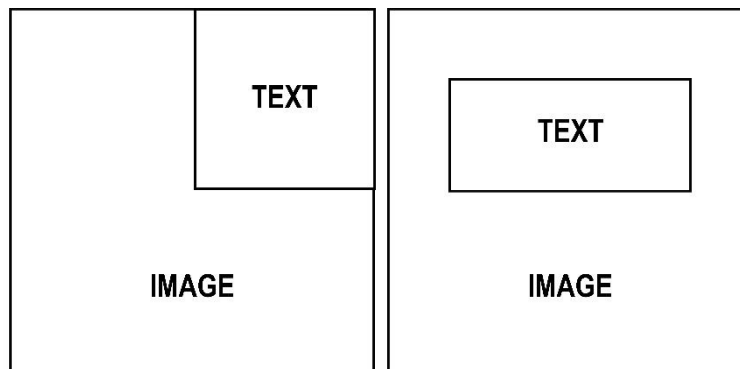


Figure 3. Big type layout  
Source: author's documentation

## 3. Rough Layout

The process of creating a rough layout using Adobe Photoshop software. Through depiction of the design character in the storyline.

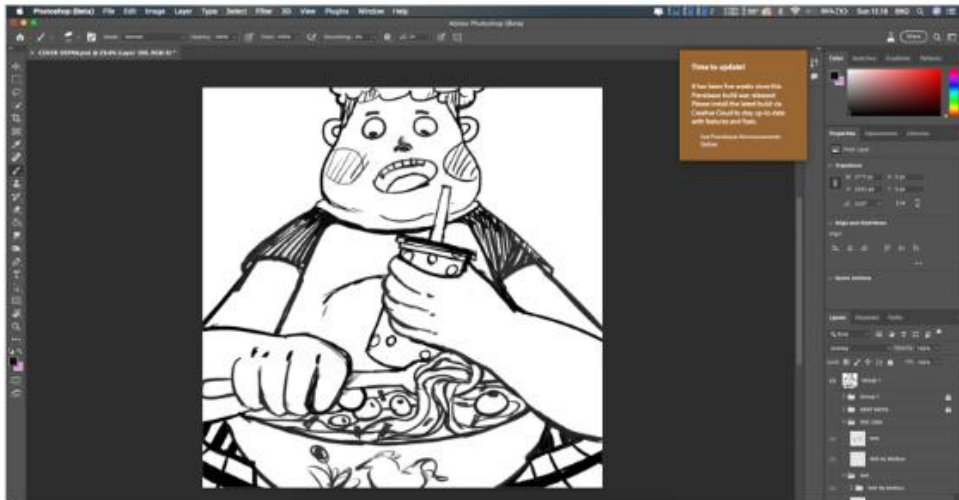


Figure 4. Sketch process  
Source: author's documentation



Figure 5. Base coloring process  
Source: author's documentation

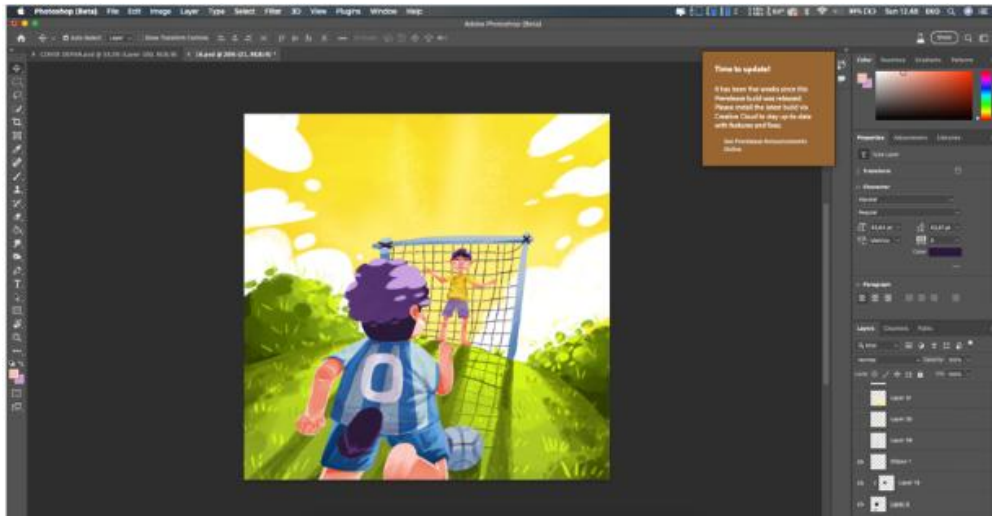


Figure 6. Shading process  
Source: author's documentation

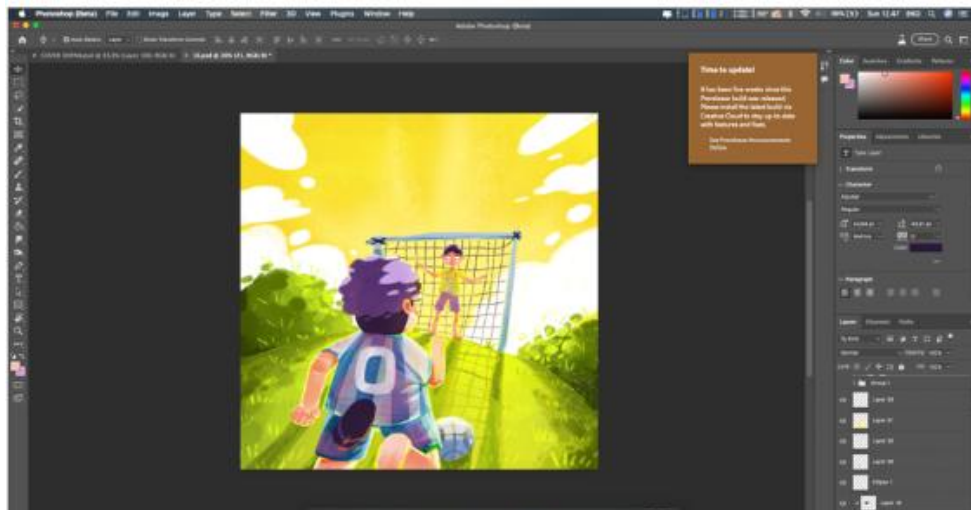


Figure 7. Final design & coloring process  
Source: author's documentation

### **Production Process**

On production process explained the steps of manufacturing an illustrated book, from the process of visualization object and background creation, coloring, and text input until become book ready- made pictures for printing.

## 1. Final Design

Finalization work contains 27 pages in Indonesian, along with the cover.



Figure 8. Final design  
Source: author's documentation

To ensure the quality and effectiveness of digital picture book visual designs, the primary instrument used is the Digital Picture Book Design Assessment Rubric, developed based on instructional design principles and child health guidelines. This rubric serves as a systematic guide and evaluation tool throughout the design production and finalization process, with measurement indicators covering five key criteria: Relevance of Visual Content to ensure the image aligns with the diabetes education message; Clarity and Ease of Understanding to ensure easy visual interpretation by children; Aesthetic Appeal to maintain visual quality and children's motivation; Positive and Non-Stigmatizing Message Delivery, crucial to avoid bias or shame related to body conditions; and Potential for Stimulating Self-Awareness, which assesses the visual's ability to trigger self-reflection in

children. The use of this rubric ensures that each visual element consistently meets the established standards, supporting the goal of increasing children's self-awareness in effective diabetes prevention. Once the final design is realized and declared valid based on this rubric, its effectiveness is then further tested through an effectiveness test on the target audience, using a self-awareness measurement instrument specifically for children in the context of diabetes prevention.

