Indonesian Journal of Global Health Research
Volume 7 Number 3, June 2025
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE USE OF VIRTUAL REALITY TO IMPROVE NUTRITIONAL FULFILLMENT IN HOSPITALIZED CHILDREN: A SYSTEMATIC REVIEW

Yelly Sari Arifin*, Dessie Wanda, Ayu Widya Lestari, Etty Rekawati
Faculty of Nursing, Universitas Indonesia, Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Beji, Depok, West Java 16424, Indonesia
*yelly.sari@ui.ac.id

ABSTRACT
Hospitalized children often experience decreased appetite, which is influenced by stress and anxiety. This decrease in appetite can worsen the recovery process and increase the risk of complications. VR technology has emerged as one of the promising innovations to reduce anxiety and improve nutritional fulfillment in children during medical treatment. Objective: To evaluate the effectiveness of Virtual Reality (VR) in improving nutritional fulfillment in hospitalized children. Method: A literature search was conducted on four major databases: PubMed, ProQuest, ScienceDirect, and Scopus. Three articles with Randomized Controlled Trial (RCT) design that met the inclusion criteria were selected and analyzed in this review. The articles were evaluated using the Joanna Briggs Institute (JBI) form to assess risk of bias and methodological quality. Results: This study shows that VR is more effective than animated videos in reducing anxiety, increasing appetite, and motivating children to eat nutritious food. In addition, VR also provides benefits as an interactive educational tool that appeals to children. Conclusion: VR is a promising intervention in improving nutritional fulfillment in hospitalized children. This technology not only reduces anxiety, but also has the potential to increase children's participation in the recovery process. Further research with larger samples is needed to confirm these findings and explore the applicability of VR to different age groups and diverse medical conditions.

Keywords: appetite decrease; child nutrition; hospitalization; virtual reality

How to cite (in APA style)
Arifin, Y. S., Wanda, D., Lestari, A. W., & Rekawati, E. (2025). The Use of Virtual Reality to Improve Nutritional Fulfillment in Hospitalized Children: A Systematic Review. Indonesian Journal of Global Health Research, 7(3), 827-832. https://doi.org/10.37287/ijghr.v7i3.6211.

INTRODUCTION

Hospitalized children often experience decreased appetite and inadequate nutrient intake, which can negatively impact their recovery. Malnutrition in children is a significant global health problem, especially in low- and middle-income countries. This condition can worsen a child's prognosis during hospitalization because malnutrition leads to decreased immune strength and healing ability. (Zangenberg et al., 2020).One of the main challenges in meeting children's nutritional needs during hospitalization is decreased appetite, which is often caused by a variety of factors, including stress, discomfort, and unfamiliar surroundings. If not managed properly, this condition can prolong the length of stay and increase the risk of complications.

In addition, children's eating behavior is greatly influenced by environmental factors and parental eating habits. Children tend to imitate their family's eating habits, which are influenced by genetic and environmental factors (Smit et al., 2021; Wang et al., 2011; Carnell et al., 2008; Kral & Rauh, 2010; Wardle & Carnell, 2009, cited in Dolwick & Persky, 2021). Eating habits formed since childhood have a long-term impact on preventing malnutrition, both in the form of malnutrition and obesity. Therefore, interventions to teach healthy eating patterns from an early age are very important to prevent nutritional problems in the future (Smit et al., 2021). In the United States, 57.3% of children are at risk of obesity by age 35, and this obesity is closely related to eating behaviors formed since childhood (Ward et al., 2017).

To address the challenges of meeting children's nutritional needs, Virtual Reality (VR) technology has emerged as an innovation in medical therapy and health education. Research shows that VR is effective in increasing patient engagement, especially in children, by creating a more engaging, interactive experience and making it easier for them to participate in various forms of therapy, including behavioral therapy and body image education (Porras-Garcia et al., 2021). The role of parents in shaping children's eating habits is significant, but VR technology provides an opportunity to directly intervene in children's eating behavior through an interactive and engaging approach (Hagerman et al., 2019. In addition, VR also allows children to learn about healthy foods through interactive simulations that make them more emotionally and cognitively involved. With this more engaging and intuitive experience, children can learn about nutrition in a fun atmosphere (Dolwick & Persky, 2021).This, the implementation of VR technology in supporting nutritional intake in hospitals not only has the potential to overcome the problem of malnutrition during hospitalization, but also creates a solid foundation for forming healthy eating habits in the future, which plays a role in improving children's quality of life. This study aim to evaluate the effectiveness of Virtual Reality (VR) in improving nutritional fulfillment in hospitalized children

METHOD

This study analyzed articles with a Randomized Controlled Trial (RCT) design that discussed the use of Virtual Reality (VR) to improve nutritional fulfillment in hospitalized children. The literature was selected based on inclusion and exclusion criteria. Inclusion criteria included pediatric patients with decreased appetite, using Virtual Reality (VR) interventions, articles published in the last 10 years, written in English, and were scientific articles. Exclusion criteria included articles in the form of literature reviews, scoping reviews , systematic reviews, umbrella reviews, and articles that did not provide full text access.

