Healthy Food Choices Through Social Stories in Early Childhood Science Education: A Study with Children with Autism Spectrum Disorder

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Abstract: This study examined changes in healthy food selection following a social story intervention among preschool children with autism spectrum disorder (ASD) in early childhood science education. A single-group intervention design with repeated pre-test and post-test assessments involved ten children with ASD. Each child participated individually in three sessions, each comprising a pre-test, a social story intervention, and a post-test. During assessments, children selected their preferred item from seven pairs of toy foods, each containing one healthy and one unhealthy option. Selections were recorded using the researcher-developed Healthy–Unhealthy Foods Chart. A retention assessment using the same procedure was conducted ten days after the intervention. Nine participants showed higher percentages of healthy food selections in the final post-test than in the initial pre-test, while one maintained a score of 100%. All participants maintained or exceeded their final post-test performance at retention. These findings suggest that social stories may support healthy food selection in structured tasks among preschool children with ASD. However, the absence of a control group limits causal interpretation, and the findings do not establish changes in actual dietary behavior.

Keyword: Autism Spectrum Disorder

Introduction

Autism Spectrum Disorder (ASD) is a group of neurodevelopmental disorders characterized by repetitive behaviors, difficulties in social interaction, and impairments in verbal and nonverbal communication (Yeniçeri, 2020). The reported prevalence of ASD has increased over time. According to data published by the Centers for Disease Control and Prevention (CDC, 2025), approximately one in 31 children is identified with ASD. ASD is reported to be more common among boys than girls, and its symptoms generally become apparent during early childhood. These symptoms may vary across developmental stages and affect social and functional abilities. Children with ASD may also experience developmental delays relative to expectations for their developmental level (Senerman, 2019). Therefore, children with ASD require special education and support services (MEB, 2006). Given the importance of early childhood for development, educational support during this period is particularly significant for children with ASD.

Preschool education encompasses the period before primary education and plays an important role in children's development. Cognitive and brain development progress rapidly during this period, making early childhood particularly conducive to learning (Arslanargun & Tapan, 2015). Children's natural curiosity and tendency to question, investigate, and explore contribute to their learning. To support these characteristics, educational experiences should provide opportunities for children to conduct investigations, formulate and analyze hypotheses, establish cause-and-effect relationships, make predictions, and express different ideas (Aktaş Arnas, 2003). In this regard, science education has an important place in early childhood. One of the primaries aims of science education is to develop logical and functional thinking and enable

individuals to address problems encountered in everyday life. Science also provides opportunities to identify problems, generate possible solutions, test these solutions, and draw conclusions (Uyanık-Balat & Arslan-Çiftçi, 2017). Early childhood science education helps children understand themselves and their surroundings by providing basic knowledge about nature and the environment while supporting sensory and psychomotor development. It also encourages children to interpret events and phenomena through observation and accurate prediction (MEB, 2016). Beyond acquiring knowledge about nature and the environment, science education contributes to children's understanding of their surroundings, development of cause-and-effect relationships, and acquisition of basic life skills (Önal & Sarıbaş, 2019). These educational opportunities are also important for children with ASD, who have the same right to participate in science education as their typically developing peers.

Nutrition is one of the fundamental areas of daily life in which individuals need to develop knowledge and skills. Within science education, nutrition-related learning activities may contribute to children's understanding of healthy eating. Sarıdağ-Devran and Saka (2019) emphasized the important role of schools in developing healthy eating habits and translating nutritional knowledge into behavior. Similarly, previous studies have highlighted the influence of the school environment on children's acquisition of healthy eating habits, particularly because children spend a considerable amount of time at school (Campbell et al., 2006; Miller et al., 2012; Perez-Rodrigo & Aranceta, 2001). The preschool period is particularly important for developing habits because children's personalities and behavioral patterns begin to take shape during early childhood. Habits and skills acquired during this period may provide a foundation for behaviors maintained later in life (Ezmeci & Akman, 2016). Therefore, introducing healthy eating concepts through early childhood science education is important. Various instructional strategies can be used for this purpose, including Social Stories, which have been used to support the development of social skills among individuals with ASD (Olçay-Gül & Tekin-İftar, 2012).

Social Stories are instructional materials that use written and visual cues to describe social situations and support the acquisition of appropriate behaviors within those contexts (Karaaslan & Kutlu, 2010). They are developed according to individual learners' needs and written from the learner's perspective. Social Stories have been used to teach skills such as playing with peers, initiating social interactions, expressing desires appropriately, interpreting social situations, and reducing undesirable behaviors (Özdemir, 2007). They can be implemented by teachers, special education professionals, therapists, and parents. Social Stories may help individuals with ASD understand social situations and learn appropriate ways of responding within different social contexts (Gray, 2002). By acquiring relevant social knowledge and skills, individuals may become better prepared to demonstrate appropriate behaviors in situations encountered in everyday life (General Directorate of Special Education and Guidance Services, 2019).

Eating-related difficulties are common among individuals with ASD (Ömeroğlu & Şentürk, 2021). Children with ASD may exhibit selective eating patterns, strong preferences for particular foods or food groups, and refusal of certain foods. Such behaviors may limit dietary variety and contribute to difficulties in achieving adequate and balanced nutrition (Berding & Donovan, 2016). Eating habits developed during early childhood may also influence later nutritional patterns, as behaviors acquired during this period can contribute to nutrition-related problems in subsequent years (Acemioğlu & Doğan, 2021). These considerations highlight the importance of providing appropriate educational support related to healthy eating during early childhood.

Although Social Stories have been used to support various skills among individuals with ASD, their potential application to healthy food choices within early childhood science education deserves further investigation. In this context, the present study aimed to examine changes in healthy food choices among preschool children with ASD following a Social Story intervention. Healthy food choices were assessed through children's selections between healthy and unhealthy toy food alternatives during structured assessment activities. The study also examined whether the observed changes were maintained ten days after the intervention. Accordingly, the following research questions were addressed:

- How do healthy food choices made by preschool children with ASD during structured assessment tasks change following a Social Story intervention?
- To what extent are the observed changes in healthy food choices maintained ten days after the intervention?

Method

Research Design. The study employed a single-group intervention design involving repeated pre-test and post-test assessments. This design was used to examine changes in healthy food choices among preschool children with Autism Spectrum Disorder (ASD) following a Social Story intervention. Each participant completed three individual intervention sessions conducted at separate time intervals. Each session included a pre-test, a Social Story intervention, and a post-test. A retention assessment was administered ten days after the intervention to examine the maintenance of the observed changes.

Participants. The participants were ten preschool children diagnosed with mild Autism Spectrum Disorder (ASD) who attended schools affiliated with the Ministry of National Education in Çanakkale, Türkiye. Information regarding the children's autism spectrum disorder (ASD) diagnoses and severity levels was obtained from the school's official records. Criterion sampling, a purposive sampling method, was used to select participants based on predefined eligibility criteria (Büyüköztürk et al., 2016). The inclusion criteria were (a) having a diagnosis of mild ASD, (b) being able to follow instructions, and (c) being able to construct meaningful sentences. Initially, preliminary interviews were conducted with twelve preschool children diagnosed with mild ASD. Two children did not meet the eligibility criteria regarding their ability to follow instructions and construct meaningful sentences and were therefore excluded. The final study group consisted of ten preschool children (five girls and five boys) aged four to six years, all of whom had been diagnosed with mild Autism Spectrum Disorder (ASD) and were attending preschool. The demographic characteristics of the participants are presented in Table 1.

Table 1.
Demographic Information of Research Participants

Participant	Gender	Age
Eda	Girl	6
Mert	Boy	4
Elif	Girl	6
Sude	Girl	4
Mustafa	Boy	4
Kerem	Boy	5
Arda	Boy	6
Miray	Girl	6
Barış	Boy	6
Melis	Girl	5

Note. Participant names are pseudonyms.

