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EDUCATION ON HEALTHY SNACKS USING NUTRITION BINGO GAMES TO IMPROVE KNOWLEDGE AND ATTITUDES ON BALANCED NUTRITION

Edukasi Jajanan Sehat Menggunakan Game Bingo Nutrisi untuk Meningkatkan Pengetahuan dan Sikap Gizi Seimbang

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ABSTRAK

Permasalahan gizi dialami oleh masyarakat di seluruh dunia, termasuk Indonesia. Gizi buruk di Samarinda banyak dialami oleh anak usia sekolah dasar. Edukasi jajanan sehat pada anak usia sekolah dasar dapat dilakukan melalui permainan bingo nutrisi. Penelitian ini bertujuan untuk menganalisis pengaruh edukasi jajanan sehat melalui permainan bingo gizi terhadap peningkatan pengetahuan dan sikap gizi seimbang siswa sekolah dasar. Penelitian ini menggunakan metode kuasi eksperimen dengan desain kelompok kontrol pretest-posttest. Subjek penelitian adalah siswa SDIT Fastabikhul Khairat Samarinda yang berjumlah 80 orang yang dipilih menggunakan purposive sampling. Sebanyak 40 siswa sebagai kelompok eksperimen dan 40 siswa kelompok kontrol. Metode pengumpulan data menggunakan instrumen tes dan angket. Metode analisis data menggunakan uji dependen sample t-tes. Hasil penelitian menunjukkan edukasi jajanan sehat menggunakan N-BINGO dapat meningkatkan pengetahuan jajanan sehat siswa sebelum edukasi (rerata =19.07; SD = 2.81) menjadi sesudah edukasi (rerata = 29.74; SD = 3.72), t=11.072; p <.001, dan meningkatkan sikap gizi seimbang sebelum edukasi (rerata =55.87; SD = 3.43) menjadi (rerata = 70.78; SD = 4.37; p <.001); t = 16.114; ρ=.003.

Kata kunci: *edukasi jajanan sehat, game bingo nutrisi, pengetahuan dan sikap gizi seimbang*

ABSTRACT

Nutritional problems are experienced by people all over the world, including Indonesia. Malnutrition in Samarinda is experienced by many elementary school-age children. Education on healthy snacks for elementary school-age children can be done through nutrition bingo games. The research aimed to analyze the effect of healthy snack education using the nutrition bingo game on elementary school student's knowledge of healthy snacks and attitudes toward balanced nutrition. This research used a quasi-experimental method with a pretest-posttest control group design. The research subjects were 80 SDIT Fastabikhul Khairat Samarinda students selected using purposive sampling. There were 40 students in the experimental group and 40 students in the control group. Data collection methods used test instruments and questionnaires. The data analysis method used the dependent samples t-test. The results of the research that healthy snacks education using the N-BINGO has increased elementary school students' healthy snacks knowledge from pre-education (mean =19.07; SD = 2.81) to post-education (mean = 29.74; SD = 3.72), t=11.072; p <.001, and has increased their balanced nutrition attitudes from pre-education (mean =55.87; SD = 3.43) to post-education (mean = 70.78; SD = 4.37; p <.001); t = 16.114 and ρ=.003.

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Keywords: attitudes to balanced nutrition, education healthy snacks, knowledge, nutrition bingo games

INTRODUCTION

Diseases In various countries caused by food are common, so they are of little concern. Most all-you-can-eat snacks are preferred in many countries because food-borne illnesses are not considered severe [1]. The FAO [2] stated that the proportion of malnourished people worldwide increased for two consecutive years and became 10.9% in 2017. Based on the 2018 Riskesdas, it was found that the nutritional status of children aged 5-12 years (according to BMI/U) in Indonesia 17.7% are thin. The prevalence of overweight or what is often called obesity in Indonesian children is 8%, while the prevalence of stunting is 30.8% [3].

Children worldwide learn and adopt eating habits from their parents, grandparents, teachers, siblings, and peers. Therefore, the home, community, and school environment provide important educational moments that help shape what, how much, when, and how children eat from birth through all stages of development [4]. Various strategies can be applied to individuals, families, health systems, communities, and governments to help combat unhealthy eating habits individually and collectively [5]. Considering that most children spend most of their time at school, many preventive interventions involve educational institutions to provide nutritional education and promote healthy lifestyles while engaging in better physical activity [6].