The literature search was conducted in October 2024 using four major databases, namely PubMed, ProQuest, ScienceDirect, and Scopus. The identification process used the PICO format to formulate research questions, where: P (Population): Children who are hospitalized; I (Intervention): Virtual Reality (VR); C (Comparison): Animation Video; O (Outcomes): Improved nutritional fulfillment. The literature search strategy was conducted by combining keywords such as: "Virtual Reality AND children OR pediatric AND eating behavior OR food intake". The literature limitations used included articles published in the last 10 years, in English, and using a Randomized Controlled Trial (RCT) research design.

ARTICLE SELECTION

The article selection process began with a search in four major databases (PubMed, ProQuest, ScienceDirect, and Scopus) using the keywords "Virtual Reality AND children OR pediatric AND eating behavior OR food intake." The first stage was a title and abstract screening, where articles that met the inclusion criteria (hospitalized children, Virtual Reality intervention, RCT design, English language) were selected. Articles that were not relevant or did not meet the criteria were excluded.The second stage was conducted based on full-text access, and only articles that met the inclusion criteria and were not included in the exclusion criteria (e.g., non-RCT studies or literature reviews) were analyzed. As a result, three articles were selected for further analysis, including studies related to the effectiveness of Virtual Reality in supporting the nutritional needs of hospitalized children. These articles were analyzed to evaluate outcomes such as increased appetite, reduced anxiety, and preference for healthy foods.

DATA EXTRACTION

The author performs data extraction from articles including author, title, design, sample, criteria. inclusion and exclusion, and the interventions used. The results of the data extraction

are shown in table systematic results review. Study quality assessment was performed using the Joanna Briggs Institute (JBI) guidelines to evaluate the risk of bias in the articles analyzed. The assessment included aspects of the randomization method, blinding process, uniformity of intervention, and reliability of outcome measurements. The assessment results showed that most articles had good methodological quality, with a clear randomization process and consistent outcome measurements. However, some limitations were found, such as the absence of blinding of the outcome assessor in one article, which could increase the potential for bias. Of the three articles analyzed, all articles explained the randomization process in detail. Although there were some weaknesses, overall the articles analyzed had sufficient methodological quality to support the results of this systematic review , so that they can be trusted in evaluating the effectiveness of Virtual Reality on increasing appetite in hospitalized children.