- **Eda.** Eda was a six-year-old girl attending preschool who had been diagnosed with ASD at the age of one. Her mother was a homemaker, and her father worked as a driver. She had one sibling who had been diagnosed with a speech and language disorder. Regarding her eating habits, Eda generally consumed rice at school. She was reported to frequently consume excessive amounts of food and snack foods outside regular mealtimes, which had previously been associated with allergic reactions. She was described as overweight and occasionally experienced vomiting following excessive food consumption.
- **Mert.** Mert was a four-year-old boy attending preschool who had been diagnosed with ASD at the age of two and a half. His mother was a homemaker, and his father worked in the gendarmerie. He had one sibling who was reported to have no known health problems. Mert was not reported to exhibit selective eating behaviors and particularly enjoyed fruits and vegetables. According to his teacher's observations during school mealtimes, he generally demonstrated healthy eating patterns.
- **Elif.** Elif was a six-year-old girl attending preschool who had been diagnosed with ASD at the age of two. Her mother was a homemaker, and her father worked as a taxi driver. She had no siblings. Her eating patterns were reported to vary over time. During some periods, she preferred healthier foods, whereas during others, her food choices were less healthy. The types of foods she preferred also changed across different periods.
- **Sude.** Sude was a four-year-old girl attending preschool who had been born prematurely, at approximately five months of gestation, and diagnosed with ASD at an early age. Her mother was a homemaker, and her father was a civil servant. She had two sisters who were reported to have no known health problems. Sude was described as having unhealthy eating patterns, frequently preferring foods and beverages with low nutritional value, including ice cream, snack foods, and sugary drinks. Her consumption of healthier foods was reported to be limited.
- **Mustafa.** Mustafa was a four-year-old boy attending preschool who had been diagnosed with ASD at the age of three. His mother was a homemaker, and his father was retired. He had five stepsiblings and one biological sibling, all of whom were reported to have no known health problems. Although Mustafa generally consumed regular meals, his food preferences were limited. He particularly enjoyed carbohydrate-rich foods, such as soup, bread, and bagels, while avoiding certain breakfast foods, including cheese and olives. His eating patterns therefore reflected a limited variety of food preferences.
- **Kerem.** Kerem was a five-year-old boy attending preschool who had been diagnosed with ASD at the age of four. His mother was a homemaker, and his father worked as a project manager for foundation-related projects. He had no siblings. Kerem was reported to enjoy a wide variety of foods and did not exhibit marked food selectivity. However, his family expressed concern that he might have difficulty recognizing feelings of fullness and therefore monitored the amount and frequency of his meals.
- **Arda.** Arda was a six-year-old boy attending preschool who had been diagnosed with ASD at the age of five. His mother was a homemaker, and his father was a civil servant. He had one sibling who was reported to have no known health problems. Although Arda had consumed very limited amounts of food several years earlier, his eating patterns had subsequently become more regular. He was not described as a selective eater and particularly enjoyed chicken. His diet was generally considered balanced, although he occasionally preferred sweet foods such as cake.
- **Miray.** Miray was a six-year-old girl attending preschool who had been diagnosed with ASD at the age of five. Her mother was a homemaker, and her father was an engineer. She had one sibling who was reported to have no known health problems. Miray exhibited marked selective eating behaviors and was reported to avoid eating during school mealtimes. This pattern was described as limiting her food intake at school and disrupting her usual eating routine.

- **Barış.** Barış was a six-year-old boy attending preschool who had been diagnosed with ASD at the age of three. His mother was a civil servant, and his father was a retired colonel. He had two stepsiblings and one biological sibling, all of whom were reported to have no known health problems. Barış exhibited selective eating behaviors and frequently rejected particular foods. He was also reported to retain food in his mouth. Despite these difficulties, he regularly consumed certain preferred foods, including tofu as a protein source. His eating patterns were characterized by limited dietary variety and strong preferences for particular foods.
- **Melis.** Melis was a five-year-old girl attending preschool who had been diagnosed with ASD at the age of four. Her mother was a homemaker, and her father was a laborer. She had one sibling who was reported to have no known health problems. Melis was described as having unhealthy eating patterns and frequently preferred energy-dense, nutrient-poor foods, including snack foods and French fries. She was also reported to consume limited amounts of healthier foods. Her selective eating behaviors contributed to restricted dietary variety and difficulties maintaining a balanced eating pattern.

Intervention and Data Collection Materials

- **Social Story.** A Social Story entitled *I Eat Healthy* was developed by the researchers for use in the intervention. The story was prepared in accordance with the characteristics of Social Stories described by Carol Gray. Gray (2003) emphasized that Social Stories should be appropriate to the language and comprehension level of the intended individual, written from that individual's perspective, and tailored to their specific needs. Another important consideration is the balanced use of four sentence types: descriptive, instructive, explanatory, and affirmative. Excessive use of instructive sentences should be avoided because it may cause children to perceive the story as a series of instructions. Similarly, statements expressing absolute certainty should be avoided, as they may create pressure or anxiety (Özdemir, 2007).
- Visual illustrations were created to accompany the written sentences on each page of the Social Story. Crozier and Sileo (2005) reported that visual representations facilitate comprehension of Social Stories among children with ASD who have limited reading skills. Accordingly, illustrations were included to improve the comprehensibility of the story. The illustrations were designed to be easily understood by children and to avoid unnecessary distracting elements. The completed *I Eat Healthy* Social Story was assembled into a book, with laminated pages and spiral binding to protect the materials from damage during use.
- **Healthy and Unhealthy Food Materials.** Toy materials representing healthy and unhealthy foods were used during the assessment activities. These three-dimensional materials were selected to increase children's interest and motivation and to facilitate their understanding of the food selection task. The use of tangible representations was intended to make the selection activity more accessible and meaningful for the participants.
- **Healthy–Unhealthy Foods Chart.** *The Healthy–Unhealthy Foods Chart* was developed by the researchers to record participants' food selections. The chart included pairs of healthy and unhealthy food items, with each pair consisting of one healthy and one unhealthy option. It was used during the assessments conducted before and after the Social Story intervention to document changes in participants' healthy and unhealthy food choices. The chart was also used during the retention assessment.

Pilot Study

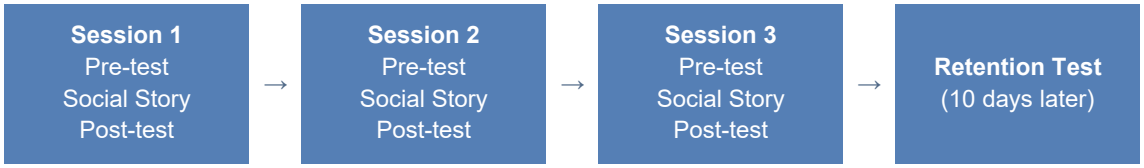
A pilot study was conducted with three preschool children with ASD who met the predefined participant selection criteria but were not included in the main study sample, to evaluate the suitability of the materials and procedures planned for the main study.The materials used in the pilot study included the I Eat Healthy Social Story, the Healthy–Unhealthy Foods Chart, and colorful printed images representing healthy and unhealthy foods. The pilot application indicated that the Social Story and the Healthy–Unhealthy Foods Chart were suitable for the planned activities. However, the printed food images presented practical difficulties. During the pilot application, some images were torn or damaged, and children attempted to put them in their mouths. Consequently, the researchers decided to replace the printed images with three-dimensional toy food materials in the main study.

Data Collection Procedure

Data collection was conducted individually with each participant. Given the importance of repeated learning opportunities for children with ASD, the intervention was implemented in three individual sessions conducted once a week over three consecutive weeks. Each session consisted of a pre-test, the Social Story intervention, and a post-test. A retention assessment was conducted ten days after the intervention to examine whether the observed changes in food choices were maintained. The procedure followed in each intervention session is described below.

