



The Influence of An Activity-Based Nutrition Education on Preschool Children's Perceptions about Healthy and Unhealthy Foods

Etkinlik Temelli Beslenme Eğitiminin Okul Öncesi Dönem Çocuklarının Sağlıklı ve Sağlıksız Gıdalara İlişkin Algılarına Etkisi

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Abstract

The aim of this study was to investigate the influence of an activity-based nutrition education on the nutrition-related perceptions of five-year-old children. The posttest-only nonequivalent control group design was employed, and a total of 111 children participated. Data were collected with group discussions and an adapted Healthy Food Knowledge Activity. It was analyzed with the inductive thematic approach, descriptive statistics, and independent-samples t-tests. The results showed that children are conscious of basic healthy or unhealthy foods; however, they cannot think in a complex way when it contains a variety of ingredients together. After the education, a statistically significant difference was found in the healthy food perception mean scores between the experimental and control group in favor of the experimental one. Moreover, girls were also found to have significantly higher scores than boys in the healthy food perceptions. It was concluded that nutrition related educations are useful to support children's perceptions about healthy nutrition.

Keywords: Early childhood education, nutrition, nutrition education, healthy, unhealthy.

Öz

Bu çalışmada, aktivite temelli beslenme eğitiminin beş yaşındaki çocukların beslenmeyle ilgili algıları üzerindeki etkisini araştırmayı amaçlanmıştır. Son test eşdeğer olmayan kontrol gruplu desen uygulanmış ve toplam 111 çocuk katılmıştır. Veriler, odak grup görüşmesi ve uyarlanmış sağlıklı gıda bilgisi etkinliği ile toplanmıştır. Toplanan veriler tümevarımsal tematik yaklaşım, betimsel istatistikler ve bağımsız örneklem t-testi ile analiz edilmiştir. Sonuçlar, çocukların sağlıklı veya sağlıksız temel besinlerin bilincinde olduklarını, ancak çok sayıda bileşenin bir arada bulunduğu besinlerde karmaşık düşünemediklerini ortaya koymuştur. Eğitim sonrasında deney ve kontrol grubu arasında sağlıklı besin algısı ortalama puanlarında deney grubu lehine istatistiksel olarak anlamlı bir fark bulunmuştur. Ayrıca, kızların sağlıklı gıda algısı konusunda erkeklerden önemli ölçüde daha yüksek puan aldıkları da tespit edilmiştir. Çocukların sağlıklı ve sağlıksız gıdalara ilişkin algılarını desteklemede beslenme ile ilgili eğitimler sağlanmasının yararlı olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Okul öncesi eğitimi, beslenme, beslenme eğitimi, sağlıklı, sağlıksız.

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1. Introduction

Protecting and improving the children's health have a special importance in the 2030 Sustainable Development Goals because childhood is an important process for healthy development and adapting healthy habits to life. Children can become healthy adults and be protected from illnesses when they have healthy eating habits. In

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particular, adequate and balanced nutrition has a crucial role in supporting children's health and quality of life (Karadaş et al., 2024; Soğukpınar Önsüren & Mutluay, 2025; Zembat et al., 2015). On the other hand, unhealthy nutritional habits slow down the development of them and cause several health problems (Saavedra & Prentice, 2023). For instance, children who do not receive sufficient nutrition are at high risk of exhibiting impaired cognitive skills (Roberts et al., 2022). As another example, obesity is also increasing rapidly among children and is one of the common health concerns around the world (Atik & Ertekin, 2013; World Health Organization, 2020). It is difficult to reverse in older ages. Therefore, it is important to implement obesity prevention strategies during the pre-school years (Gato-Moreno et al., 2021; Horodyski & Stommel, 2005; Skouteris et al., 2011) and shape eating habits from these ages (Birch & Fisher, 1998). In this respect, healthy and balanced nutrition is necessary for children's healthy growth and development (Millward, 2017), and it is important to understand the determinants of healthy eating behaviors to promote health related outcomes in their future life. Nutrition literacy is one of the important factors among these (Çelik et al., 2025). It is crucial for establishing healthy eating habits in children (Gillic et al., 2025), and it is essential to be integrated into the early childhood curriculum (Karadaş et al., 2024; Muslu, 2023). However, there is a lack of literature regarding food literacy of preschool children and their caregivers (Gillic et al., 2025). In fact, it might shape perceptions or behaviors regarding the healthy nutrition. Perception of nutrition concepts at a young age can also affect lifetime food choices in children's future lives as well as becoming one of the influential factors on children's eating habits (Bernath & Masi, 2006).