Snacks are food prepared by street vendors and sold on the streets and other public places, which are eaten or consumed directly without further processing or preparation. The term snacks is close to the terms junk food, fast food, and street food because these terms are part of street food [7]. Recent research shows that an adequate amount of daily food if eaten five times per day, is associated with a lower risk of obesity in children. However, it has been shown that 10% to 30% of children and adolescents in 33 countries do not eat breakfast [8]. Snacks are generally eaten between main meals, often to reduce or prevent hunger until the next meal. The choice of snacks especially for children, is not oriented towards maximizing the right healthy choices but towards consuming fast food or the most delicious ones [9].

The Ministry of Health in Indonesia found that school snacks did not meet the required health standards. This is because school snacks are unhygienic, dirty cooking utensils, people selling them or making them unhealthy, bacteria contaminating the food, and use of dangerous substances such as borax, formalin, rhodamine B, and yellow methanol [10]. Snacking, is part of individual eating patterns at all stages of life, but the negative impact on health is mainly related to the nutritional content of these snacks [11]. Mora et al. [12] said that snacks for school children whose health is not guaranteed can cause poisoning and digestion and, if they last for a long time, can cause poor nutritional status. Apart from that, unhealthy snacks can hinder children's performance at school.

Schools are an effective and engaging environment for nutrition education to improve children's health and reduce the risk of future chronic diseases [13]. Wang et al. [14] said snacking can make a significant contribution to daily energy intake. A recent national nutritional survey of children aged 4-13 found that snacks accounted for a quarter of energy intake. In addition, there is concern that children's snack choices are often wrong because they are very high in sugar and fat [15].

Kurniawan et al. [16] researched the eating attitudes of elementary school students. This research shows that students eat snacks during the first and second breaks or when they come home from school. The most popular snacks with children are basreng, cimol, cilok and flour chicken. Iklima [17] conduct research at SDN Babakan to gain insight into the food choices of elementary school children. The results of this study show that 42.7% of students have good food choices, and 57.3% have lousy food choices. This study

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shows that food choices are related to three factors, namely food factors, personal factors and socio-economic factors. Children with poor food choices choose food without paying attention to nutrition and food contamination, choosing salty snacks with too much vinegar and spicy foods with too much chilli, and paying attention to the suitability of aroma and texture.

Students are a vulnerable age group who often experience food poisoning because their knowledge about nutrition and food safety is still weak [18]. Children need to learn more about nutrition. Nutrition knowledge can influence eating habits, attitudes, and behaviour related to food choices, which can influence the condition of causes related to nutrition with the level of knowledge a person has about food [19]. Kostanjevec et al. [20] stated that children with sound nutritional knowledge eat healthier than children with poor nutritional knowledge. Several studies implementing nutrition education interventions have reported positive impacts on school-aged children's (SAC) nutritional knowledge and their ability to differentiate between adequate nutrition and snacking attitudes [21].

The problem of snacks for elementary school students found in Samarinda City. The results of the PJAS sample test by BPOM Samarinda on 308 samples from 32 elementary schools found that 133 samples (43%) were eligible and 175 samples (57%) were not eligible. The test parameters did not meet the requirements, including Rhodamin B in crackers, Borax in crackers, Nitrite in snacks, Benzoate in snacks and noodles, and TMS samples of microbial contamination attitudes [22].

The East Kalimantan DKP3A collaborated with BPOM Samarinda and related agencies conducted a rapid test of children's snack food samples in several schools in Samarinda City. The rapid test of school children's snack samples is reviewed in terms of the seller's hygiene, processing method, serving method, storage method and food quality. A quick test on 34 snack samples, some of them were indicated containing harmful substances [23]. Research was conducted by Anton et al. [24] on samples of siomay snacks, cireng, pentol, wet noodles, crackers and sauces sold in elementary schools in Samarinda City. The study was conducted on 12 samples of snacks in terms of physical quality (color, taste, smell and foreign objects), the results of the chemical quality test on the snacks were obtained 67% of the samples contained formalin and 8% of them contained borax. The results of the biological quality test were obtained from 11 samples of snacks contaminated with coliform bacteria, and there were 2 samples of snacks that passed the quality requirements of the maximum limit of microbial contamination in food.