- **Pre-test.** Before the Social Story intervention, each child was presented with seven pairs of toy foods, each consisting of one healthy and one unhealthy option. For each pair, the researcher provided the following instruction: "Now imagine you are hungry. Which of these foods would you like to eat? You can choose whichever you want." The child was then asked to select one of the two food items. The researcher recorded the child's selection on the Healthy–Unhealthy Foods Chart. This procedure was repeated for all seven food pairs. Instances in which the child did not respond were also recorded.
- **Social Story intervention.** Following the pre-test, the toy food materials were removed, and the child's attention was directed to the Social Story book. The researcher read the I Eat Healthy Social Story aloud while allowing the child to follow the accompanying illustrations.
- **Post-test.** Immediately after the Social Story reading, the food selection task administered during the pre-test was repeated using the same toy food pairs and verbal instructions. The child's responses were recorded on the Healthy–Unhealthy Foods Chart. The pre-test, Social Story intervention, and post-test sequence was repeated during each of the three intervention sessions for every participant.
- **Retention assessment.** Ten days after the completion of the intervention, a retention assessment was administered to examine the maintenance of the observed changes in healthy food choices. The same seven food pairs, instructions, and recording procedures used during the pre-tests and post-tests were employed. The overall data collection procedure is illustrated in Figure 1.

Figure 1.
Schematic Overview of the Intervention and Assessment Procedure



Data Analysis

The data obtained from the Healthy–Unhealthy Foods Chart were analyzed using descriptive statistics. The frequencies and percentages of healthy food choices, unhealthy food choices, and nonresponses were calculated for each participant. Each assessment consisted of seven food selection opportunities, and percentages were calculated based on the total number of food pairs presented.

The pre-test and post-test results were examined separately for each of the three intervention sessions to identify changes in participants' healthy food choices following the Social Story intervention. Changes across the three sessions were also evaluated descriptively. In addition, the results of the retention assessment conducted ten days after the intervention were examined to determine the extent to which the observed changes in healthy food choices were maintained.

Validity and Reliability Considerations

To support the validity and reliability of the study, the intervention and data collection procedures were carefully planned and standardized. The Social Story, data collection instruments, and implementation procedures were developed based on the relevant literature and reviewed by experts in special education, early childhood education, and science education. Necessary revisions were made in accordance with the experts' feedback. During data collection, the same sequence of procedures and verbal instructions was followed for all participants. Each intervention session consisted of a pre-test, the Social Story intervention, and a post-test, implemented using the same procedures across participants. Furthermore, a retention assessment was conducted ten days after the completion of the intervention to examine the maintenance of the observed changes in healthy food choices. To support the consistency of data collection, the researcher systematically recorded participants' responses using the Healthy–Unhealthy Foods Chart. Detailed descriptions of the intervention materials, data collection procedures, and analysis methods were provided to enhance the transparency and reproducibility of the study.

Ethics Committee Approval

Ethics committee approval was received for this study from Çanakkale Onsekiz Mart University Social and Humanities Ethics Committee (Approval no: 2025-YÖNP-0495, Date: 16.05.2025). Informed consent was obtained from the parents or legal guardians of all participating children prior to data collection.

Results

Student 1 (Eda)

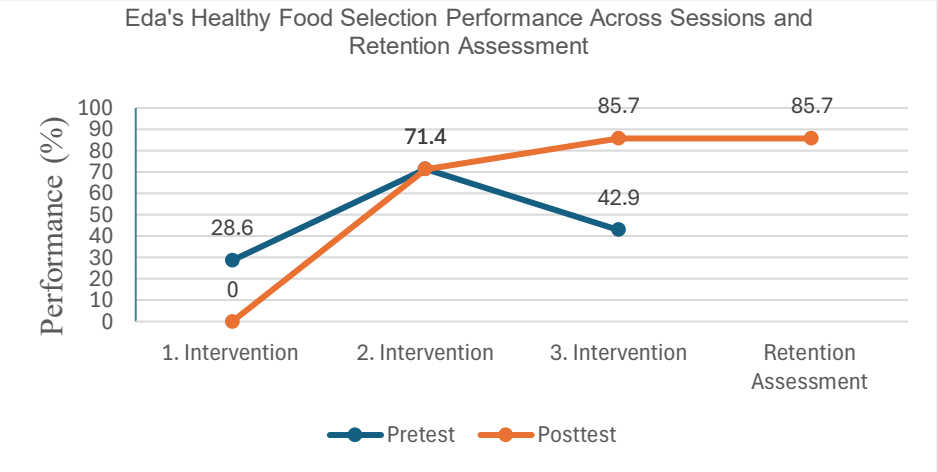
Table 2.
Pre-test, Post-test, and Retention Assessment Results for Eda's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	2	28.6	4	57.1	1	14.3	0	0	6	85.7	1	14.3

Intervention 2	5	71.4	2	28.6	0	0	5	71.4	2	28.6	0	0
Intervention 3	3	42.9	4	57.1	0	0	6	85.7	1	14.3	0	0
Retention Assessment	-	-	-	-	-	-	6	85.7	1	14.3	0	0

Table 2 presents Eda's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices decreased from 28.6% in the pre-test to 0% in the post-test. In the second session, the percentage remained unchanged at 71.4%. In contrast, an increase from 42.9% to 85.7% was observed in the third session. During the retention assessment, conducted 10 days after the intervention, Eda selected healthy foods in 85.7% of the trials, maintaining the performance level achieved in the final post-test. Overall, the findings indicate variability across sessions, with improved performance observed in the final session and maintained during the retention assessment. Eda's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 2.

Figure 2
Changes in Eda's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 2 (Mert)

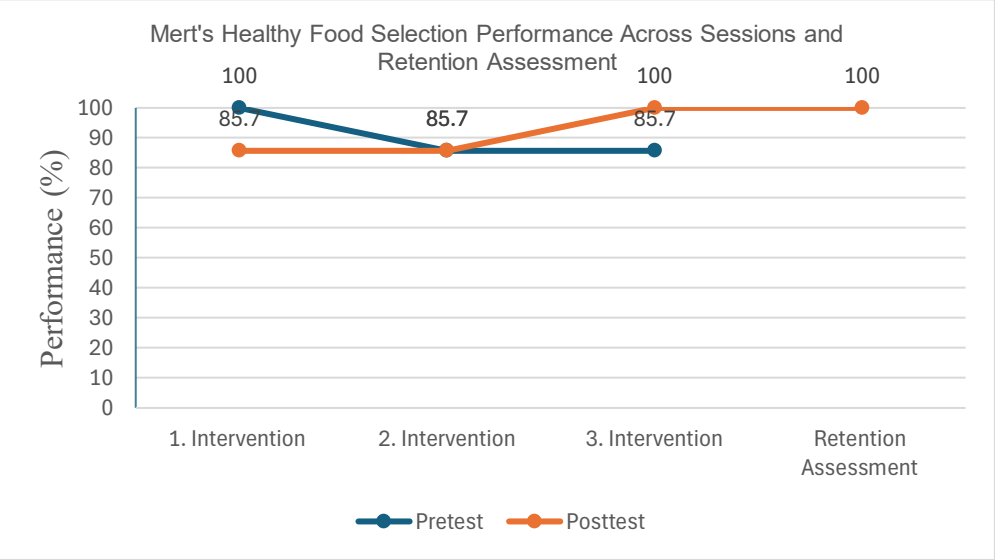
Table 3.
Pre-test, Post-test, and Retention Assessment Results for Mert's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	7	100	0	0	0	0	6	85.7	0	0	1	14.3
Intervention 2	6	85.7	0	0	1	14.3	6	85.7	0	0	1	14.3
Intervention 3	6	85.7	1	14.3	0	0	7	100	0	0	0	0
Retention Assessment	-	-	-	-	-	-	7	100	0	0	0	0

Table 3 presents Mert's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices decreased from 100% in the pre-test to 85.7% in the post-test. In the second session, the percentage remained unchanged at 85.7%. In the third session, healthy food choices increased from 85.7% to 100%. During the retention assessment, conducted 10 days after the intervention, Mert selected healthy foods in 100% of the trials, maintaining the performance level achieved in the final post-test. Overall, the findings indicate consistently high performance across sessions, with the highest level observed in the final session and maintained during the retention assessment.