## **2. The Result of the Effectiveness Test**

Testing was done to determine the level of success and suitability of the product. The results of the effectiveness test data were created based on the Guttman scale by administering a questionnaire to the target audience. Eight questions were created related to content and media. With results from 30 respondents, the presentation from the answer "YES" is 89%, which means respondents give a positive response with good results in evaluating the effectiveness of the illustrated book about obesity as an educational medium. This media is considered effective. Illustrations as a medium have an important role in conveying messages, information, or emotions in a creative, visual way (Wardani & Hendrawan, 2024). Because of its capability to convey health messages in an interesting, easily understandable, and child-appropriate manner, this digital picture book proves effective.

Its interactive illustrations and simple storyline successfully capture children's interest, simultaneously enhancing their understanding of the importance of maintaining a healthy lifestyle for preventing obesity. Furthermore, literature suggests that such books for children and adolescents serve as valuable educational media, offering direction and guidance to both parents and children (Pertiwi et al., 2021). Consequently, this illustrated storybook emerges as an appropriate and effective alternative educational medium to support early obesity prevention efforts.

## CONCLUSION

The study successfully developed "Aku Terlindungi dari Obesitas!" (I Am Protected from Obesity!), a digital picture book specifically designed to enhance children's self-awareness regarding diabetes prevention by translating complex health information into an accessible format. Evaluated among children aged 9–12 in Malang City, the digital picture book achieved a 'very good' effectiveness rating of 89%, underscoring its engaging nature and pedagogical soundness. These findings affirm the book's significant role in:

**Catalyzing Self-Awareness through Visual Storytelling:** By transforming abstract medical warnings into relatable, character-driven narratives (e.g., featuring the character 'Budi'), the digital picture book effectively lowers barriers for children to identify obesity symptoms and understand associated risks, fostering a deeper personal connection to health information.

**Promoting Behavioral Modeling for Early Health Autonomy:** The medium powerfully illustrates the direct causal link between daily habits, such as sedentary behavior and excessive sugar intake, and their physical consequences. This serves as a vital preventive tool, empowering children to develop early health autonomy by making informed lifestyle choices.

**Bridging Perceptual Gaps within Families:** The digital picture book effectively addresses common misconceptions, such as 'fat is healthy,' often observed among parents. It provides a shared, visually intuitive language that facilitates crucial family discussions about body mass index (BMI), healthy eating, and active lifestyle choices, promoting a unified understanding of health within the household.