The phenomenon of snacking behavior of SDIT Fastabikhul Khairat students found that they have the habit of buying and consuming snacks based on taste without paying attention to nutritional content and health. Factors such as purchasing power, the duration of learning at school is longer than other elementary schools, and environmental factors in the Samarinda city who like eating snack outside the home have the potential to make students buy and consume snacks outside of school.

Healthy snacks education is one way to increase students healthy snacks knowledge [25]. Nutrition education for elementary school students plays a vital role in forming and increasing knowledge and attitudes about balanced nutrition, especially in choosing food [26]. Educational media has undergone many changes, including game media, which has been made as enjoyable as possible to increase enthusiasm for learning [27]. In this study, researchers used the Nutrition Bingo Game (as N-BINGO) to increase students healthy snacks knowledge and balanced nutrition attitudes. The bingo game is square in the form of a numbered table, in which the first winner calls "BINGO", and the table fills the shape with horizontal, vertical, or diagonal lines. Healthy snacks education using bingo games requires students to not only look (bingo board) but also listen (clues from the caller), talk/discuss and interact. So many senses are used in healthy snack education, the more information will be received and processed in the

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brain to implant long-term memory. Based on the reasoning for the importance of healthy snack education for students, and bingo game media can be an interesting medium to learn healthy snacks, so researchers are interested in researching healthy snack education using the nutrition bingo game to increase healthy snacks knowledge and balanced nutrition attitudes of elementary school students.

METHODS

The research was conducted at SDIT Fastabikhul Khairat. Data collection was carried out from month November 2023 to Januari 2024. Ethical clearance issued by Research Ethics Committee of Sebelas Maret University with number 242/ UN27. 06.11/KEP/ EC/2023. The method in this research was a quasi-experiment using a pretest-posttest control group design [28]. This design consists of two exploratory groups to determine the effect of the independent variable on the dependent variable by treating the experimental group rather than the control group. Education on healthy snacks is the independent variable, while knowledge and balanced nutrition attitudes are the dependent variables. The research used a pre-test for the experimental and control groups before treatment and a post-test for both groups after treatment. Treatment was given to the experimental group, but not to the control group. The experimental group were given education about healthy snacks using N-BINGO, while the control group only given healthy snack pamphlets to read independently.

The treatment in this research was providing education on healthy snacks for four times in four weeks using the N-BINGO. The game material of Bingo Nutrition contains 3 aspects. First, healthy snacks based on cleanliness, color, taste, aroma and content. Second, healthy snacks based on packaging, nutrition table, and expiration date. Third, unhealthy snacks based on dyes, preservatives, characteristics of unhealthy snacks, side effects of unhealthy snacks and how to maintain personal hygiene. Table 1 below describes the research experimental design education on healthy snacks used the N-BINGO.

Table 1. Experimental Design

Group	Pre-test	Experiment	Post-test
Experiment	O_1	X	O_2
Control	O_3	-	O_4

$O_{1,3}$: Pre-test in the experimental group and control group.
$O_{2,4}$: Post-test in the experimental group and control group
X : Providing education on healthy snacks using N-BINGO to the experimental group.

The research subjects were SD IT Fastabikhul Khairat Samarinda students who were selected using a purposive sampling technique. The inclusion criteria were that the research subjects had a habit of consuming healthy snacks and could play N-BINGO. While the exclusion criteria were that the research subjects were not sick in the last 3 months and not disabled. A total of 40 students were designated as the experimental group and 40 students as the control group that received informed consent from parents/guardians.

Data collection methods used test instruments and questionnaires. The test instrument was used to assess students' knowledge of healthy snacks, while the questionnaire assessed students' balanced nutrition attitudes. Experts and practitioners have validated the determination of competency standards and indicators for healthy snack education, N-BINGO implementation design, instruments for assessing knowledge of healthy snacks, and balanced nutrition attitudes through Focus Group Discussions (FGD).