Mert's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 3.

Figure 3.
Changes in Mert's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 3 (Elif)

Table 4.
Pre-test, Post-test, and Retention Assessment Results for Elif's Healthy and Unhealthy Food Choices.

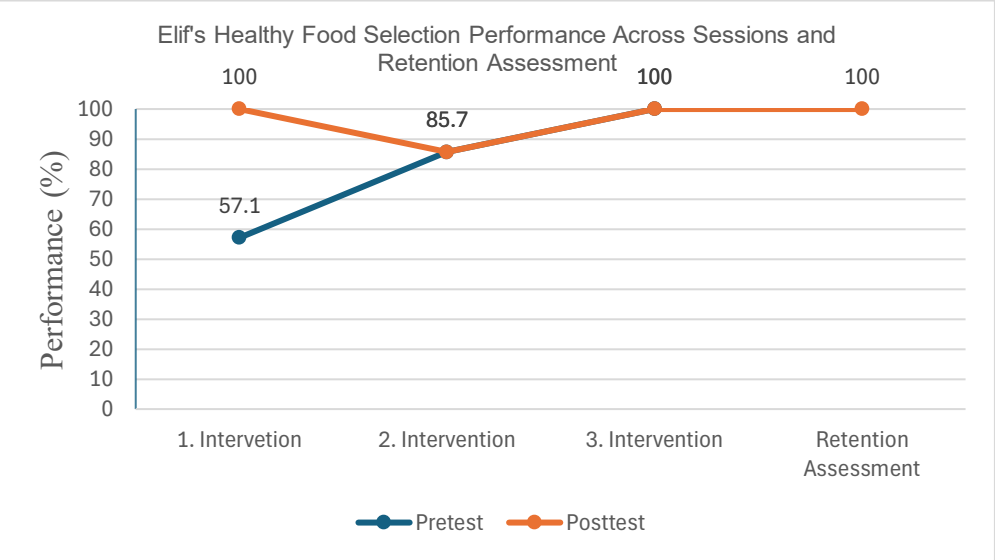
INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	4	57.1	3	42.9	0	0	7	100	0	0	0	0
Intervention 2	6	85.7	0	0	1	14.3	6	85.7	0	0	1	14.3
Intervention 3	7	100	0	0	0	0	7	100	0	0	0	0
Retention Assessment	-	-	-	-	-	-	7	100	0	0	0	0

Table 4 presents Elif's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the

percentage of healthy food choices increased from 57.1% in the pre-test to 100% in the post-test. In the second session, the percentage remained unchanged at 85.7%. In the third session, Elif selected healthy foods in 100% of the trials in both the pre-test and post-test. During the retention assessment, conducted 10 days after the intervention, Elif selected healthy foods in 100% of the trials, maintaining the performance level achieved in the final post-test. Overall, the findings indicate improved performance following the first session, with consistently high percentages of healthy food choices in subsequent assessments.

Elif's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 4.

Figure 4.
Changes in Elif's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 4 (Sude)

Table 5.
Pre-test, Post-test, and Retention Assessment Results for Sude's Healthy and Unhealthy Food Choices.

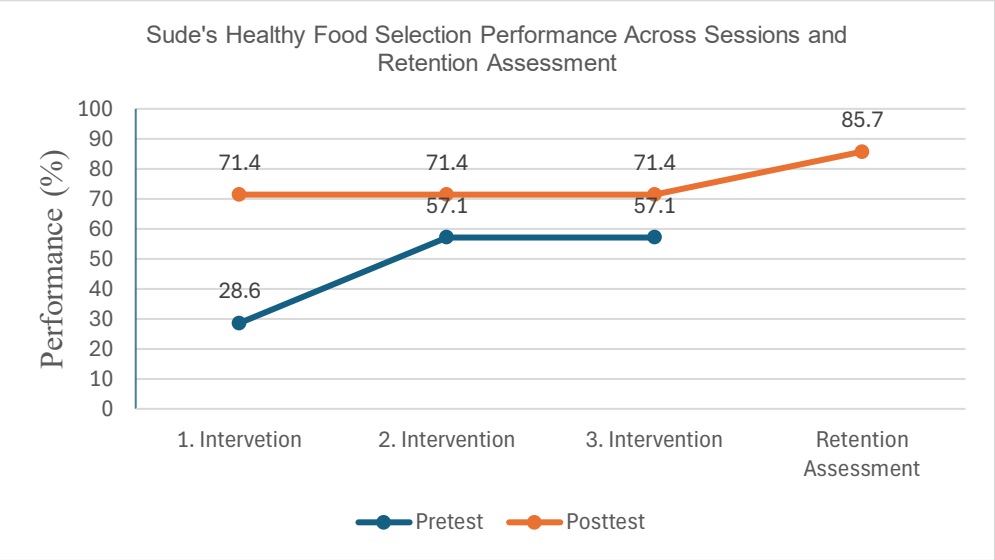
INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	2	28.6	5	71.4	0	0	5	71.4	2	28.6	0	0
Intervention 2	4	57.1	3	42.9	0	0	5	71.4	2	28.6	0	0
Intervention 3	4	57.1	3	42.9	0	0	5	71.4	2	28.6	0	0
Retention Assessment	-	-	-	-	-	-	6	85.7	1	14.3	0	0

Table 5 presents Sude's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices increased from 28.6% in the pre-test to 71.4% in the post-test. In the second and third sessions, the percentage increased from 57.1% in the

pre-test to 71.4% in the post-test. During the retention assessment, conducted 10 days after the intervention, Sude selected healthy foods in 85.7% of the trials, exceeding the performance level achieved in the final post-test. Overall, the findings indicate improvements in healthy food selection within each session, with the highest performance observed during the retention assessment.

Sude's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 5.

Figure 5.
Changes in Sude's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 5 (Mustafa)

Table 6.
Pre-test, Post-test, and Retention Assessment Results for Mustafa's Healthy and Unhealthy Food Choices.

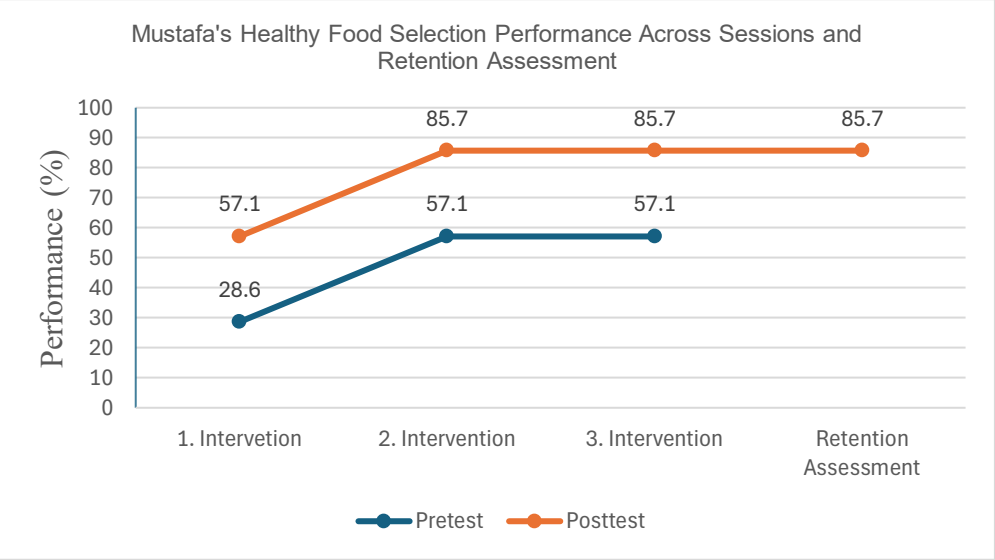
INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	2	28.6	3	42.9	2	28.6	4	57.1	2	28.6	1	14.3
Intervention 2	4	57.1	2	28.6	1	14.3	6	85.7	1	14.3	0	0
Intervention 3	4	57.1	3	42.9	0	0	6	85.7	1	14.3	0	0
Retention Assessment	-	-	-	-	-	-	6	85.7	1	14.3	0	0

Table 6 presents Mustafa's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices increased from 28.6% in the pre-test to 57.1% in the post-test. In the second session, the percentage increased from 57.1% to 85.7%, while in the third session, it increased from 57.1% to 85.7%. During the retention assessment, conducted 10 days after the intervention, Mustafa selected healthy foods in 85.7% of the trials, maintaining the performance level achieved in the final post-test. Overall, the

findings indicate improvements in healthy food selection across the intervention sessions, with the highest performance level maintained during the retention assessment.