There are different factors affecting children's nutrition-related perceptions and behaviors. To illustrate, gender differences were seen in food-health and food-nutrient links (Hart et al., 2002). In another research study, it was found that preschool children rely on physical characteristics such as color, shape, and texture to classify the foods as healthy (Matheson et al., 2002). Parents can also be important factors in shaping their nutritional habits (Kızıltan & Oral, 2024). In the research study by Özgen and Demiriz (2022), parents were asked whether their children can differentiate between healthy and unhealthy foods, and a significant positive difference was found in favor of the children of parents with a higher education level. Moreover, marketing was viewed as an effective factor in food awareness, preferences, and eating habits (Atik & Ertekin, 2013; Boddy et al., 2012). In light of these, it could be stated that both personal and environmental factors shape children's eating habits (Çiftçi & Tayhan, 2025). It is important to improve children's nutrition-related awareness to contribute to their nutritional competency to make healthy food choices (Tarabashkina et al., 2016). To this end, nutrition-related education has crucial importance to ensure the desired awareness for the children, and it should support children's lack of knowledge (Holub & Musher-Eizenman, 2010; Slaughter & Ting, 2010). Children's nutrition knowledge can influence their nutritional habits and protect them from obesity by helping them make healthy choices (Tarabashkina et al., 2016; Tatlow-Golden et al., 2013). In other words, nutrition-related education or school-based interventions are influential in the prevention of obesity (Köse & Yıldırım, 2020; Silveira et al., 2011; Singhal et al., 2020). In particular, interventions for low-income mothers' children can contribute to healthy nutrition in low-income nations (Horodyski & Stommel, 2005).

There is increasing research literature on children's knowledge and perceptions related to nutrition or healthy eating (e.g., Alaçam, 2025; Çiftçi & Tayhan, 2025; Elliott, 2009; Kerkez, 2018; Zarnowiecki et al., 2011). In some of these, it was found that children can identify healthy foods, but they have difficulty evaluating unhealthy foods (Lipowska & Lipowski, 2018). It is important to teach children about unhealthy foods in the preschool years (Tatlow-Golden et al., 2013). In this regard, attention needs to be given to developing nutrition education programs and integrating those into the early childhood curriculum. In this way, these education programs can contribute to health outcomes by promoting children's nutrition-related knowledge and literacy. An activity-based nutrition education was developed in the present study, and its impact on children's nutrition-related perceptions was investigated.

1.1. Current Study

Food and nutrition literacy in early childhood years is important to support children's healthy growth and development as well as influencing their nutritional behaviors in their future life (Angın et al., 2022). Nutrition education contributes to preschool children's nutrition knowledge and healthy eating habits by providing positive changes in their attitudes and practices towards good nutrition (Köse & Yıldırım, 2020; Ruzita et al., 2007; Ünver & Ünüsan, 2005; Wagner et al., 2005). For instance, after the nutrition education program, preschoolers showed increased understanding of healthy foods and changed their food preferences (Sigman-Grant et al., 2014), which contributed to their fruit and vegetable consumption (Anderson et al., 2005; Melnick et al., 2020). The probable reason is that nutrition education positively affects children's menu choices by enabling them to engage in rational reasoning (Süt & Kutluca, 2021). Therefore, it is suggested to integrate nutrition into early childhood education programs. Nutrition education can help decrease unhealthy dietary behaviors and contribute to good lifestyle

behaviors (Hu et al., 2010). It also contributes to preschoolers' healthy eating literacy and preference of the healthy foods in addition to improving nutrition-related health outcomes (Chojnacka et al., 2021; Gato-Moreno et al., 2021; Jung et al., 2019; Kerkez, 2018; Kim et al., 2019; Sigman-Grant et al., 2014; Ünver & Ünüsan, 2005; Zarnowiecki et al., 2011). In this way, those can shape children's future eating habits in a healthy way (Yardımcı et al., 2015) and contribute to the prevention of obesity (Gato-Moreno et al., 2021).

It is important to give special consideration to nutrition in early childhood education. In the currently revised early childhood education curriculum in Türkiye, there is a special place for movement and health skills, and nutrition-related skills were highlighted as a part of it. In this way, it is aimed to develop healthy lifestyle habits from childhood years (MoNE, 2024). According to Dewey, children learn best through interaction with other people and collaboration with peers and adults (Mooney, 2013). In line with this, children should be actively integrated into the nutrition education process to support them (Yurdakul, 2022). Healthy food choices should be discussed with children, and healthy eating examples should also be provided in the classroom (Mulvey, 2020). For instance, children's picture books are important tools to create awareness among children related to the targeted subject by getting their attention on the topic. Reading the book, listening to children's ideas about the book theme, and supporting the process with different activities will help children gain positive attitudes and behaviours about the focused issue (Alici & Gül, 2023). Furthermore, for successful education programs, it is important to explore children's prior perceptions and knowledge of healthy eating (O'Dea, 2003; Paquette, 2005). This study provides information concerning the development of children's conceptual understanding of healthy food by implementing child-centred activity-based education with respect to the determined needs of the children in Türkiye (Alaçam, 2025) and offers implications to support children's perceptions in terms of healthy nutrition. Thus, the following research questions were focused in line with the purposes:

