The Utilization of Current Technology in Raising Children Awareness of the Needs of Nutrition: A Literature Review

Lia Kartika1)*, Georgina Dwi Astuti Penna1), Anastasia Geraldine Sagitadewi1), Alandia Alandia1)

1)Faculty of Nursing, Universitas Pelita Harapan.

*Corresponding author: Lia Kartika, Jl. Jenderal Sudirman Boulevard No. 15, Lippo Karawaci, Tangerang, Banten, Indonesia 15811. Email: sarah.kartika@uph.edu

ABSTRACT

Objectives: One of the main problems of public health in the world is children’s malnutrition. Lack of education and knowledge about nutrition is one of the factors that cause the problem of malnutrition. Smartphone and computer-based educational games, which nowadays children familiar with, are few forms of technological advancements used in the health sector. This literature review aimed to explore articles about the use of technology in raising awareness of nutrition needs in the pediatric area.

Methods: The searching process involved two databases; the e-resources page of the National Library of the Republic of Indonesia, and Google Scholar in the 2012-2019 period. Keywords used in the literature search include children, nutrition, dietary behavior, technology, and nutrition learning. From 316 articles obtained and through the selection process, 5 articles were found that were in accordance with the inclusion and exclusion criteria.

Results: A simplified thematic analysis revealed five themes; the changes of children behavior in choosing foods, various application forms, the knowledge improvement amongst children, the increase of the children’s participation, and the enhancement of children’s attitude in learning about nutrition.

Conclusions: Finally, nurses are expected to have curiosity and the willingness to accept technological developments in the intervention of providing education to children and families. The latest evidence-based technology can be used by health care educator as a new strategy in an effort to improve the nutritional status of children. The recommendation from this literature review is to conduct research to identify the factors that influence the effectiveness of games and application in increasing children’s awareness about the goodness of nutrition.

Keywords: Awareness, child, nutrition, technology

INTRODUCTION

The problem of malnutrition in people's lives is one of the main problems in the world. Malnutrition generally occurs in developing countries. This is a health problem involving multidisciplinary and must be controlled(1). Every day there are around 3.1 million children who are on average less than 5 years around the world die from malnutrition(2). Malnutrition is a condition that occurs in the body when needed food nutrients are not met (3). Thus malnutrition can be worsen from other mother low perception of malnutrition. A recent study(3) showed that majority of the mothers did not understand the signs and symptoms of malnutrition in children 0-5 years.Oldewage-Theron(4) proves that the approach which focuses on behavior with active methods, including activity-based food, will increase the effectiveness of nutrition education programs and children's nutrition knowledge. Various interventions have been made to overcome the problem of malnutrition. Providing nutritional supplements is one of them but has not been successful. Research on providing nutrition education to children as an effort to overcoming the problem of malnutrition carried out on 586
children aged 6 months to 8 years from 2 regions in Pakistan. The results of the study show that after three months of being given nutrition education to these children, almost 36% of children at Tando Jam and 32% of children in Quetta show improvement in nutrition to normal status.(5).Educational game is a type of game developed for stimulating cognitive abilities including increasing concentration and solve the problem. Educational game is a learning technique more interactive and effective for early childhood due to early childhood have a great curiosity about the various things that are on the environment.(6). School-based learning in Spain reported the decline in the number of malnourished children was 62% for 2 years prospective study.(7). The development of an increasingly advanced era makes technology develop rapidly. Technology is used in various fields including in the field of education. In the world of education, technology is used as a more interesting learning media. One of the technologies used is an educational game. Learning uses games education is expected to increase children's learning interest and motivate children to understand about a subject.(8). This literature review explores how the utilization of current technology impacts in raising children’s awareness of the needs of nutrition.

**METHODS**

The writing method is a literature review. According to Aveyard (2010), a literature review must be conducted with a systematic approach so that all available information is entered into the study. A systematic study approach can be done by the author follow strict protocols to ensure that the review process is done systematically using explicit and strict methods for identify, critically assess and synthesize relevant research to answer questions that have been set before. The literature review of this quantitative study uses experimental design to obtain the utilization of current technology in raising children’s awareness of the needs of nutrition. The keyword used to conduct a literature search is "Games" AND “Children” AND “Dietary Behavior” AND “Nutrition” AND “Technology” AND “Nutrition Learning”. The database used includes the National Library of the Republic of Indonesia (PNRI) and Google Scholar. The author documents the literature search results in the PRISMA chart and mapping in matrix synthesis. This literature review has several inclusion criteria, namely: articles with full text in English and Indonesian; articles published in the past 10 years (2010-2019); articles with quantitative research methods, and articles with child respondents who experienced in using the application or computer-based games with the nutrition theme. Exclusion criteria include systematic review articles, meta-analysis, expert commentary articles, case studies, and articles that do not clearly discuss the utilization of technology in gaining children’s awareness of nutrition needs. The eligible articles were assessed using critical appraisal guidelines from Aveyard (2010). This guideline assess the quality of the methodology of a study and determine the extent to which research has discussed the possibility of bias in the design, implementation and analysis.
RESULTS AND DISCUSSION