Mustafa's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 6.

Figure 6.
Changes in Mustafa's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 6 (Kerem)

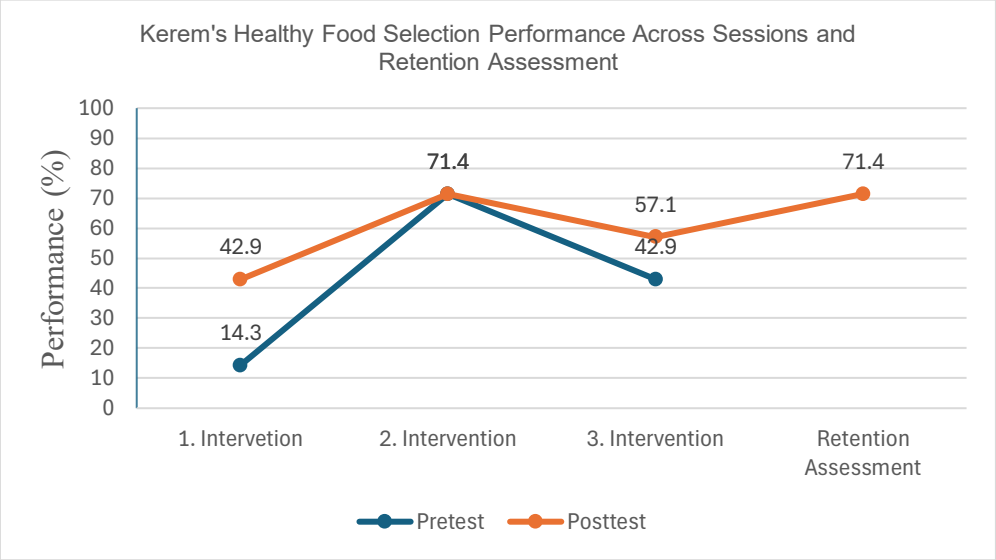
Table 7.
Pre-test, Post-test, and Retention Assessment Results for Kerem's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	1	14.3	6	85.7	0	0	3	42.9	4	57.1	0	0
Intervention 2	5	71.4	2	28.6	0	0	5	71.4	2	28.6	0	0
Intervention 3	3	42.9	4	57.1	0	0	4	57.1	3	42.9	0	0
Retention Assessment	-	-	-	-	-	-	5	71.4	2	28.6	0	0

Table 7 presents Kerem's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices increased from 14.3% in the pre-test to 42.9% in the post-test. In the second session, the percentage remained unchanged at 71.4%. In the third session, healthy food choices increased from 42.9% in the pre-test to 57.1% in the post-test. During the retention assessment, conducted 10 days after the intervention, Kerem selected healthy foods in 71.4% of the trials, exceeding the performance level achieved in the final post-test. Overall, the findings indicate variability across sessions, with higher percentages of healthy food choices observed in the second session and the retention assessment.

Kerem's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 7.

Figure 7.
Changes in Kerem's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 7 (Arda)

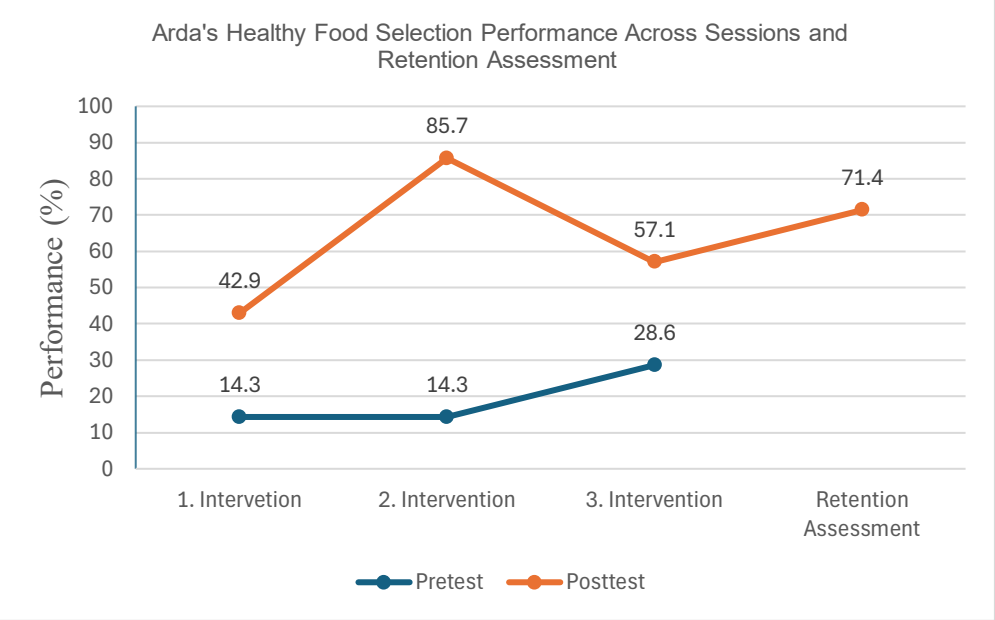
Table 8.
Pre-test, Post-test, and Retention Assessment Results for Arda's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	1	14.3	6	85.7	0	0	3	42.9	4	57.1	0	0
Intervention 2	1	14.3	6	85.7	0	0	6	85.7	1	14.3	0	0
Intervention 3	2	28.6	5	71.4	0	0	4	57.1	3	42.9	0	0
Retention Assessment	-	-	-	-	-	-	5	71.4	2	28.6	0	0

Table 8 presents Arda's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices increased from 14.3% in the pre-test to 42.9% in the post-test. In the second session, the percentage increased from 14.3% to 85.7%. In the third session, healthy food choices increased from 28.6% in the pre-test to 57.1% in the post-test. During the retention assessment, conducted 10 days after the intervention, Arda selected healthy foods in 71.4% of the trials, exceeding the performance level achieved in the final post-test. Overall, the findings indicate improvements within each intervention session, although performance varied across sessions, with the highest percentage observed in the second session's post-test.

Arda's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 8.

Figure 8.
Changes in Arda's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 8 (Miray)