- What are the preschool children's perceptions about healthy and unhealthy foods?
- Is there a significant difference in children's healthy food perceptions between the experimental and control groups?
- Is there a significant difference in children's healthy food perceptions with respect to gender in the experimental group?

2. Method

2.1. Research Design

This research study was designed in an experimental nature to investigate the impact of an activity-based nutrition education on the perceptions of five-year-old children related to healthy and unhealthy foods. To explain, experimental research aims to investigate the influence of a particular variable and enables the identification of cause-and-effect relationships. The experimental designs can take a variety of forms. The posttest-only nonequivalent control group design was employed in this study, in which the existing groups are randomly determined as the experimental and control groups. In this design, participants in one group are exposed to a treatment, and a nonequivalent group is not exposed to it, and then the two groups are compared on the posttest (Fraenkel et al., 2018). To prevent testing bias and implement the education process in the school routine of the available classrooms, the posttest-only nonequivalent control group design was preferred in the current study. The groups were randomly assigned as the experimental and the control groups. All the participant classrooms had similar characteristics, and children were randomly assigned to the classrooms by the school administration. To explain, they were all five years old and following the same program. The teachers of all the classrooms had at least six years of teaching experience, and the families of the children also had a middle socioeconomic status.

Testing was not a threat in the design of the present study because none of the participants was tested twice. However, there were some other threats to consider (Fraenkel et al., 2018). One of them was mortality, which refers to the dropout of the children from the groups. To decrease its impact, the purpose of the research study was explained to the educators, and the attendance of the children in the treatment week was largely ensured. However, data collector bias, location, and history were other possible threats. To decrease the influence of these, the researcher collected all the data, and she was educated about the research methods. The study process was also conducted in similar classroom environments in the same school to decrease the possibility of these threats. The implementation was conducted at the end of the spring semester. Although the planned activities were not conducted with the control groups, there were nutrition-related objectives in the early childhood education program. Therefore, they may have also participated in some activities related to nutrition, which was one of the threats of the study.

2.2. Participants

Convenience sampling was employed in the selection of the participants, which refers to the selection of conveniently available participants for the study (Fraenkel et al., 2018). To explain this, the participants were selected from a public preschool in one of the central districts of Samsun, Türkiye. Samsun is on the north coast of Türkiye and one of the central cities in the Black Sea region. The participant preschool was in the central district of the city, which was a convenience sample for the researcher and consisted of families with middle socioeconomic status. There is a centralized education system in Türkiye, and the public preschools implement the same early childhood education curriculum (MoNE, 2024). As a public preschool, the participant preschool was implementing this curriculum. It had typical characteristics of other public preschools in that district and volunteered to adapt its schedule for the study. It had 11 classrooms in total, which served children aged 3- 5 years old. The participants were five years old and attending five different classrooms in the same preschool. The school had six classrooms for five-year-old children. Three of these were selected randomly as experimental groups, and the other two groups also became control groups for the research. A total of 111 children participated in the study, of whom 62 were in the experimental groups, and 49 were in the control groups. It is suggested to have at least 40 subjects for experimental and control groups in the experimental designs (Fraenkel et al., 2018), which was assured in the present study. Among the participating children, 55 of them were girls and 56 of them were boys. The activities were implemented as a part of the classroom routine, and all the children in the classrooms volunteered to participate in the study. None of the children was excluded for any reason.

2.3. Data Collection

This study was reviewed and approved by Ondokuz Mayıs University Social and Human Sciences Ethics Committee with the approval number 2025-527. Prior to the study, consent was obtained from the school administrator to be able to carry out the research. Moreover, children were asked to reveal their willingness to participate, and consent was also obtained from their parents.