The following is a PRISMA flow chart that shows the process of screening articles in this literature review (Chart 1). Through the screening process, the researcher obtained five complete script articles that were in accordance with the inclusion and exclusion criteria. The literature review that discusses the application of games in children's learning about nutrition consists of five articles. The five research articles show the same results, namely a significant increase in knowledge in children who get learning through games compared to children who learn with traditional learning methods or the provision of material on sheets of paper. These articles revealed that games learning media can change children's behavior in choosing food, utilizing various forms of application, increasing children's knowledge about nutritious foods, increasing participation and attitude children in learning about nutrition (Gousiou & Kordaki, 2016; Yien, 2011; Mellecker & Watterson, 2013; Suggs, 2017).

DISCUSSION

Behavior.

Games learning media can change children's habits or behaviors related to nutrition, namely their dietary behavior in terms of choosing nutritious foods (9). They revealed that they would pay more attention to food hygiene and voluntarily share the nutrition knowledge they had with their families. This shows the positive influence of the application of computer games on the habits or behavior of children's diets (10). This study corroborates previous study that stated that forms of video games have promised for promoting positive health behavior (11). Previous study also contended that children who play educational games such as nutritional video games increased fruit and vegetables consumption per day (12).

Various Application.

The five research articles used by the authors in this literature review apply various types of technological developments in examining the influence of educational games on children's nutrition knowledge. A recent study (10) has used footgaming, which is a computer-based game that uses a wireless mat (footpad) designed to mimic a mousepad. Children use their feet to change the function of the mouse while playing. Another study (13) used Kaledo, a computer-based board game to improve nutrition knowledge and change the child's dietary behavior to be healthier. Another application method (14) used a different game method, namely Educational Digital Card Game (EDCG). This game
resembles conventional card games with healthy and unhealthy food content but uses a computer. Furthermore, a study(9) used games in their research where children only need to choose the right food or a balanced diet for them. Finally, recent study(15) used different technologies, namely games with drag-and-drop features and that resemble TV game shows "Who wants to be a millionaire?".

Knowledge.

Effective games-based learning to improve children's nutrition knowledge seen from the scores obtained by the experimental group was significantly higher than the control group. Participants revealed that they become aware of foods that are beneficial to health and the nutritional content of various types of food(14)(9)(10). The participants became aware of the recommended food and beverage portions for them through the information presented in games(15). Games are the right choice to increase children's knowledge about nutrition because games increase excitement and long-term memory of information obtained(13). These findings are in line with the study in Spanish which showed an increased score regarding nutritional knowledge on experimental group of 228 children. The children stated that the use of online games is an effective medium in improve their nutritional knowledge(16).

Participation.

It has been recognized that learning by using games can be a good tool or medium to increase student participation in learning activities(10). Researchers identify that game-based learning applied to students can trigger their learning motivation(9)(10)(14). Media learning games on computers can be designed more interesting and interactive to improve student learning achievement(15).

Attitude.

Games also affect children's learning attitudes. They have a positive view of the influence of computer games on their learning attitude about nutrition. Their desire to learn about nutrition is increasing, for example they want to learn more about how to choose healthy foods(10)(14). Children love the learning they receive and want to repeat learning nutrition using games(15). Teachers also revealed that their students were motivated to come to class early, focus more and more on learning, and found that students talked about food nutrition in games(9). Through games, children can learn and play, so learning becomes more interesting and effective for children to learn new knowledge or skills. "Serious games" is a term that refers to digital games designed for educational, persuasive and health purposes. "Serious games" can accelerate children's learning processes and increase children's learning motivation and stimulate changes in healthy lifestyle behaviors(16). Games made the youth learn to use their intellect to solve problems, to find their
capacities, and exercise their mind and bodies. They are trained to make decisions and respect the weight of responsibilities(17). Technology plays an important role in nursing education and practice in this modern age. At present there are opportunities for nurses to master technology. Nurses who are involved in the field of informatics are expected to have skills in mastering basic computers, information literacy, and information management. Nursing informatics can make it easier for nurses to communicate with other health personnel and patients and families, coordinate patient care, and manage information related to patient care and the nursing process (18) Finally, studies show the use of technology can improve nursing productivity (19)