Univariate data analysis in this study was used to describe the knowledge of healthy snacks and the balanced nutritional attitudes of research subjects. Meanwhile, bivariate to analyze the difference in students' knowledge of healthy snacks and balanced nutrition

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attitudes before and after receiving healthy snack education using N-BINGO. Data analysis begins with a validity test, normality test, and homogeneity test using the Kolmogorov Smirnov test. The criteria of homogeneous data if the probability value (*p*) is ≥ .05; conversely, if the *p*-value is < .05, then the research data has an unequal variance. Data analysis used the dependent T-Test because the data is normally distributed with SPSS 25.

Bingo game uses card media that contains subject matter points that have certain rules arranged vertically, horizontally, or diagonally. The Bingo game is carried out by applying the steps; presenting lecture-based learning material, arranging the bingo cards containing these points in a pile, placing one different point in each box and emptying several boxes, making several additional bingo cards with the main points the same card and placing them in different boxes, distributing bingo cards to students with a strip of cards consisting of several colored dots, explaining that when presented with material, students should stick one dot on their card, and shouting “Bingo” when students collect three vertical dots , horizontally, or diagonally respectively [29]. Figure 1 below is a display of Nutrition Bingo games for education healthy snacks.

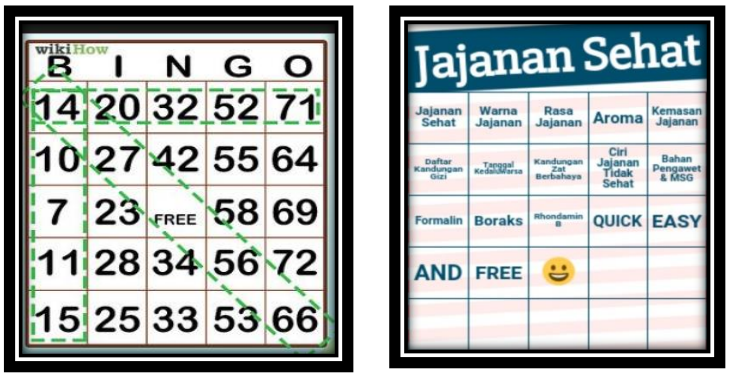

Figure 1. Nutrition Bingo Game (N-BINGO)

RESULT

The general characteristics of the research subjects were presented in Table 2 below were almost comparable between males and females, but they were 11 years old more than were 10 years old. The parents/guardians of the subjects most worked as ASN/TNI/Polri, then entrepreneurs/traders and entrepreneurs:

Table 2. General Characteristics of Research Subjects

General Characteristics		N-1	N-2	Sum	%
Gender	Boy	23	20	43	53.75
	Girl	17	20	37	46.25
Age	10 years old	12	13	25	31.25
	11 years old	28	27	55	68.75
Parents' job:	Government Servants	22	20	42	52,50
	Entrepreneur/Trader	10	8	18	22.50
	Entrepreneur/Other	8	12	20	25.00
Information	N-1 Healthy Snack Education Based on N-BINGO				
	N-2 Non-Healthy Snacks Educational Based on N-BINGO				

Researcher tested the differences in students' average healthy snacks knowledge and attitudes towards balanced nutrition before and after being given healthy snacks education using the N-BINGO game in the control and intervention groups. Data analysis begins with instrument validity testing, normality testing, and homogeneity testing. The

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healthy snack knowledge and balanced nutrition attitude instruments that were declared valid (α > .349), the validity test results are shown in Table 3.

Table 3. Validity Test Results

Instrument'	Cronbach's Alpha (α = .349)		Sum	Status
Healthy Snack Knowledge	(α ≥ .349)	28	Min = .350 Max = .586	Valid
Balanced Nutrition Attitude	(α ≥ .349)	24	Min = .364 Max = .623	Valid

Table 4. Normality Test Result of Healthy Snack Knowledge Data and Balanced Nutrition Attitudes

Variable	Group	Test	ρ-value
Healthy Snack Knowledge	Experiment	Pretest	.266
		Posttest	.241
	Control	Pretest	.193
		Posttest	.087
Balanced Nutrition Attitude	Experiment	Pretest	.216
		Posttest	.173
	Control	Pretest	.213
		Posttest	.200

The data of healthy snacks knowledge and balanced nutrition attitudes for pre-test and post-test results and the experimental and control groups are normally distributed (*p = >.05*) and homogeneous (*p = >.05*). The results of data normality test for healthy snacks knowledge and balanced nutrition attitudes using the Kolmogorov Smirnov test are shown in Tables 4, and the data homogeneity test for healthy snacks knowledge and balanced nutrition attitudes using the Levene Statistic can be seen in Table 5 below.