Data collection was conducted as a part of the classroom routine in the spring semester of 2025. To explain, prior to the data collection, the educator of the participating classrooms introduced the researcher to the children. The researcher spent some time in the classrooms with the children by participating in their classroom activities before the implementation. After that, she began to lead the classroom in the activities and data collection processes. Initially, children's nutrition-related perceptions were investigated with a group discussion before the activity implementation to explore their initial perceptions prior to the treatment. It was implemented in an unstructured format and continued with respect to the children's responses. "What are the healthy and unhealthy foods and drinks?" guided the entire process. Follow-up questions were generated with respect to the children's responses. For instance, "Why is it healthy or unhealthy?" Voice recording was also conducted during the process. It took about 20 minutes to complete for each classroom. After exploration of the prior perceptions, nutrition-related education was provided to children in their classroom environment by highlighting their misperceptions in the initial group discussion. The researcher spent 40 minutes per a day in each classroom for one week. By considering the transition to the activity and its assessment process, two activities were implemented each day after breakfast. After that, as a post-test, data were collected by means of the adapted Healthy Food Knowledge Activity, which was implemented in the classroom environment and lasted about 20 minutes. The activity was adapted from Zarnowiecki et al. (2011) to investigate children's nutritional knowledge regarding healthy and unhealthy foods in Turkish culture by replacing some food photos (e.g., cereals, doughnuts) with those more familiar to children in Türkiye. Its adaptation details were provided in Alaçam (2025). To explain the activity, it includes a list of 30 foods and drinks with varying degrees of difficulty to be categorized as healthy (apple, watermelon, orange juice, broccoli, carrot, fish, eggs, nuts, legumes, soup, rice, bread, pasta, yoghurt, cheese, milk, meat) or unhealthy (pastry, cookies, coke, chips, chocolate, candies, dessert, ice-cream, fried chicken, fried potatoes, sausage bread, hamburger, dragee) (Alaçam, 2025; Zarnowiecki et al., 2011). In the activity process, it is expected of children to categorize them as healthy or unhealthy.

2.3.1. Nutrition Education in the Experimental Group

Nutrition education was provided by means of a variety of activities. The activity processes were developed by the researcher and reviewed by three experts in the early childhood education field. Some minor revisions were conducted in the activity processes with respect to the expert opinions. For instance, some wording was revised in the instructions to clarify them for the children. In the process, it focused on healthy and unhealthy nutrition by

referring to different food groups, the content of the foods and drinks, and the influence of the cooking style on their healthfulness. Different food groups including grains, meat, dairy products, nuts, fruits, and vegetables were covered by highlighting adequate and balanced nutrition. Moreover, unhealthy foods and drinks including sugar, ice cream, cookies, Coke, hamburger, and fried chicken were explained by referring to the ingredients or cooking styles. Firstly, a story was read by explaining the healthy and unhealthy foods and drinks. Its content was prepared by the researcher as part of the activity processes of the present study, and expert opinion was taken on it as part of other activities. Children were asked how the character in the book can have a healthy diet by selecting different foods and drinks. Then, healthy and unhealthy foods or drinks were explained with some prepared cards, which included photos of a variety of foods and drinks. Nutritional content of the foods (e.g., including sugar) and outcomes related to the food (e.g., making bones strong) were especially highlighted while explaining the healthy side. The cooking process was explained if the food belongs to a healthy group but becomes unhealthy because of the cooking process, which children have difficulty understanding (Alaçam, 2025). Moreover, the influence of the cooking process on the healthfulness of foods such as fried chicken or fried potatoes was explained by giving examples. Then, a food graph was prepared with the children by grouping foods and drinks as healthy and unhealthy. They also created some art products (cards) about the healthy and unhealthy foods, learned a song about the benefits of vegetables by creating its rhythm, and engaged in physical activities that required them to predict some foods and drinks based on the expressed features. The activity list was provided in Table 1. These different activities helped them to maintain their attention and interest in the topic. The activity-based nutrition education was not provided for the control group.

Table 1
Implemented activities

Activity types	Examples
Turkish language	Fingerplay related to vegetables and fruits, Story about healthy nutrition
Science	Brainstorming with children about the content of the foods and drinks and exploring them, Learning about the influence of cooking process on healthfulness
Math	Matching food and drink photo cards, Preparing food graph
Art	Preparing food cards
Music	Learning a song about vegetables by creating its rhythm
Play, Physical	Card plays (about healthy and unhealthy foods), Physical activity (on identifying food and drink)

2.3.2. *Post-test Data Collection*

After the implementation of the activities in the experimental group, the adapted Healthy Food Knowledge Activity was employed by the researcher for both the experimental and control groups to collect the research data as a post-test. In this activity, colorful digital photographs of the foods and drinks were presented on paper for five-year-old children. Smiling face stickers were provided for getting their responses to the healthy foods, and sad face stickers were also provided for the unhealthy ones. Data collection was conducted with each child individually. Children were requested to select healthy foods and drinks and paste smiling face stickers on them, and also select unhealthy foods and drinks and paste sad face stickers on them. In line with the original study, healthy food was defined as “food that is good for you that you should eat a lot of, and unhealthy food was also defined as “food that is not good for you that you should only eat sometimes” (Zarnowiecki et al., 2011). Children’s gender was also noted by the researcher on the back of their activity paper. The same instructions were employed in the data collection process for each child by the researcher. The activity process took about 20 minutes for each child to complete. An example of the activity sheet with child responses is provided in Figure 1. The data collection process took about one month to complete for the entire process.