## ACKNOWLEDGMENT

The researcher would like to express sincere gratitude to all parties who have supported the completion of this study. Special thanks are extended to Institut Teknologi dan Bisnis Asia Malang for the facilities and academic support provided during the research process. The researcher also conveys

deep appreciation to the experts and respondents, teachers, parents, and children who willingly participated and contributed valuable insights for this study. Gratitude is also addressed to the advisors and colleagues whose guidance, encouragement, and constructive feedback have been invaluable in refining this work. Finally, the researcher is indebted to family and friends for their continuous support, patience, and motivation throughout the research journey.

## REFERENCES

- Agustina, R., Sari, O. L., Sholihah, L. A., Rizqi, N., Octavia, L., Pramesthi, I. L., Prafiantini, E., & Kardha, P. C. D. (2018). Development of innovative picture storybooks to empower parents and teachers for early childhood education in nutrition and social-behavior in Jakarta. *ASEAN Journal of Community Engagement*, 2(2), 298–310. <https://doi.org/10.7454/ajce.v2i2.128>
- Chiang, J. L., Maahs, D. M., Garvey, K. C., Hood, K. K., Laffel, L. M., Weinzimer, S. A., Wolfsdorf, J. I., & Schatz, D. (2018). Type 1 diabetes in children and adolescents: A position statement by the American Diabetes Association. *Diabetes Care*, 41(9), 2026–2044. <https://doi.org/10.2337/dci18-0023>
- Frietag, H. (2010). *Bebas obesitas tanpa diet menyiksa*. PT Buku Kita.
- Kolokouri, E. (2025). Building healthy habits: An educational program to overcome childhood obesity. *International Journal of Research in Education Humanities and Commerce*, 6(1), 112–125. <https://doi.org/10.37602/ijrehc.2025.6316>
- Li, J., Huang, J., Zheng, L., & Li, X. (2020). Application of artificial intelligence in diabetes education and management: Present status and promising prospect. *Frontiers in Public Health*, 8, Artikel 173. <https://doi.org/10.3389/fpubh.2020.00173>
- Lu, J., Zhang, S., Li, W., Leng, J., Wang, L., Liu, H., Li, W., Zhang, C., Qi, L., Tuomilehto, J., Chen, J., Yang, X., Yu, Z., & Hu, G. (2019). Maternal gestational diabetes is associated with offspring's hypertension.

- American Journal of Hypertension*, 32(4), 335–342.  
<https://doi.org/10.1093/ajh/hpz005>
- Nyolinda, V. A., & Hartanti, M. (2016). Campaign to introduce children yoga to the mothers in Bandung City. *Journal of Visual Communication Design*, 1(1), 18–32.
- Oktaviani, S., Mizutani, M., Nishide, R., & Tanimura, S. (2023). Factors associated with overweight/obesity of children aged 6–12 years in Indonesia. *BMC Pediatrics*, 23(1), Artikel 432.  
<https://doi.org/10.1186/s12887-023-04321-6>
- Patterson, C. C., Karuranga, S., Salpea, P., Saeedi, P., Dahlquist, G., Soltesz, G., & Ogle, G. D. (2019). Worldwide estimates of incidence, prevalence and mortality of type 1 diabetes in children and adolescents: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. *Diabetes Research and Clinical Practice*, 157, Artikel 107842.  
<https://doi.org/10.1016/j.diabres.2019.107842>
- Pertiwi, S., Asmara, R., Wahyudi, N., & Iriani, T. (2021). Illustration book media design diabetes mellitus type 1 in Ikadar. *Review of International Geographical Education (RIGEO)*, 11(6), 1368–1379.  
<https://doi.org/10.48047/rigeo.11.06.150>
- Soetjningsih. (2012). *Tumbuh kembang anak* (2nd ed.). Buku Kedokteran EGC.
- Sumarni, & Bangkele, E. Y. (2023). Persepsi orang tua, guru, dan tenaga kesehatan tentang obesitas pada anak dan remaja. *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)*, 9(1), 45–53.
- Sutanto, S. M., & Wardaya, M. (2020). The paradigm shift of comic as storytelling media. *Journal of Visual Communication Design*, 5(2), 57–70.
- Sutanto, S. M., Mudra, I. W., Udayana, A. A. G. B., & Suardina, I. N. (2024). Beyond the Lantern Festival: Designing fantasy illustrations inspired by Lontong Cap Go Meh and Kelenteng Hok An Kiong. *Journal of Visual Communication Design*, 9(1), 1–21.
- Wardani, L. S., & Hendrawan, F. (2024). Ilustrasi sebagai media representasi self-cherishing dan self-acceptance dalam perspektif visual studi

fenomenologis. *Jurnal Desain Komunikasi Visual Asia (JESKOVSLA)*,  
9(1), 69–80. <https://doi.org/10.32815/jeskovsia.v9i1.1076>

Ziegler, R., & Neu, A. (2018). Diabetes in childhood and adolescence - A  
guideline-based approach to diagnosis, treatment, and follow-up.  
*Deutsches Arzteblatt International*, 115(9), 146–156.  
<https://doi.org/10.3238/arztebl.2018.0146>