Table 5. Homogeneity Test Result of Healthy Snack Knowledge Data and Balanced Nutrition Attitudes

Variables	ρ-value	Information
Healthy Snack Knowledge	.081	Homogeneous
Balanced Nutrition Attitude	.427	Homogeneous

Table 5 above showed that all post-test data for the variable's healthy snack knowledge and balanced nutrition attitudes come from the same or homogeneous variance, characterized by a probability value of ≥ .05. Next, Table 6 presents the Dependent T-Test results of measuring the healthy snacks knowledge and balanced nutritional attitudes of elementary school students towards the pretest and posttest of control and experimental groups.

Table 6. Differences in Healthy Snack Knowledge and Balanced Nutrition Attitudes Before and After Education in the Intervention and Control Groups (n=40).

Variables	Groups	Mean Pretest ± SD	Mean Post-tests ± SD	Mean	Mean Difference	t	ρ-Value
Healthy Snack Knowledge	Experiment	19.07 ± 2.81	29.74 ± 3.72	- 10.67	7.73	11.072	.000*
	Control	19.26 ± 3.21	22.24 ± 2.91	- 2.94			
Balanced Nutrition Attitudes	Experiment	55.87 ± 3.43	70.78 ± 4.37	- 14.91	12.19	16.114	.000*
	Control	54.22 ± 3.44	56.94 ± 3.67	- 2.72			

Information: *Signifikant (p < .05; t-test)

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Based on the results of the dependent samples t-test on students' healthy snack knowledge listed in Table 6 above. The mean score of students' healthy snacks knowledge in the experimental group before being given education using N-BINGO, mean = 19.07 increased to 29.74 after receiving education. The mean difference between the experimental group and the group before and after receiving healthy snack education using N-BINGO = 7.73, SD = 3.72, t = 11.072 and ρ = < .001. Thus, Ho (there is no difference in students' knowledge of healthy snacks between the experimental group and the control group before and after being given snack education using the N-BINGO game) is rejected, and Ha (there is a difference in students' knowledge of healthy snacks between the experimental group and the control group before and after being given snack education using N-BINGO) is accepted. Based on this analysis, it can be concluded that healthy snack education using the N-BINGO significantly increases elementary school student's healthy snacks knowledge.

Meanwhile, the score of students' balanced nutritional attitudes in the experimental group before being given education using N-BINGO, mean = 55.87 increased to 70.78 after receiving education. The mean difference between the experimental group and the group before and after receiving healthy snack education using N-BINGO = 12.19, SD = 4,37, t = 16.114 and *p* = .003. Thus, Ho (there is no difference in students' balanced nutritional attitudes between the experimental group and the control group before and after being given snack education using N-BINGO) is rejected, and Ha (there is a difference in students' balanced nutritional attitudes between the experimental group and the control group before and after being given education snacks using the N-BINGO game) are accepted. Based on this analysis, it can be concluded that healthy snack education using the N-BINGO significantly improves elementary school students' balanced nutritional attitudes.

DISCUSSION

Knowledge is an essential aspect of human life. Knowledge is a deep understanding of something or a collection of information that a person has in a particular field [30]. Knowledge is obtained from cognitive processes involving perception, memory, and information processing. Knowledge can also be obtained through individual experience and the learning process. Each person's knowledge will differ depending on their sense of something [31].

Supariadi and Febriary [32] emphasize that knowledge is the accumulation of a person's experience about something. Hence, a person's effort to know and something that is known are two important, inseparable elements. From a phenomenological perspective, nothing can be understood independently, so knowledge is the result of a person's cognition or action directed towards understanding something. Brief game-based interventions such as the Alien Health Game can increase children's nutritional knowledge [33].