Figure 1*Healthy food knowledge activity sheet with child answers*

2.4. Data Analysis

The initial group discussion was analyzed with the inductive thematic approach to discover patterns and themes in the responses (Creswell & Poth, 2024; Patton, 2015). Those were transcribed by the researcher, and then codes, categories, and themes were extracted from the data after reading transcripts and listening the records several times (Patton, 2015). Those were determined according to the similarities in children's responses regarding healthfulness or unhealthfulness of the foods or drinks. Peer review was employed for data reliability. A second coder, who is a researcher in the early childhood education field and experienced in qualitative research, independently coded a sufficient amount (15%) of interviews (O'Connor & Joffe, 2020). The percentage of agreement was calculated as 94% for the interviews by dividing the number of agreements to the total number of agreements and disagreements (Miles et al., 2014). Differences were discussed until reaching an agreement. It was suggested that intercoder agreement should be above .85, which was assured in the present study (Miles et al., 2014). In order to protect participants' identities, pseudonyms were used, such as C for children (e.g., C1 for child 1).

IBM SPSS 25 program was also used in data analysis of the Healthy Food Knowledge Activity. The researcher quantified children's responses by assigning "1" for correct ones and by assigning "0" for wrong ones. Data were entered into the SPSS program, and descriptive statistics were conducted to determine the foods that the children perceive as healthy or unhealthy. In order to explore differences in nutrition-related perceptions between experimental and control groups, independent-samples t-tests were carried out, which are used to investigate the mean difference between two groups of subjects (Pallant, 2007). Moreover, independent sample t-tests were also conducted to explore whether there is a significant difference with respect to gender in the experimental group children's nutrition-related perceptions after the implemented activity-based education.

3. Results

3.1. Children's Perceptions of Healthy and Unhealthy Foods in the Group Discussion

Prior to the activity-based education process, a group discussion was conducted with the children in each classroom to explore their perceptions about healthy and unhealthy foods. The categorization of the children in the group discussion was summarized in Table 2. It was found that children were conscious of basic healthy or unhealthy foods, and they could explain the reason for their classification. To explain, fruits and vegetables were described as healthy, and they mentioned a variety of benefits for each of them. For instance, they mentioned "carrots are necessary for our eye health" (C1, C5). As another example, they viewed cookies as unhealthy and explained the reason that "There are sugar and food coloring in it, which are harmful for our health" (C2).

On the other hand, it was also found that children focus on a single ingredient when determining the healthfulness of food and cannot think in a complex way when it contains a variety of healthy and unhealthy ingredients. To illustrate, some of the children viewed ice-cream as healthy and explained the reason for it as including milk and fruits. Since milk and fruits are healthy, they perceived the ice-cream as healthy. As another example, one of the children asked, "Why is hamburger unhealthy? There is lettuce and meatball in it. Since those are healthy, hamburger should be healthy" (C3).

Moreover, it was also found that children cannot consider the influence of the cooking process on the healthfulness of the foods. For instance, fried chicken and fried potatoes were described as healthy by some of the children by

ignoring their cooking process. All these points constituted a basis to highlight in providing activity-based education to children, and the quantitative findings indicated improvements in their perceptions regarding the previously mentioned points after the education process, which were explained below.

Table 2*Categories and subcategories extracted from group discussion*

Category	Subcategory	Some examples
Healthy	Fruits	Apple, peach, watermelon
	Vegetables	Carrot, cucumber
	Milk and milk products	Cheese, yoghurt
	Egg	Omelets
	Legumes	Beans, chickpeas
Unhealthy	Foods with sugar	Sugar, chocolate
	Salami	
	Coke	
	Chips	
Both healthy and unhealthy	Ice-cream	Ice cream with strawberry
	Fruitcake	
	Fruit juice	Orange juice
	Hamburger (with meat)	
	Fried chicken	
	Fried potatoes	

3.2. Descriptive Results on Healthy Food Knowledge Activity

Quantified Healthy Food Knowledge Activity data were analyzed with descriptive statistics, and the average score was found to be 28 out of 30 for the experimental group and 24 out of 30 for the control group. Table 3 presents how children in both groups categorized each food.

