Original Article

The Effect of Cox's Interaction Model-based Nutrition Education Program on Health Perception, Dietary Self-Efficacy, Dietary Pattern, and Diet Behaviors of Children

Fadime Hatice İnci[1*], Asiye Kartal[1], İlgün Özen Çınar[1], Nazan Koştu[1],   Gülbahar Korkmaz Aslan[1],

Abstract

Background: Healthy lifestyle behaviors gained in childhood have a great impact on health in adulthood. Nutrition is one of the most important healthy lifestyle behaviors. Children's nutritional behaviors should be improved through nutrition programs.

Objective: To determine the effects of Cox's Interaction Model-based Nutrition Education Program on health perception, dietary self-efficacy, dietary pattern, and diet behaviors of children.

Methods: The research employed a quasi-experimental design. This research was conducted with 5th-7th grade students of similar socioeconomic status attending two different secondary schools (n=516). The lottery method was used to randomly assign the two schools to the intervention and control groups. Data were collected using a demographic data form, Children's Dietary Self-Efficacy Scale, Dietary Pattern Index, and Diet Behavior Scale. Cox's Interaction Model-based Nutrition Education Program was applied to students in the intervention group for five weeks. This program consists of two sections: interactive education and educational activities. Paired samples t-test was used for intra-group comparisons and Student's t-test was used for inter-group comparisons.

Results: There was no significant difference between the two groups in terms of diet self-efficacy, dietary pattern, and diet behaviors in the pre-intervention. After the post-intervention, diet self-efficacy, health perception, and diet behavior scores of the experimental group increased, while the diet pattern scores decreased. However, there was no change in the control group.

Conclusions: It was found that Nutrition Education Program given to students positively affected their dietary self-efficacy, health perception, dietary pattern, and diet behaviors. [*Ethiop. J. Health Dev*. 2023; 37(1):00-00]

Keywords: Diet behavior, dietary pattern, Interaction Model of Client Health Behavior, nutrition education, self-efficacy

Introduction

Changes in lifestyle such as increased consumption of high-energy food, widespread unhealthy eating habits, and reduced physical activity have had a negative impact on children's balanced nutrition and the development and maintenance of a healthy lifestyle in the last 20 years (1). Inadequate nutrition during childhood may have permanent negative effects on physical and mental development (2).

There is a relationship between health perception and nutritional patterns. Those with a good perception of health are more likely to choose healthy foods. Perceived health and nutrition can have a vital effect on health behaviors of children (3). Dietary self-efficacy is the level of self-efficacy that an individual perceives to be able to choose healthier foods (4). Children with healthier food preferences are protected against obesity and diseases caused by obesity. High dietary self-efficacy contributes to the general well-being of children in the long term (5). Dietary self-efficacy is an important component to prevent inadequate nutrition in children (4,5). Several studies have found that self-efficacy is the main determinant of healthy nutrition (4,6,7). It has also been revealed that dietary self-efficacy and perceived health are improved with programs prepared for children (6,7).

The increase in unhealthy eating habits with age indicates the importance of programs aiming to gain children and adolescents healthy eating habits from an early age (8). While nutrition programs held in schools have a positive effect on children's growth, development, and learning, gaining them healthy eating habits during school years reduces the risk of developing chronic diseases such as diabetes, obesity, cardiovascular disease, and cancer during adulthood (9,10). Studies have shown that nutrition programs have a significant effect on children's health perceptions, diet behaviors, self-efficacy, and eating habits (11–17). In these studies, the effects of different methods such as nutrition education, diet-exercise training, and game-based nutrition education on child nutrition were examined. However, in these studies, the effects of the programs on children's health perceptions, diet behaviors, self-efficacy, and eating habits were not examined together. Model-based interventions are used to improve the nutrition habits of school-age children. Social Learning Theory, Theory of Planned Behavior, Transtheoretical Model, Health Belief Model, and Interaction Model of Client Health Behavior (IMCHB) are among the most widely used models (18–22). The IMCHB was based on the perspective that the individual is adequately informed on health behavior, that he/she is able to make decisions independently and competently regarding health behaviors and that his/her health behaviors are affected by his/her individual characteristics and relationship between him/her and the health professional. According to the model, if caregiving

---

[1] Public Health Nursing Department, Faculty of Health Sciences, Pamukkale University, Denizli, Turkey
   *Corresponding Author email: hemel@pau.edu.tr

professionals plan their interventions by considering their clients' individual characteristics, the nutrition behaviors will be positively affected. In short, to maximize the outcome of positive health, interventions should be performed by taking the individual characteristics component into account (23).