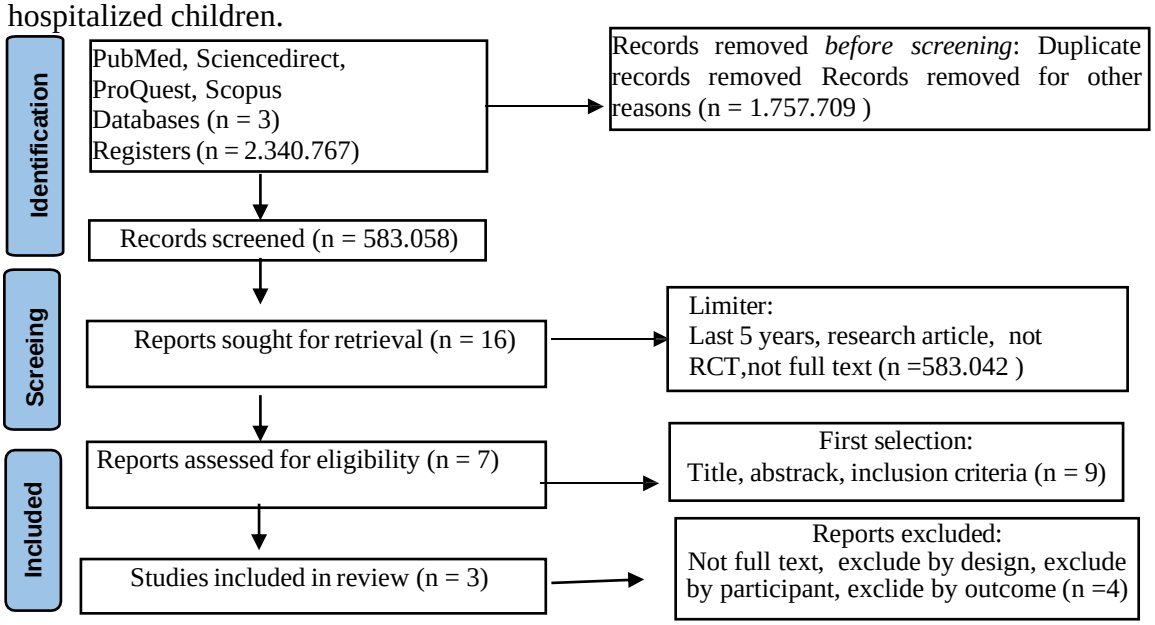

Diagram 1. PRISMA diagram (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

The studies were grouped based on the type of intervention performed and compared their results with each other. In general, the interventions performed in these studies were the use of Virtual Reality (VR) as an interactive tool compared to animated videos as a control. The primary outcome analyzed was increased appetite in hospitalized children.The results of each study showed that the use of VR provided more significant results in increasing appetite compared to animated videos. In addition, VR also helped reduce children's anxiety, which indirectly supported the improvement of children's nutritional fulfillment. The findings from the three studies were analyzed to evaluate the effectiveness of VR based on comparisons with the control group, and the results showed that VR can be an innovative and effective intervention to support nutritional fulfillment in hospitalized children.

RESULT

Table 1.
analysis article

Database	Author, Place	Article Title	Title Journal	Objective	Design	Sample	Result
ProQuest	Esteban M. Fuentes, Jose Varela-Aldas, Guillermo Palacios-Navarro, and Ivan Garcia-	Immersive Virtual Reality App to Promote Healthy Eating in Children	HCII 2020	Developing an immersive virtual reality application used as a serious game tool to promote healthy eating patterns in	Randomized Controlled Trial (RCT)	12 children aged between 8 and 10 years of both genders. These children used a virtual reality application for one week, and their food preferences were measured before and after using the application. Inclusion criteria: Children aged between 8 and 10 years. Children of both genders	The use of the virtual reality application significantly increased healthy food preferences in children. After one week of use, 83% of children chose healthy foods, while 100% switched to fruit as a snack, and 75% showed an increased interest in exercising. The application was also rated

	Magarino (Spain)			children.		and obtained permission from a parent or guardian (through informed consent) to participate in the study. exclusion criteria : Children who do not have permission from a parent or guardian to participate and who have a health condition that may prevent the use of VR technology or participation in the research.	as very easy to use, with a usability score of 88.33%, indicating a high level of acceptance.
Science Direct	Cho Lee Wong, Chi Kong Li, Kai Chow Choi, Winnie Kwok Wei So, Jojo Yan Yan Kwok, Yin Ting Cheung, and Carmen Wing Han Chan (Hong Kong)	Effects of immersive virtual reality for managing anxiety, nausea and vomiting among pediatric cancer patients receiving their first chemotherapy: An exploratory randomized controlled trial	Uropean journal of oncology nursing : the official journal of the European Oncology Nursing Society	To assess the feasibility and effectiveness of VR intervention in managing acute anxiety, nausea, and vomiting in children during chemotherapy.	Randomized Controlled Trial (RCT)	19 pediatric patients, 19 accompanying parents, and 9 caregivers. The children sampled were patients aged 6 to 12 years who had never received chemotherapy before and were scheduled to undergo their first intravenous chemotherapy. The children were also required to be able to understand Chinese in order to participate in the study.	virtual reality (VR) intervention was shown to be feasible and acceptable in managing anxiety and acute nausea in pediatric patients undergoing their first chemotherapy. The intervention group showed significant improvements in anxiety levels at time T2 (after the first chemotherapy) with a Hedges' effect size of 1.25 (95% CI: 0.22–2.17) and at time T4 (after the second chemotherapy) with an effect size of 1.87 (95% CI: 0.72–2.85). In addition, a greater reduction in acute nausea was also noted in the intervention group compared to the control group at time T4, with a Hedges' effect size of 0.97 (95% CI: 0.02–1.87).
ProQuest	Esteban M. Fuentes, Jose Varela-Aldas, Guillermo Palacios-Navarro, and Ivan Garcia-Magarino	I immersive Virtual Reality App to Promote Healthy Eating in Children	HCII 2020	Developing an immersive virtual reality application used as a serious game tool to promote healthy eating patterns in children.	Randomized Controlled Trial (RCT)	12 children aged between 8 and 10 years of both genders. These children used a virtual reality application for one week, and their food preferences were measured before and after using the application.	The use of the virtual reality application significantly increased healthy food preferences in children. After one week of use, 83% of children chose healthy foods, while 100% switched to fruit as a snack, and 75% showed an increased interest in exercising. The application was also rated as very easy to use, with a usability score of 88.33%, indicating a high level of acceptance.