In the experimental group, all the children described soup, yoghurt, eggs, apple, watermelon, carrot, and broccoli as healthy. Over 90% of them also correctly categorized cheese, milk, legumes, fish, rice, and nuts as healthy. Moreover, orange juice was viewed as healthy by 84% of them, and 71% of the children also categorized bread as healthy. However, only 66% of them viewed pasta and meat as healthy. On the other hand, candies, dragee, chocolate, dessert, coke, and ice-cream were described as unhealthy by all the children in the experimental groups. Over 90% of them also viewed hamburgers, fried chicken, cookies, sausage bread, and chips as unhealthy. Furthermore, 89% of them correctly classified fried potatoes as unhealthy, and 74% of them could also view pastry as unhealthy.

In the control groups, over 90% of the children described yoghurt, soup, cheese, apple, orange juice, milk, carrot, eggs, watermelon, and broccoli as healthy. Moreover, 86% of them correctly classified legumes as healthy, and 76% of them also viewed rice as healthy. However, only 69% of them viewed fish as healthy, and nuts were also recognized as healthy by 55% of them. Furthermore, 53% of them categorized bread as healthy, and pasta was also viewed as healthy by 45% of them. In particular, meat could be correctly categorized as healthy by only 27% of the children. On the other hand, chocolate was viewed as unhealthy by all of them. Over 90% of them also correctly classified chips, coke, candies, and dragee as unhealthy. Moreover, hamburger, dessert, and sausage bread were viewed as unhealthy by over 85% of the children, and 75% of them also correctly categorized ice-cream as unhealthy. However, only 59% of them could recognize fried chicken and cookies as unhealthy. Fried potatoes (53%) and pastry (51%) were also categorized as unhealthy by only about half of the children.

3.3. Influence of the Activity-Based Education on Children's Healthy Food Perceptions

An independent sample t-test was conducted to compare the preschool children's healthy food perception scores between the experimental and control group. Initially, assumptions were checked and ensured including level of measurement, random sampling, independence of observations, normal distribution, and equal variances (Pallant, 2007). As a result, it was found that there is a statistically significant difference in the mean scores between the experimental ($M=28.11$, $SD=1.60$) and control group ($M=24.04$, $SD=3.81$); $t(109) = 7.00$, $p < .001$ (two-tailed).

Table 3

Summary of responses given by children in the experimental and control group

Food	Experimental Group				Control Group			
	Said healthy		Said unhealthy		Said healthy		Said unhealthy	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Unhealthy foods								
Candies	0	0	62	100	2	4.1	47	95.9
Hamburger	1	1.6	61	98.4	6	12.2	43	87.8
Chocolate	0	0	62	100	0	0	49	100
Fried chicken	4	6.5	58	93.5	20	40.8	29	59.2
Cookies	1	1.6	61	98.4	20	40.8	29	59.2
Pastry	16	25.8	46	74.2	24	49	25	51
Dessert (Baklava)	0	0	62	100	6	12.2	43	87.8
Sausage bread	1	1.6	61	98.4	7	14.3	42	85.7
Chips	1	1.6	61	98.4	1	2	48	98
Coke	0	0	62	100	2	4.1	47	95.9
Fried potatoes	7	11.3	55	88.7	23	46.9	26	53.1
Ice-cream	0	0	62	100	12	24.5	37	75.5
Dragee	0	0	62	100	3	6.1	46	93.9
Healthy foods								
Yoghurt	62	100	0	0	47	95.9	2	4.1
Soup	62	100	0	0	48	98	1	2
Cheese	61	98.4	1	1.6	45	91.8	4	8.2
Apple	62	100	0	0	47	95.9	2	4.1
Legumes	58	93.5	4	6.5	42	85.7	7	14.3
Orange juice	52	83.9	10	16.1	46	93.9	3	6.1
Milk	61	98.4	1	1.6	47	95.9	2	4.1
Carrot	62	100	0	0	48	98	1	2
Eggs	62	100	0	0	47	95.9	2	4.1
Bread	44	71	18	29	26	53.1	23	46.9
Watermelon	62	100	0	0	45	91.8	4	8.2
Broccoli	62	100	0	0	46	93.9	3	6.1
Fish	61	98.4	1	1.6	34	69.4	15	30.6
Pasta	41	66.1	21	33.9	22	44.9	27	55.1
Rice	56	90.3	6	9.7	37	75.5	12	24.5
Meat	41	66.1	21	33.9	13	26.5	36	73.5
Nuts	59	95.2	3	4.8	27	55.1	22	44.9

After that, two independent sample t-tests were also conducted to compare the experimental and control group children's perception scores in both the healthy food and unhealthy food groups. As a result, it was found that there is a statistically significant difference in the healthy food group mean scores between the experimental ($M=15.61$, $SD=1.41$) and control group ($M=13.61$, $SD=2.52$); $t(109) = 4.99$, $p < .001$ (two-tailed). Similarly, a statistically significant difference was also found in the unhealthy food group mean scores between the experimental ($M=12.50$, $SD=.67$) and control group ($M=10.43$, $SD=2.13$); $t(109) = 6.56$, $p < .001$ (two-tailed).