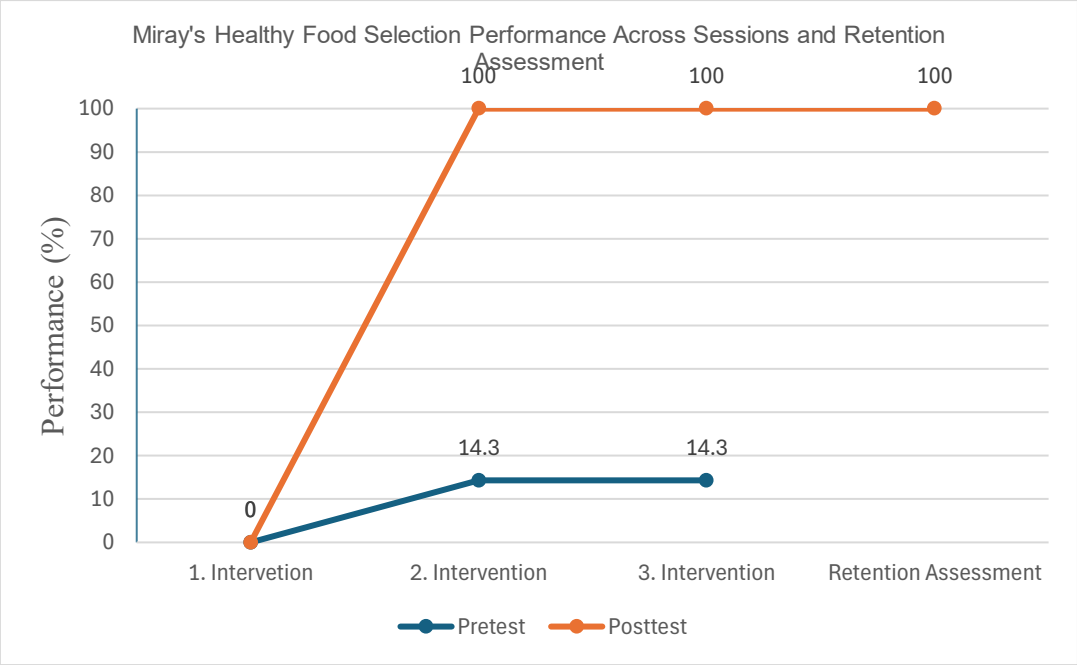
Table 9.
Pre-test, Post-test, and Retention Assessment Results for Miray's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	0	0	7	100	0	0	0	0	7	100	0	0
Intervention 2	1	14.3	6	85.7	0	0	7	100	0	0	0	0
Intervention 3	1	14.3	6	85.7	0	0	7	100	0	0	0	0
Retention Assessment	-	-	-	-	-	-	7	100	0	0	0	0

Table 9 presents Miray's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, Miray did not select any healthy foods in either the pre-test or the post-test, resulting in a score of 0% in both assessments. In the second session, the percentage of healthy food choices increased from 14.3% in the pre-test to 100% in the post-test. The same pattern was observed in the third session, with an increase from 14.3% to 100%. During the retention assessment, conducted 10 days after the intervention, Miray selected healthy foods in 100% of the trials, maintaining the performance level achieved in the final post-test. Overall, the findings indicate substantial improvements in healthy food selection during the second and third sessions, with the highest performance level maintained during the retention assessment.

Miray's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 9.

Figure 9.
Changes in Miray's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 9 (Barış)

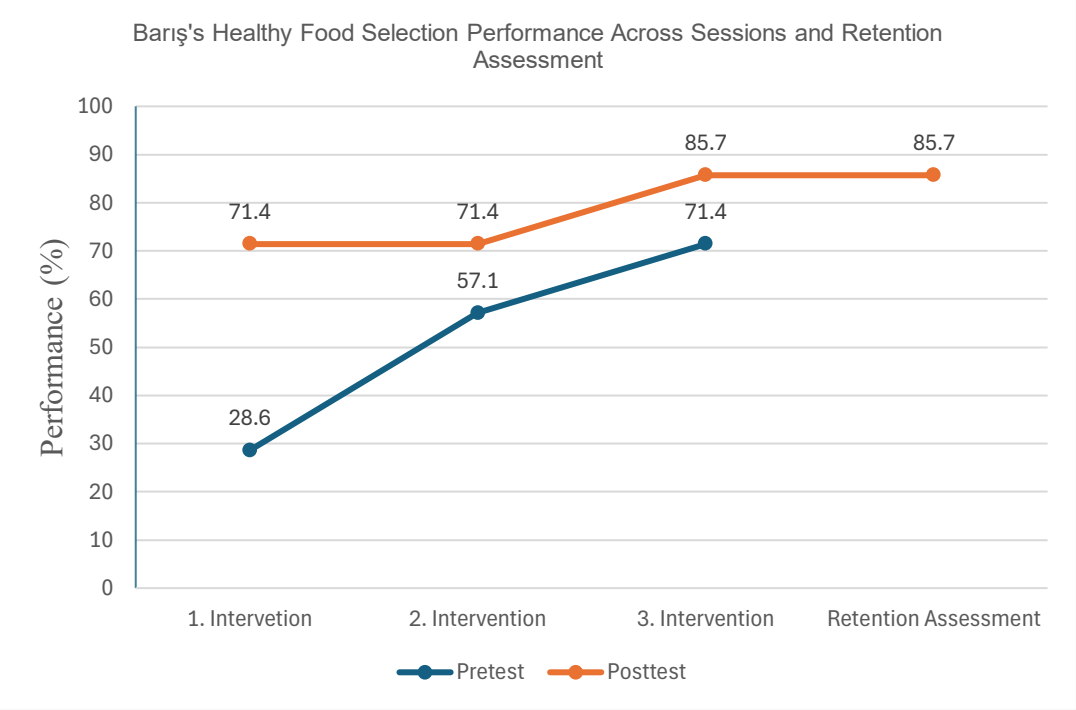
Table 10.
Pre-test, Post-test, and Retention Assessment Results for Barış's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	2	28.6	5	71.4	0	0	5	71.4	2	28.6	0	0
Intervention 2	4	57.1	3	42.9	0	0	5	71.4	2	28.6	0	0
Intervention 3	5	71.4	2	28.6	0	0	6	85.7	1	14.3	0	0
Retention Assessment	-	-	-	-	-	-	6	85.7	1	14.3	0	0

Table 10 presents Barış's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices increased from 28.6% in the pre-test to 71.4% in the post-test. In the second session, the percentage increased from 57.1% to 71.4%. In the third session, healthy food choices increased from 71.4% in the pre-test to 85.7% in the post-test. During the retention assessment, conducted 10 days after the intervention, Barış selected healthy foods in 85.7% of the trials, maintaining the performance level achieved in the final post-test. Overall, the findings indicate improvements within each intervention session, with progressively higher post-test percentages across sessions and maintenance of the final performance level during the retention assessment.

Barış's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 10.

Figure 10.
Changes in Barış's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Student 10 (Melis)

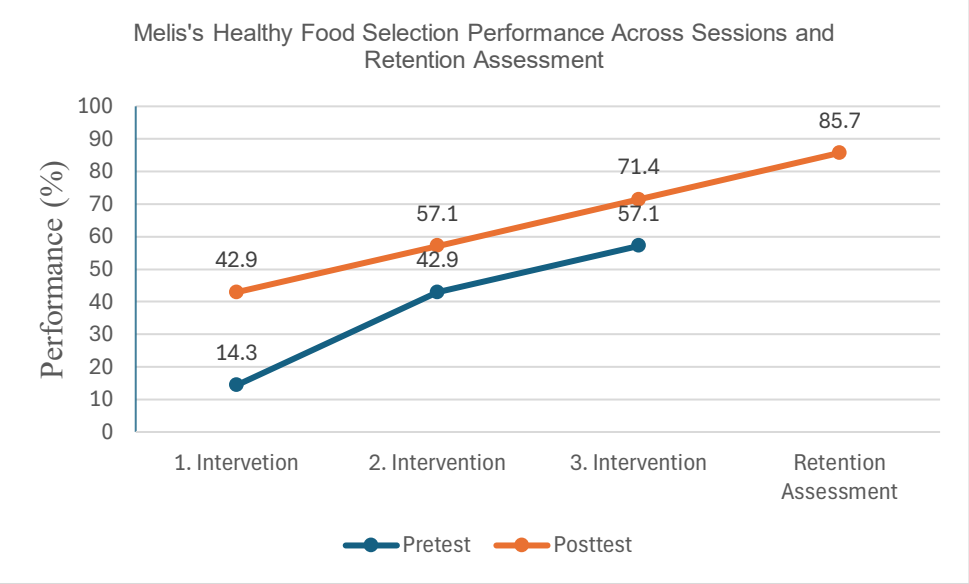
Table 11.
Pre-test, Post-test, and Retention Assessment Results for Melis's Healthy and Unhealthy Food Choices.