Various areas in life are important to know, including healthy food/snacks. According to Rahman et al. [34], knowledge about food is very useful for choosing healthy foods and losing weight and for the long-term implications of food in maintaining health. A person's ability to make decisions about nutrition depends on his or her knowledge of nutrition. The ability to select and process food ingredients to meet nutritional needs can be improved by providing education regarding nutritional knowledge. Understanding healthy food and its effect on health and nutritional status contributes effectively to overcoming various types of malnutrition [19]. Likewise, nutritional knowledge is the basis for creating attitudes towards food, nutrition, health, and eating behaviour [35].

Students can learn about healthy snacks through experience and the educational process. Providing students with an understanding of healthy snacks can be done by providing healthy snacks education. Providing education on healthy snacks using the N-

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BINGO game to elementary school students is an intervention that is considered appropriate in increasing knowledge about healthy snacks that are worth consuming or avoiding. The senses and sensory system will process knowledge of healthy snacks provided into positive knowledge, forming positive attitudes in daily life practices [36]. Intervention in the form of health education using media has a positive role in increasing a person's physical activity [37].

The results of this study show differences in healthy snacks knowledge regarding the implementation of healthy snacks education using the N-BINGO in elementary school students, based on the pre-test and post-test results. The increase occurred in the group given the healthy snack educational intervention using N-BINGO. Participants showed an increase in healthy snacks knowledge from pre- education using N-BINGO (mean = 19.07; SD = 2.81) to post-education (mean = 29.74; SD = 3.72; $p < .001$), $t = 11.072$ and $p < .001$. This difference is significant, so this research can conclude that healthy snack education using N-BINGO significantly increases elementary school students' knowledge of healthy snacks.

This study's results align with research by Espinosa-Curiel et al. [38]. Participants showed an increase in food knowledge from pre-game (mean = 56.9; SD = 10.7) to post-game play (mean = 67.8; SD = 10.7; $p <.001$). Additionally, there was a greater frequency of self-reported consumption of cauliflower and broccoli ($p < .001$) and corn quesadillas ($p < .001$). They also showed lower self-reported intake of 10 unhealthy foods, including French fries ($p= .003$), sweets and chocolate ($p= <.001$), sweet soft cakes ($p= .009$), and soft drinks ($p= .03$), so from this study, it was concluded that in the initial evaluation, children aged between 8 and 10 years showed an increase in nutritional knowledge and frequency of intake of two healthy foods after playing FoodRateMaster.

The research results by Amira and Setyaningtyas [39] stated that education about healthy snacks can increase the knowledge of elementary school children. Children's knowledge and attitudes increase between 3 weeks and 2 months, with each meeting lasting 30-45 minutes. Research conducted by Raut et al. [40] showed a significant increase in the average nutritional knowledge score of 1.80 after implementing the intervention compared to the control group. Other research also found that nutritional knowledge increased significantly after a nutrition education intervention and six months after that [41]. In addition, students who were given nutrition education interventions showed higher nutritional knowledge scores.

The use of the N-BINGO game as a medium for educating healthy snacks is also in line with research conducted by Nauli [42], which used the Monopoly game in elementary school-age children, and the research showed an increase in students' knowledge. The results showed that 50% of students experienced a good increase in knowledge, as many as 15 respondents (50%). Next, research conducted by Afra et al. [43] produced a difference in the average knowledge score between the treatment and control groups, that providing picture card media affected knowledge of healthy snacks in elementary school children. Research by Nuranisah and Kurniasari [44] also showed that there was an increase in elementary school students' knowledge after an intervention using an interesting game of snakes and ladders made students enthusiastic about playing it and made it easier for students to understand educational material through this game.

Attitudes reflect perceptions and tendencies to perform certain actions. The formation of attitudes and behavior can be influenced by various factors, one of which is education [31]. Education according to Triwijayati et al. [45] can determine individual behavior, and the learning process through formal and non-formal education, including providing education to improve individual behavior.

Elementary school students tend to consume snacks based on their "good" taste while ignoring their nutritional content and health risks. Their nutritional vulnerability is partly due to their habit of purchasing unhealthy snacks in the school environment.

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Healthy snack education is needed for students to improve their attitudes in choosing and consuming snacks that contain balanced nutrition.