3.4. Difference in Children's Healthy Food Perceptions with Respect to Gender in the Experimental Group

An independent sample t-test was conducted on experimental group children's healthy food perception scores with respect to gender. As a result, it was found that there is a statistically significant difference in the mean scores between the girls ($M=28.63$, $SD=1.30$) and boys ($M=27.63$, $SD=1.72$); $t(60) = 2.59$, $p=.012$ (two-tailed).

Then, two independent sample t-tests were also conducted to compare the children's scores in both the healthy food and unhealthy food groups with respect to gender. As a result, it was found that there is not a statistically significant difference in healthy food group mean scores between the girls ($M=15.87$, $SD=1.22$) and boys ($M=15.38$,

$SD=1.54$; $t(60) = 1.39$, $p=.171$ (two-tailed). On the other hand, a statistically significant difference was found in unhealthy food group mean scores between the girls ($M=12.77$, $SD=.430$) and boys ($M=12.25$, $SD=.762$); $t(60) = 3.31$, $p=.002$ (two-tailed).

4. Discussion

Both qualitative and quantitative findings confirm each other about the fact that children can recognize basic healthy and unhealthy foods. For instance, fruits and vegetables were viewed as healthy by the majority of them in both experimental and control groups. They also easily recognized sugar and sugar-containing foods as unhealthy. As explained in the group discussion by the participant children, they were aware of the fact that sugar makes the food as unhealthy (Alaçam, 2025; Brindal et al., 2012; Protudjer et al., 2010). Similarly, it was confirmed in the literature that children can easily recognize the healthy and unhealthy foods (Alaçam, 2025; Boddy et al., 2012; Frerichs et al., 2016; Lipowska & Lipowski, 2018; Zarnowiecki et al., 2011). School and family might be the source of this information for the children, as they become role models for them (Arredondo et al., 2006; Brindal et al., 2012; Reeve & Bell, 2009), and it is essential to consider families while planning nutrition-related interventions (Murimi et al., 2018). Government regulations regarding nutrition, such as food advertising, can also provide improvements in dietary intake (Chan et al., 2025).

Qualitative findings revealed that children cannot think complexly if the food contains different healthy and unhealthy ingredients together. For instance, prior to the implementation of the activity-based education process, children were confused about the ice cream because it contained healthy and unhealthy ingredients together. In other words, they have difficulty classifying when the food belongs to a healthy food group but is prepared in an unhealthy way (Nguyen, 2007). This can be a problem in our modern food environment (Frerichs et al., 2016), and nutrition education was suggested for the children (Sigman-Grant et al., 2014; Ünver & Ünüsan, 2005). This study confirmed the influence of nutrition education on the children's perceptions. For instance, after explaining the unhealthy ingredients of ice cream in the activity process, all the children could identify it as unhealthy in the final Healthy Food Knowledge Activity in the experimental group. Likewise, after explaining the influence of the cooking process on the healthfulness of the foods in the activity-based education process, children could easily recognize these foods as unhealthy in the present study. Therefore, it is essential to provide nutrition-related education that considers and illustrates the complex nature of the foods and drinks in our current world. That education should also be planned for the long-term process because long-term interventions can contribute to the intervention effect on the children (Murimi et al., 2018). Mealtimes can also contribute to children's nutritional learning. In particular, interactions between educators and children during mealtimes have a significant role in nutrition education (Searle et al., 2025), and mealtimes might be integrated into the nutrition education processes.

In the experimental group, the majority of the children correctly identified most of the foods as healthy or unhealthy after the activity-based education process. However, meat, pasta, and bread were viewed as unhealthy by a significant percentage of them. Likewise, in the control group, the majority of the children could not recognize the health benefits of bread and pasta, and only a small percentage of them could also identify meat as healthy. This indicates that children have difficulty understanding the health benefits of these foods. Similarly, children showed less understanding of meat and bread in the research study of Alaçam (2025). As indicated in the rates of meat consumption, families may provide less meat to their children in Türkiye due to mostly economic reasons, and this might be one of the factors affecting the perceptions. On the other hand, bread is one of the commonly consumed foods in Turkish culture, but there is an effort to decrease its consumption by considering its harmful impacts on health. The nutrition menus can also change with respect to the socio-economic status (Atli & Osmanoğlu, 2021). Likewise, a relationship was reported between low socio-economic status and lower food literacy among parents in the research by Gillic et al. (2025). Parental education was also positively correlated with higher food literacy in the same research study. These confirm the significance of socioeconomic status and social environment for children's perceptions, as noted in the study by Atik and Ertekin (2013).