Health professionals, who play an important role in minimizing health-related risk behaviors and promoting healthy lifestyle behaviors, can use the IMCHB to assess children's eating habits and plan initiatives to improve health (1,24). The model provides an opportunity to determine the variables affecting the eating habits of children in detail. It also provides a conceptual framework for health professionals to establish a relationship between practice and theoretical knowledge (23).

This study aimed to the effects of the IMCHB- based Nutrition Education Program on health perception, dietary self-efficacy, dietary patterns, and diet behaviors of children.

Material and Methods
Design and sample size
This study is a quasi-experimental study with a pre-test group and a post-test control group. The population of the study consists of 5th, 6th, and 7th-grade students of secondary schools in Merkezefendi district Denizli, Turkey. There are 30 secondary schools in the district of Merkezefendi. These schools were divided into low, medium, and high according to socio-economic status, in consultation with the national education directorate.

In the evaluation of socioeconomic status, the neighborhood of the school, education of parents, working status, and income of the family were taken into consideration. Two schools with low socioeconomic status were selected by random sampling method. The lottery method was used to randomly assign the two schools to the intervention and control groups. For avoiding information contamination, schools were selected from different neighborhoods of the same district. Considering the fact that some students would withdraw from the study, change their schools, or fail to complete the education, and thus there might be losses from the sample, all the 5th, 6th, and 7th graders in both secondary schools (*n*=578) were planned to include in the study. However, 19 students refused to participate in the study. 36 students did not meet the inclusion criteria. However, the study included 523 students who were at school during the study, who were willing to participate in the study, who were allowed to participate in the research by their parents, and who met the sample selection criteria. At the end of the study, seven students who did not complete the education program were excluded from the study. Thus, the study was completed with 309 students in the intervention group and 207 students in the control group. The flow diagram of this study is given in Figure 1. Post-hoc Power analysis was performed using the G Power program (25). In the power analysis, the mean post-test score for the diet behavior variable of the IMCHB was used. The power for this study was .88 and the effect size was .28.
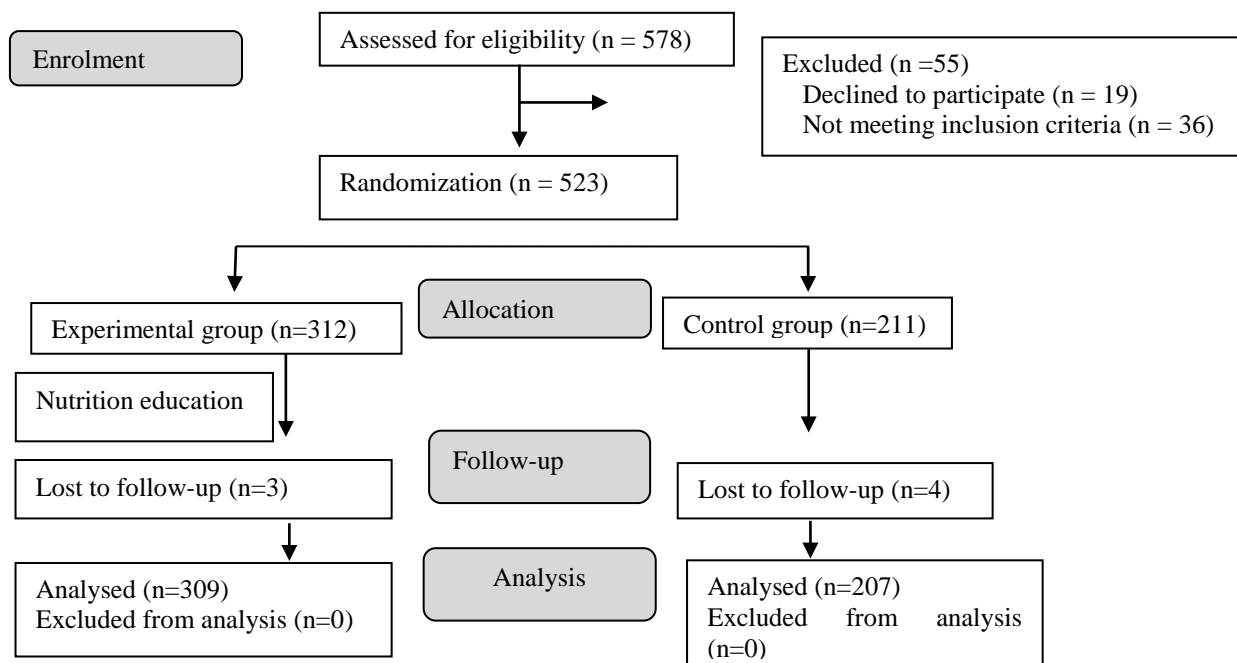