Play-based interventions can improve outcomes and benefits of vegetable intake and educate children about healthy eating [46]. Providing education on healthy snacks using the N-BINGO game to elementary school students is believed to be effective in improving attitudes towards balanced nutrition, namely awareness of eating snacks by paying attention to the criteria for snacks that are nutritious enough to be consumed or avoiding snacks that do not meet the criteria for being healthy and nutritious and not to be consumed. Intervention in the form of health education using media has a positive role in increasing a person's physical activity [37].

Healthy snacks education using the N-BINGO game is expected to reflect awareness of the importance of living a healthy life with balanced nutrition, which is carried out through the selection and habit of consuming healthy, nutritious snacks. According to Notoatmodjo [31], Healthy snack education is part of health services to increase awareness of the importance of healthy living, maintaining health, and avoiding disease. Snack education is provided so that each individual, individually and collectively, can live a healthy, nutritious lifestyle.

The results of this study show differences in balanced nutrition attitudes regarding the implementation of healthy snacks education using the N-BINGO in the two study groups, namely elementary school students, based on the pre-test and post-test results. The increase occurred in the group given healthy snack educational intervention using the N-BINGO game. Participants showed an increase in balanced nutrition attitudes from pre-education using N-BINGO (mean = 55.87; SD = 3.43) to post-education (mean = 70.78; SD = 4.37; $p < .001$), $t = 16.114$ and $\rho = .003$.This difference is significant, so this research can conclude that healthy snack education using N-BINGO significantly increases elementary school students' balanced nutrition attitudes. After receiving education on healthy snacks using the N-BINGO, students have a better attitude towards a balanced nutritional diet. After the nutrition bingo intervention, students were more likely to consume various foods to meet their daily nutritional needs.

This study's results align with Chow et al. [47], who stated that health education plays a role in changing a person's health behaviour. Amira and Setyaningtyas [39] stated that nutrition education can improve attitudes towards choosing healthy snacks in elementary school children. In their research, Septiana and Suaebah [48] concluded that nutrition education shows an increase in students' attitudes about the importance of health. Wahyuningsih et al. [25] in their research provided education on healthy snacks for 1 month with a duration of 30 minutes/meeting, and Ghaffari et al. [49] provided education on healthy snacks for 2 months with a duration of 30-45 minutes. Both studies showed increased attitudes toward choosing healthy snacks among elementary school children.

In their research, Wulandari and Woro [50] provided educational treatment on healthy snacks using similar media, and the results showed an increase in the attitudes of elementary school students in choosing healthy snacks to consume, as well as being believed to be important for health. In line with this research, EduGame influences attitudes towards healthy snacks [51]. The increased attitudes toward balanced nutrition are due to the N-BINGO game environment, which can create an entertaining atmosphere so that school-age children are interested and more easily absorb the information provided [27].

Providing healthy snack education based on the N-BINGO game, which significantly influences attitudes towards balanced nutrition, is also supported by the results of research by Sumarliyah et al. [52], which identified changes in attitudes and behaviour towards healthy snack choices among school children through the monopoly educational game Healthy Snacks. 86% of students had positive attitude changes, and 69% had

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good behaviour. This change in attitude for the better is due to fun games, teacher support, and available facilities.

CONCLUSION

The research can be concluded that healthy snacks education using the N-BINGO significantly increases elementary school students' healthy snacks knowledge and their balanced nutrition attitudes. Students' knowledge of healthy snacks has increased from pre-education using N-BINGO (mean = 19.07; SD = 2.81) to post-education (mean = 29.74; SD = 3.72; p <.001). Students' balanced nutrition attitudes has increased from pre-education using N-BINGO (mean = 55.87; SD = 3.43) to post-education (mean = 70.78; SD = 4.37; p <.001). This research implies that the N-BINGO can be used to educate elementary school students about healthy snacks because this education has been proven to significantly increase students' knowledge of healthy snacks and their balanced nutrition attitudes. Teachers should use the N-BINGO to educate elementary school students about healthy snacks. Healthy snack education is important to be carried out evenly in every elementary school because providing this education has been proven to increase student's knowledge about healthy snacks and balanced nutrition attitudes. Moreover, government support is needed to integrate nutrition education into the school curriculum to include the principle of balanced nutrition intake in school education. Nutrition education integrated into the school curriculum can improve the application of balanced nutrition principles.

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