A significant difference was reached on healthy food perception scores in favor of the experimental group, which confirms the effectiveness of the nutrition education on the children. Likewise, the influence of the nutrition education on the level of children's nutritional knowledge and awareness was highlighted in the literature (Chojnacka et al., 2021; Çavdar & Yılmaz, 2025; Jung et al., 2019; Sigman-Grant et al., 2014; Ünver & Ünüsan, 2005; Wagner et al., 2005). After the implementation of a nutrition education program, children showed increased understanding of healthy foods and changed their food preferences (Sigman-Grant et al., 2014) because messages about those foods affect children's consumption of them (DeJesus et al., 2019). In this regard, contributing to young children's nutritional competency might help them make healthy choices (Tarabashkina et al., 2016). In particular, nutrition education programs help children choose healthy food options and improve nutrition-related health

outcomes (Kim et al., 2019). These education programs contribute to children's nutritional behaviours by increasing their nutritional knowledge, which also supports their growth and development (Köse & Yıldırım, 2020; Silveira et al., 2011). However, it is suggested that this education should be provided in long-term processes to be able to reflect it in their behaviors (Çavdar & Yılmaz, 2025). Such nutrition-related education can also be utilized for contributing to children's self-regulatory behaviors (Razza & Brann, 2025).

Moreover, a significant difference was found in healthy food perception scores in favor of the girls in the experimental group. Likewise, gender was found to be a significant factor in nutrient intake in the studied preschool children by Merkiel-Pawłowska and Chalcarz (2017). Hart et al. (2002) also found a significant difference in nutrition-related understanding with respect to gender in favor of the girls. Similarly, Çelik et al (2025) and Gillic et al. (2025) confirmed that girls have higher nutritional literacy than boys of the same age. In this regard, the observed difference in the present study may be related to girls' having a higher awareness of unhealthy foods in comparison to boys. As a probable result of this, it was found that girls preferred meals which have fewer calories and less fat than boys (Holub & Musher-Eizenman, 2010). However, it was also shown that girls are more likely to have unhealthy diets than boys when parents have control strategies on eating (Arredondo et al., 2006). Parents might be influential factors on creating such differences in children's perceptions (Boddy et al., 2012). In the research study by Özgen and Demiriz (2022), children's consciousness of healthy nutrition was found to be higher for parents with a higher education level. Furthermore, healthy and unhealthy nutritional habits of the families can also influence children's choices (Litterbach et al., 2017) because families can be important role models for changing the eating habits of the children (Özgen & Demiriz, 2022). In relation to this, Gato-Moreno et al. (2021) confirmed the influence of parental intervention related to nutrition on children's body-mass index. In light of this, it could be concluded that family participation in preschool nutrition education increases the effectiveness of the education (Aktaş et al., 2019). Therefore, family and school collaboration should be provided for creating nutrition-related awareness in children. To this end, families should be integrated into the nutrition education process for influential outcomes of the education, and this education should be provided at every stage of formal and informal education (Yardımcı et al., 2015).

5. Conclusion, Limitations, and Recommendations

The current study was designed to examine and improve preschool children's understanding of healthy and unhealthy foods by implementing the activity-based education process. As a result, the education was found to be useful for supporting children's nutrition-related perceptions, and girls were also found to have significantly higher scores than boys in the healthy food perceptions. It was concluded that nutrition knowledge of the preschool children can be improved with such activity-based education. Findings also indicated the areas in which children need to be supported. However, there are limitations of the study at the same time. Findings are bounded by the participant setting. Increasing the sample size and including children from different socio-economic status might contribute to the generalization of the findings. In future research studies, children's detailed demographic information (e.g., weight, height) might also be collected and interpreted together with the findings. Furthermore, nutrition education programs might be developed by considering the cultural differences, and the influence of the nutrition education on children's nutrition-related habits might be investigated by integrating families into the longitudinal research processes. Pre-tests were not implemented in this study due to the testing threat in the limited implementation time, and classrooms were randomly assigned as experimental and control groups. Pre-tests can be integrated into longitudinal research designs, and children can also be randomly assigned to the experimental and control groups in future research studies.

6. Contribution Declaration

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7. Conflict of Interest

No conflict of interest.

8. Supporter and Grant Declaration (If exists)

No.

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