CONCLUSION

The literature review analyzed five articles and revealed the theme of the use and development of technology. Educational games learning media can change children's behavior in choosing food, utilizing various forms of application, increasing children's knowledge about nutritious foods, increasing participation and attitude of children in learning about nutrition. Nurses are expected to have curiosity and openness to accept technological developments so as to increase awareness of nutrition and children's nutritional status. The next researcher is expected to be able to develop nutrition education games in online or offline mode with a method that is simple and easy to understand by children. Nurses can involve parents to work together in research regarding the use of the latest technology-based applications to increase children's nutrition awareness.

ACKNOWLEDGMENTS

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CONFLICTS OF INTEREST

No conflict of interest has been declared by the authors.

REFERENCES


5. Zahid Khan A, Rafique G, Qureshi H, Halai Badruddin S. A Nutrition Education Intervention to Combat


**Table 1 Synthesis Matrix**

<table>
<thead>
<tr>
<th>No</th>
<th>Author</th>
<th>Title</th>
<th>Purpose</th>
<th>Method</th>
<th>Participant</th>
<th>Result</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Mellecker, R. R., Witherspoon, L., &amp; Watterson, T. (2013).</td>
<td><em>Active Learning: Educational Experiences Enhanced Through Technology-Driven Active Game Play</em></td>
<td>Determine whether Footgaming in the classroom produces the concept of learning nutrition</td>
<td>Mixed method</td>
<td>57 children in grades 3, 4, 5 with an age range of 7-11 years</td>
<td>There is an increase in scores and percentages between pretest and posttest Footgaming usage</td>
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<td>2.</td>
<td>Viggiano, A., Viggiano, E., Costanzo, A. et al. (2015).</td>
<td><em>Kaledo, a board game for nutrition education of children and adolescents at school: cluster randomized controlled trial of healthy lifestyle promotion</em></td>
<td>Promote nutritional education and improve proper dietary behavior</td>
<td>Randomized controlled trial</td>
<td>3,110 children in the age range of 9-19 years from 20 schools in Campania, Italy</td>
<td>Game technology can be an effective tool to improve nutrition knowledge and dietary behavior in children</td>
</tr>
<tr>
<td>3.</td>
<td>Gousiou, A., Kordaki, M. (2016).</td>
<td><em>“Health-Goal” - a digital card game for the learning of nutrition and food safety issues: design and pilot formative</em></td>
<td>Promote nutritional education and improve proper dietary behavior</td>
<td>Quantitative method</td>
<td>100 students (48 male and 52 female) aged 13-14 years</td>
<td>Students are attracted and encouraged to learn a number of topics about nutrition and</td>
</tr>
<tr>
<td>Reference</td>
<td>Title</td>
<td>Method</td>
<td>Participants</td>
<td>Findings</td>
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<td>4. Yien, J., Hung, C., Hwang, G. &amp; Lin, Y. (2011).</td>
<td>A game-based learning approach to improving students’ learning achievement in a nutrition course</td>
<td>Exploring the influence of applying the game-based learning approach to nutrition education</td>
<td>100 students (48 male and 52 female) aged 66 students in grade 3 elementary school from 2 classes in one primary school 13-14 years</td>
<td>Student achievement and learning interest in the experimental group were significantly better than students in the control group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Suggs, L., Rangelov, N., S., Occa, A., Radchuk, O., Schmeil, A. (2017).</td>
<td>Online Games to Improve Children’s Knowledge of Nutrition and Physical Activity Guidelines – A Pilot Study</td>
<td>Test the influence of online games to increase children’s knowledge about healthy nutrition and physical activity</td>
<td>19 children in the 7-9 year age range who were invited by the author</td>
<td>Games technology successfully promotes healthy lifestyles in children</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chart 1. Literature Search Flow Diagram

Google Scholar  
(n = 263)  

PNRI  
(n = 53)  

Records after duplicates removed  
(n = 316)  

Records screened  
(n = 316)  

Records excluded, unsuitable article content  
(n = 278)  

Full-text articles assessed for eligibility  
(n = 38)  

Non Full-text articles excluded  
(n = 26)  

Eligible articles  
(n = 12)  

Full-text articles excluded, paid article  
(n = 7)  

Full text reviewed  
(n = 5)