DISCUSSION

Based on the literature found, Virtual Reality (VR) can be an effective intervention to improve nutritional fulfillment in hospitalized children. The use of VR has been shown to help reduce anxiety and stress that children often experience during medical care, which can ultimately affect their eating habits (Yaremych & Persky, 2023). In a study by Wong et al. (2022), VR was reported to be able to improve children's eating behavior in the hospital by creating a fun experience and distracting them from frightening medical procedures. This makes children more willing to consume nutritious foods that are needed for their recovery. In addition to reducing anxiety, VR also serves as an effective educational tool in teaching children about the importance of nutrition with a visual and interactive approach. Fuentes et al. (2021) showed that VR allows children to understand the benefits of nutritious food through fun simulations. With an interesting and easy-to-understand approach, children become more interested in healthy foods and are more motivated to consume them during hospitalization. VR has also been reported to increase children's appetite. Alonzi et al. (2020) found that children who interacted with a virtual world during mealtimes showed an increase in appetite compared to children who did not use VR. The fun game or simulation elements in the virtual world help reduce boredom or discomfort that children often experience during treatment, thereby encouraging the consumption of food needed for recovery.

The results of the analysis of the articles that have been conducted show that the use of VR has a significant positive impact. In a study by Alonzi et al. (2020), the use of VR

significantly reduced anxiety, fear, and pain in children undergoing medical procedures, such as blood draws, which are often required in food allergy clinical trials. The study involved 49 children aged 6 to 17 years and showed that this reduction in anxiety could contribute to increased compliance in children with medical procedures related to food allergies, thus helping in the management of allergies and encouraging healthier eating patterns (Chang et al., 2022; Daly et al., 2024).Another study by Wong et al. (2022) assessed the feasibility and effectiveness of a VR intervention in managing acute anxiety, nausea, and vomiting in children undergoing chemotherapy. The study involved 19 pediatric patients and showed that the immersive VR intervention was feasible and acceptable, with significant improvements in anxiety levels and a greater reduction in acute nausea in the intervention group compared to the control group. Additionally, a study by Fuentes et al (2020)developed a virtual reality application used as a serious gaming tool to promote healthy eating in children. The results showed that after one week of using the application, 83% of children chose healthy foods, while 100% switched to fruit as a snack, and 75% showed increased interest in exercising. The application was also rated as very easy to use, with a usability score of 88.33%, indicating a high level of acceptability.

The study (Pescud & Pettigrew, 2014; So et al., 2024) adapted the Trials of Improved Practices (TIPs) method to explore the acceptability and feasibility of nutrition and parenting recommendations among low-income families with children aged 3–11 years. This research observed how parents selected, tried, and maintained behavioral changes related to nutrition and parenting over a period of 4–6 months following participation in an educational program. The study found that parents tended to choose practices they felt were suitable and compatible with their family conditions, especially those focused on increasing children's intake of healthy foods. The TIPs method enabled identification of motivations, barriers, and supporting factors in changing eating and parenting behaviors related to nutrition. The study emphasized the importance of considering the family's socio-economic context when designing nutrition interventions, as recommendations must be acceptable and sustainable. It also highlighted the need for ongoing support and personalized approaches in nutrition education. These findings are relevant as further evidence that interactive, adaptive interventions that consider family context can improve the success of nutritional behavior change in children. This is also relevant to the use of technologies such as Virtual Reality (VR), which similarly emphasize interactive and personalized approaches in nutrition educationOverall, the use of VR to improve nutritional outcomes in hospitalized children has great potential. By reducing anxiety, providing interactive nutrition education, and increasing appetite, VR plays a significant role in supporting children's recovery through better nutritional outcomes. However, existing studies suggest the need for further research to understand the mechanisms and applications of VR in various hospital settings, especially in children with diverse medical conditions.