INTERVENTION	Pre-test (Healthy)	%	Pre-test (Unhealthy)	%	No reaction .	%	Final Test (Healthy)	%	Final Test (Unhealthy)	%	No reaction .	%
Intervention 1	1	14.3	6	85.7	0	0	3	42.9	4	57.1	0	0
Intervention 2	3	42.9	4	57.1	0	0	4	57.1	3	42.9	0	0
Intervention 3	4	57.1	3	42.9	0	0	5	71.4	2	28.6	0	0
Retention Assessment	-	-	-	-	-	-	6	85.7	1	14.3	0	0

Table 11 presents Melis's performance in selecting healthy and unhealthy foods across the three intervention sessions and the retention assessment. In the first session, the percentage of healthy food choices increased from 14.3% in the pre-test to 42.9% in the post-test. In the second session, the percentage increased from 42.9% to 57.1%. In the third session, healthy food choices increased from 57.1% in the pre-test to 71.4% in the post-test. During the retention assessment, conducted 10 days after the intervention, Melis selected healthy foods in 85.7% of the trials, exceeding the performance level achieved in the final post-test. Overall, the findings indicate improvements within each intervention session, progressively higher pre-test and post-test percentages across sessions, and the highest performance level during the retention assessment.

Melis's performance in selecting healthy foods across the pre-test, post-test, and retention assessments is illustrated in Figure 11.

Figure 11.
Changes in Melis's Healthy Food Selection Percentages Across the Pre-test, Post-test, and Retention Assessments.



Discussion

This study aimed to examine the use of social stories to support healthy food selection among preschool children diagnosed with autism spectrum disorder (ASD) within the context of science education. The findings showed that nine of the ten participants achieved higher percentages of healthy food choices in the final post-test than in the initial pre-test, while one participant maintained a score of 100%. However, the magnitude and pattern of change varied across individuals. The retention assessment, conducted 10 days after the intervention, indicated that all participants maintained or exceeded their final post-test performance. These findings are discussed individually to explore differences in participants' responses to the intervention and to consider factors that may have influenced their performance.

- ***Student 1 (Eda).*** Before the intervention, Eda was reported to have several eating-related difficulties, including excessive food consumption, frequent consumption of unhealthy snacks, and excess weight. This finding is consistent with Berding and Donovan (2016), who stated that the risk of obesity increases among children with ASD due to the consumption of processed foods. In the first intervention session, Eda's percentage of healthy food choices decreased from 28.6% in the pre-test to 0% in the post-test. However, her performance subsequently improved, reaching 85.7% in the third session's post-test and remaining at this level in the retention assessment conducted 10 days later (Figure 2). One possible explanation for the initial decline is Eda's reported interest in rotating objects, which may have interfered with her attention during the assessment. Restricted and repetitive behaviors, commonly observed in individuals with ASD, may affect their engagement in daily activities and learning contexts (Alpdoğan & Sazak, 2023). Nevertheless, because attention and engagement were not systematically measured in this study, this explanation remains speculative. The improvement observed in Eda's later assessments is consistent with previous research suggesting that social stories can be an effective method for increasing appropriate behaviors and reducing problematic behaviors among individuals with ASD (Sansosti & Powell-Smith, 2008). However, the present findings demonstrate improvement in food selection during the assessment tasks rather than providing direct evidence of changes in Eda's everyday eating habits.

- ***Student 2 (Mert).*** Before the intervention, Mert was reported to have relatively healthy eating habits. This observation was consistent with his performance in the first pre-test, in which he selected healthy foods in 100% of the trials. Although his performance decreased slightly to 85.7% in the first post-test, it remained consistently high throughout the intervention sessions, reaching 100% again in the third post-test and the retention assessment conducted 10 days later (Figure 3). Unlike participants who initially demonstrated low percentages of healthy food choices, Mert entered the intervention with a high level of performance, leaving limited room for measurable improvement. Gray (2003) stated that social stories can be used for different purposes, including reinforcing positive behaviors that children already exhibit in social situations. In this context, social stories also aim to increase children's awareness of positive changes in their behavior. From this perspective, Mert's consistently high performance may be compatible with the potential role of social stories in supporting existing skills. However, because Mert demonstrated the target behavior before the intervention, the present findings do not establish whether the social story contributed to maintaining his performance. His results also highlight the importance of considering participants' initial skill levels when interpreting individual responses to educational interventions.
- ***Student 3 (Elif).*** Before the intervention, Elif was reported to exhibit fluctuations in her eating habits, with periods of relatively balanced food consumption alternating with periods characterized by less healthy choices. This variability was also reflected to some extent in her assessment results. In the first intervention session, the percentage of healthy food choices increased from 57.1% in the pre-test to 100% in the post-test. Although her performance was 85.7% in both assessments of the second session, it reached 100% in the third session's pre-test and post-test and remained at this level in the retention assessment conducted 10 days later (Figure 4). Elif's results suggest that high levels of healthy food selection can be achieved during structured assessment tasks even among children whose everyday eating patterns are reported to fluctuate. Similarly, Mohammed and Mostafa (2012) observed a rapid change in the target child's eating behavior following a social story intervention. Nevertheless, the observed changes in Elif's performance should be interpreted cautiously, as the assessments measured food selection rather than actual dietary intake. Furthermore, the 10-day retention assessment provides evidence of short-term maintenance of performance but does not establish whether these improvements would persist over longer periods or generalize to everyday eating situations.
- ***Student 4 (Sude).*** Before the intervention, Sude was reported to have irregular eating habits and a history of feeding difficulties beginning in early childhood. She was also reported to have been born prematurely. In the first intervention session, her percentage of healthy food choices increased from 28.6% in the pre-test to 71.4% in the post-test. The post-test percentage remained at 71.4% in the second and third sessions, while her performance reached 85.7% in the retention assessment conducted 10 days after the intervention (Figure 5). Despite the overall improvement in healthy food selection, Sude continued to choose carbonated beverages, which were classified as unhealthy in the assessment tasks. This observation suggests that changes in food selection may differ across specific food and beverage categories. Food selectivity, characterized by restricted dietary variety and strong preferences for particular foods, is frequently reported among children with ASD (Ministry of Health, General Directorate of Public Health, 2019). Although Sude's persistent selection of carbonated beverages may reflect an established preference, the present study did not systematically investigate the factors underlying this behavior. Her results therefore suggest that improvements in overall food selection performance do not necessarily indicate changes in every individual food preference. Further assessment using actual foods and beverages would be needed to determine whether the observed improvements extend to everyday eating behavior.