Figure 1: CONSORT diagram showing participant flow through the study

Not having a physical or mental disability, speaking Turkish, and obtaining parents' written consent are defined as the inclusion criteria of this study. The exclusion criteria were: having developmental problems, having any psychiatric problem, and having received a similar education program before.

Data collection tools
The present study was based on the IMCHB. The demographic characteristics of the students were assessed to determine the variables about the students' backgrounds, their dietary self-efficacy was assessed to measure the intrinsic motivation, the perceived health status was assessed for cognitive appraisal, their dietary patterns were assessed to measure the affective response, and their diet behaviors were assessed for the health outcome (Table 1).

Demographic data form: This form included eleven items questioning children's age, sex, chronic diseases, parent's education, family income, mother's employment, parent's chronic diseases, body mass index, and health perception. Body Mass Index (BMI) was measured using standard procedures. Overweight was defined as a BMI 85th percentile to less than the 95th percentile, obesity was defined as a BMI 95th percentile or higher for children and teens of the same age and sex (26). The health perception was measured using a single item: "I believe that my health is poor (score 1), fair (score 2), good (score 3), excellent (score 4)" (27).

Table 1: Conceptual, theoretical, empirical structure of The Interaction Model of Client Health Behavior

Elements of IMCHB	Study Variables	Measures
Elements of Client Singularity		
• Background variables		
− Demographic characteristics	Child's age	
	Child's sex	
− Social influence	Parental health status	Demographic data form
− Health Experience	Child's health	
	Parent's health	
− Environmental resources	Income status	
	Parental educational level	
• Dynamic variables	Child's dietary self-efficacy	Children's Dietary Self-Efficacy Scale
− Intrinsic motivation		
− Cognitive appraisal	Child's health perception	Child's Self-Rating of Health Status
− Affective Response	Food preferences	Dietary Pattern Index
Client-Professional Interaction	Nutrition Education Program	
Elements of Health Outcome Health behaviors	Child's diet	Diet Behavior Scale

The Children's Dietary Self-Efficacy Scale: The Scale consists of 15 items rated on a 3-point scale. The scale items included various foods and food groups with fat and salt content. The possible score range was from -15 to +15, and a higher total score suggested higher self-efficacy. The internal consistency coefficient of the scale was 0.84 and the test-retest reliability was 0.63. The scale was adapted into Turkish by Haney and Erdogan. The internal consistency of the Turkish form was 0.79 (28). The Cronbach's alpha coefficient was found to be 0.73 in the present study.

Dietary Pattern Index: This Index (DPI) developed by Demirezen has six items questioning respondents' eating habits. The responses were measured using a 5-point Likert-type. One item was reverse scored. The total score ranged from 0 to 24, with higher scores representing unhealthier eating habits. The total score was categorized as follows: no risk (0 points), low risk (1-6 points), intermediate risk (7-12 points), high risk (13-18 points), and very high risk (19-24 points) (8).

The Diet Behavior Scale: The scale was used to measure the usual food consumption of children. It consists of 14 pictorial items using a forced-choice format where a higher-fat or higher-sodium food was always paired with a lower-fat or lower-sodium food. The students marked the food they eat most often. The possible score range was from −14 to +14. The high total score indicates healthy eating behavior. The internal consistency was 0.76 (29,30). The scale was adapted into Turkish by Haney and Erdogan. The internal consistency of the Turkish scale is 0.68 (28). The internal consistency was found to be 0.67 in the present study.

Data collection
The study data were collected between April 2016 and June 2016. Pre-test data for both groups were collected before the intervention. NEP was launched in the intervention group and no intervention was applied to the control group. One month after the program, post-test data for both groups were collected.