CONCLUSION

The use of Virtual Reality (VR) in hospitalized pediatric patients is one of the efforts to improve children's nutritional fulfillment while reducing anxiety and stress related to medical care. The results of this systematic review show that VR can improve children's comfort during treatment, which ultimately can increase appetite and make it easier for children to consume nutritious food. In addition, VR also functions as an effective educational tool to teach children about the importance of nutrition and how to choose healthy foods.The reviewed studies revealed that various VR applications, such as interactive simulations and fun virtual worlds, can help reduce children's fear of hospital medical procedures that often interfere with their eating patterns. With increased comfort and reduced stress, children become more willing to consume the foods needed for their recovery. Therefore, the selection of appropriate VR applications, both for reducing anxiety and for nutritional education, must

be designed through collaboration between medical personnel, families, and nutritionists in hospitals, according to the characteristics of pediatric patients.By increasing the fulfillment of nutrition in hospitalized children, it is expected not only to accelerate the recovery process, but also to reduce the cost of care arising from malnutrition. Therefore, the integration of VR in hospitalized children's care has great potential to improve the quality of life of children undergoing long-term care.

REFERENCES

Chang, Z. Y., Kang, G. C.-Y., Koh, E. Y. L., Fong, R. J. K., Tang, J., Goh, C. K., & Tan, N. C. (2022). Immersive Virtual Reality in Alleviating Pain and Anxiety in Children During Immunization in Primary Care: A Pilot Randomized Controlled Trial. Frontiers in Pediatrics, 10. https://doi.org/10.3389/fped.2022.847257

Daly, A. N., Kearney, J. M., & O'Sullivan, E. J. (2024). The underlying role of food guilt in adolescent food choice: A potential conceptual model for adolescent food choice negotiations under circumstances of conscious internal conflict. Appetite, 192, 107094. https://doi.org/10.1016/j.appet.2023.107094

Dolwick, A. P., & Persky, S. (2021). Parental reward-based eating drive predicts parents' feeding behaviors and Children's ultra-processed food intake. Appetite, 164. https://doi.org/10.1016/j.appet.2021.105241

Fuentes, E. M., Varela-Aldás, J., Palacios-Navarro, G., & García-Magariño, I. (2020). Immersive Virtual Reality App to Promote Healthy Eating in Children (pp. 9–15). https://doi.org/10.1007/978-3-030-50729-9_2

Hagerman, C. J., Ferrer, R. A., Klein, W. M. P., & Persky, S. (2019). Association of Parental Guilt With Harmful Versus Healthful Eating and Feeding From a Virtual Reality Buffet. Health Psychology. https://doi.org/10.1037/hea0000831

Pescud, M., & Pettigrew, S. (2014). 'I know it's wrong, but . . .': a qualitative investigation of low-income parents' feelings of guilt about their child-feeding practices. Maternal & Child Nutrition, 10(3), 422–435. https://doi.org/10.1111/j.1740-8709.2012.00425.x

Porras-Garcia, B., Ferrer-Garcia, M., Serrano-Troncoso, E., Carulla-Roig, M., Soto-Usera, P., Miquel-Nabau, H., Olivares, L. F. D. C., Marnet-Fiol, R., Santos-Carrasco, I. de la M., Borszewski, B., Díaz-Marsá, M., Sánchez-Díaz, I., Fernández-Aranda, F., & Gutiérrez-Maldonado, J. (2021). An-vr-be. A randomized controlled trial for reducing fear of gaining weight and other eating disorder symptoms in anorexia nervosa through virtual reality-based body exposure. Journal of Clinical Medicine, 10(4), 1–23. https://doi.org/10.3390/jcm10040682

Smit, E. S., Meijers, M. H. C., & van der Laan, L. N. (2021). Using virtual reality to stimulate healthy and environmentally friendly food consumption among children: An interview study. International Journal of Environmental Research and Public Health, 18(3), 1–13. https://doi.org/10.3390/ijerph18031088

So, J. T. H., Byrne, R., Nambiar, S., Gallegos, D., & Baxter, K. A. (2024). "You just have to spread it thin": Perceptions and feeding experiences of Australian fathers of young children living with disadvantage. Appetite, 194, 107197. https://doi.org/10.1016/j.appet.2023.107197

Yaremych, H. E., & Persky, S. (2023). Development and Validation of the Parental Food Choice Guilt Scale. European Journal of Psychological Assessment. https://doi.org/10.1027/1015-5759/a000800

Zangenberg, M., Abdissa, A., Johansen, Ø. H., Tesfaw, G., Friis, H., Briend, A., Eshetu, B., Kurtzhals, J. A. L., & Girma, T. (2020). Critical evaluation of the appetite test for children with severe acute malnutrition. Tropical Medicine and International Health, 25(4), 424–432. https://doi.org/10.1111/tmi.13360.