- ***Student 5 (Mustafa).*** Before the intervention, Mustafa was reported to exhibit food selectivity, including the rejection of certain foods and limited dietary variety. In the first intervention session, his percentage of healthy food choices increased from 28.6% in the pre-test to 57.1% in the post-test. This percentage reached 85.7% in the post-tests of both the second and third sessions and remained at the same level in the retention assessment conducted 10 days after the intervention (Figure 6). Mustafa's results indicate improvements in healthy food selection within each intervention session, with higher post-test performance in the later sessions. This pattern is consistent with previous research suggesting that social stories may support the acquisition of appropriate behaviors among individuals with ASD. Olçay-Gül and Tekin-İftar (2012) stated that a substantial proportion of studies on social stories involving individuals with ASD examined their effects on the acquisition of social skills and the reduction of inappropriate behaviors, and that the findings demonstrated the effectiveness of social stories. However, the present results do not establish whether repeated exposure to social stories produced a cumulative effect on Mustafa's performance. Another noteworthy observation was Mustafa's relatively frequent lack of responses during the first pre-test. This may have been associated with difficulties in social communication or unfamiliarity with the assessment situation. Ökcün-Akçamuş (2016) discussed challenges in early social communication and interaction among children with ASD, providing a possible context for interpreting this observation. Nevertheless, because the reasons for Mustafa's non-responses were not directly assessed, they cannot be attributed specifically to anxiety or social communication difficulties. His subsequent improvement suggests that his performance during the initial assessment may not have fully reflected his ability to complete the food selection tasks.
- ***Student 6 (Kerem).*** Before the intervention, Kerem was reported to show interest in a wide variety of foods without exhibiting marked food selectivity. However, his percentage of healthy food choices was only 14.3% in the first pre-test, suggesting that a willingness to consume different foods does not necessarily correspond to selecting healthier alternatives. His performance increased to 42.9% in the first post-test and reached 71.4% in both assessments of the second session. In the third session, the percentage increased from 42.9% in the pre-test to 57.1% in the post-test. During the retention assessment conducted 10 days after the intervention, Kerem selected healthy foods in 71.4% of the trials (Figure 7). According to his teacher, Kerem showed a general interest in different foods, which may have contributed to variability in his selections across assessments. In addition, his family expressed concerns about his ability to recognize feelings of satiety. Although these observations provide useful background information about his eating-related behaviors, the present study did not directly assess satiety recognition or the reasons underlying his food choices. Therefore, the fluctuations in his performance cannot be attributed to these factors with certainty. Kerem's variable performance suggests that additional instructional support may be worth considering promoting more consistent healthy food selection. Peterson, Lerman, and Nissen (2016) stated that the use of reinforcers is important for increasing the frequency or duration of behaviors among individuals diagnosed with ASD. Nevertheless, because reinforcement was not independently evaluated in the present study, its potential contribution to Kerem's performance remains a recommendation for future intervention rather than a conclusion supported by the current findings.
- ***Student 7 (Arda).*** Before the intervention, Arda was reported to have relatively regular eating habits without marked food selectivity. Nevertheless, his percentage of healthy food choices was only 14.3% in the first pre-test, suggesting that the absence of food selectivity does not necessarily indicate an ability to distinguish between healthier and less healthy food options. His performance increased to 42.9% in the first post-test and reached 85.7% in the second post-test. However, the percentage decreased to 57.1% in the third post-test, followed by a score of 71.4%

in the retention assessment conducted 10 days after the intervention (Figure 8). Similar to Kerem, Arda demonstrated variability in healthy food selection across intervention sessions. Although this pattern may reflect fluctuations in the consistency of his responses, the available data do not establish whether these changes resulted from incomplete skill acquisition, differences in attention, or other contextual factors. Importantly, Arda's retention assessment performance was higher than his final post-test performance but remained below the highest level achieved during the intervention. This finding suggests that the ability to select healthy foods was demonstrated during the follow-up assessment, although performance was not consistently maintained at its highest observed level. Additional practice and appropriately designed reinforcement strategies may help promote greater consistency in future interventions; however, their effectiveness would need to be evaluated empirically.

- ***Student 8 (Miray).*** Before the intervention, Miray was reported to have substantial eating-related difficulties, including refusing to eat during school mealtimes and having inadequate daily food intake. In the first intervention session, she did not select any healthy foods in either the pre-test or the post-test, resulting in a score of 0% in both assessments. However, her performance increased markedly in the second session, reaching 100% in the post-test. The same post-test performance was observed in the third session, and Miray selected healthy foods in 100% of the trials during the retention assessment conducted 10 days after the intervention (Figure 9). One possible explanation for Miray's low initial performance is that emotional or situational factors may have influenced her engagement in the assessment tasks. Emotional regulation difficulties, including irritability and heightened emotional reactivity, have been reported among children with ASD (Samson et al., 2015). However, because Miray's emotional state and task engagement were not systematically assessed, the extent to which these factors contributed to her initial performance remains uncertain. Miray demonstrated one of the largest improvements in post-test performance among the participants, suggesting that substantial changes in healthy food selection can occur across a relatively small number of intervention sessions. Nevertheless, her pre-test performance remained at 14.3% in both the second and third sessions, indicating that high post-test scores were not accompanied by consistently high performance across all assessments. Although the 100% score in the retention assessment is encouraging, further evaluation would be needed to determine whether this performance generalizes to actual food consumption and is maintained over longer periods.
- ***Student 9 (Barış).*** Before the intervention, Barış was reported to exhibit marked food selectivity, including the rejection of various foods and a tendency to hold food in his mouth without swallowing. Such behaviors are consistent with feeding difficulties reported among children with ASD, including restricted food acceptance and difficulties during mealtimes (Meral, 2017). In the first intervention session, Barış's percentage of healthy food choices increased from 28.6% in the pre-test to 71.4% in the post-test. His post-test performance remained at 71.4% in the second session and increased to 85.7% in the third session. This level was maintained in the retention assessment conducted 10 days after the intervention (Figure 10). Unlike participants who demonstrated considerable fluctuations across sessions, Barış showed progressively higher or stable post-test percentages throughout the intervention. This pattern suggests increasing consistency in selecting healthy food options during the structured assessment tasks. However, the observed improvement should not be interpreted as evidence that his food selectivity or food-holding behavior decreased, as these behaviors were not directly evaluated as intervention outcomes. Although the findings are encouraging in terms of healthy food selection, further research involving direct observation of eating behavior would

be necessary to determine whether similar improvements occur during actual mealtimes.

- ***Student 10 (Melis).*** Before the intervention, Melis was reported to exhibit a strong preference for unhealthy foods, particularly packaged snacks and French fries, along with limited acceptance of healthier alternatives. These observations are consistent with nutritional challenges described among children with ASD, including preferences for processed foods and restricted consumption of certain food groups (Berding & Donovan, 2016). In the first intervention session, Melis selected healthy foods in only 14.3% of the pre-test trials, while this percentage increased to 42.9% in the post-test. Her performance continued to improve across subsequent sessions, reaching 71.4% in the third post-test and 85.7% in the retention assessment conducted 10 days after the intervention (Figure 11). Unlike participants whose performance fluctuated considerably across sessions, Melis demonstrated progressively higher pre-test and post-test percentages throughout the intervention. This pattern suggests increasing consistency in selecting healthy food options during the structured assessment tasks. The higher percentage observed in the retention assessment is also encouraging, as it indicates that Melis demonstrated the target selection behavior 10 days after the intervention. Nevertheless, these findings do not establish whether her preference for unhealthy foods decreased in everyday situations or whether her actual dietary intake improved. Further assessment involving real foods and direct observation of eating behavior would be necessary to determine the extent to which the observed improvements generalize beyond the assessment setting.

When the findings of the study are evaluated as a whole, social story-based science education appears to be a promising approach for supporting healthy food selection among preschool children diagnosed with ASD. The improvements observed in nine participants, together with the maintenance of initially high performance in one participant, suggest that social stories may support healthy food selection skills and existing positive behaviors, consistent with the perspective outlined by Gray (2003). In this regard, Mert's consistently high performance, including his 100% score in both the initial pre-test and the retention assessment, illustrates the maintenance of an already established skill, although the contribution of the intervention to this maintenance cannot be determined. Another important finding is that participants responded to the intervention at different rates and with different patterns of performance despite receiving similar instructional support. While Miray demonstrated a marked increase in healthy food selection, reaching 100% in the second post-test, Kerem and Arda exhibited fluctuations across intervention sessions. These differences may be associated with individual characteristics, including food selectivity, emotional reactivity, distractibility, and repetitive behaviors; however, the influence of these factors was not directly examined in the present study. The generally high percentages observed in the retention assessments conducted 10 days after the intervention provide encouraging evidence of short-term maintenance of healthy food selection performance. Nevertheless, further research is needed to determine whether these improvements persist over longer periods and generalize to actual eating behaviors.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the single-group design without a control group limits causal conclusions about the Social Story intervention. Repeated exposure to the same food selection tasks may also have influenced participants' responses. Second, the small sample of ten preschool children with ASD limits the generalizability of the findings. Third, toy representations were used instead of actual foods, and children's choices may have been influenced by the toys' visual characteristics. Furthermore, the classification of foods as healthy or

unhealthy was determined by the researchers without using a standardized nutritional guideline, potentially introducing subjectivity. The assessments measured choices in structured tasks rather than actual food consumption or everyday eating behavior. Finally, the retention assessment was conducted only ten days after the intervention, limiting conclusions about long-term maintenance. Future studies should include larger samples, comparison groups, real-food assessments, and longer follow-up periods.

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