Intervention processes
The NEP was used as an intervention. The NEP was given to the intervention group for five weeks, one session per week. Each session consists of two sections: interactive education (45 minutes) and educational activities (45 minutes). Interactive education included the following topics: the importance of healthy nutrition, adequate and balanced

nutrition, major food groups, the daily amount of nutrients to be consumed, regular meals, the importance of breakfast, damages of fast food, food safety, and healthier food purchases. The educational activities have been done at the end of the interactive education. The activities consist of role-play, crossword puzzles, word search puzzles, card matching, and riddles related to nutrition. The NEP was carried out in the classroom by the researchers using interactive educational methods. All researchers took a total of 84 hours of certified courses in training methods, development, and learning. In addition, the third researcher has been conducting nutrition courses in the nursing department for 7 years. The control group was not given education during the study. However, at the end of the study, NEP was applied to the control group so that they could benefit from the positive effects of the program. Thus, equality of opportunity was provided to the control group. The content of the NEP is given in Table 2.

Table 2: Contents of Nutrition Education Program

Weeks	Method	Time	Topics
1st	Interactive education	45 min	The importance of healthy nutrition Adequate and balanced nutrition
	Break	15 min	
	Educational Activities	45 min	Role play
2nd	Interactive education	45 min	Major food groups (fruits, vegetables, grains, protein foods , dairy)
	Break	15 min	
	Educational Activities	45 min	Riddles related to nutrition
3rd	Interactive education	45 min	According to the age group, the daily amount of nutrients to be consumed, Regular meals
	Break	15 min	
	Educational Activities	45 min	Card matching
4th	Interactive education	45 min	İmportance of breakfast Damages of fast food
	Break	15 min	
	Educational Activities	45 min	Crossword puzzles related to nutrition
5th	Interactive education	45 min	Food safety Healthier food purchases
	Break	15 min	
	Educational Activities	45 min	Role play

Data analysis
Data were analyzed using the Statistical Package for Social Sciences (SPSS version 22). Chi-square tests were used to examine homogeneity between the groups. The independent t-test was used for the intergroup comparison. The paired sample t-test was utilized to compare the pre-test and post-test scores. The effect size was considered as small for .20, medium for .50, and large for .80. The p-value of less than .05 was considered statistically significant.

Ethical considerations

This study was approved by the Institutional Review Board of Pamukkale University (Approval number: 60116787-020/14505). Written informed consent was obtained from all students and their parents. Permission for use of the scales was obtained from the authors via email.

Results
The descriptive characteristics of the students in the intervention and control groups in this research were tested for homogeneity to confirm that there were no differences (p > .05) (Table 3).

Table 3: Descriptive characteristics of experimental and control group students

	Experimental group		Control group		p value of χ^2
Variables	**n**	**%**	**n**	**%**	
Sex					
Female	145	46.9	100	48.3	
Male	164	53.1	107	51.7	.76
Age					
11 age	102	33.0	63	30.5	
12 age	110	35.6	75	36.2	.81
13 age	97	31.4	69	33.3	
Child's Chronic diseases					
Chronic diseases	28	9.1	19	9.2	
No chronic diseases	281	90.9	188	90.8	.96
Mother's education level					
Primary school	113	36.6	97	46.9	
Secondary school	124	40.1	74	35.7	

High school	55	17.8	30	14.5	.09
University	17	5.5	6	2.9	
Father's education level					
Primary school	127	41.1	96	46.4	
Secondary school	75	24.3	46	22.2	
High school	89	28.8	58	28.0	.46
University	18	5.8	7	3.4	
Family income					
Low	103	33.3	68	32.9	
Moderate	144	46.6	111	53.6	
High	62	20.1	28	13.5	.12
Mother's employment					
Working	142	46.0	94	45.4	
Not working	167	54.0	113	54.6	.90
Mother's Chronic diseases					
Chronic diseases	49	15.9	35	16.9	
No chronic diseases	260	84.1	172	83.1	.75
Father's Chronic diseases					
Chronic diseases	28	9.1	25	12.1	
No chronic diseases	281	90.9	182	87.9	.27
BKİ					
Normal	257	83.2	176	85.0	
Overweight	32	10.4	20	9.7	
Obese	20	6.5	11	5.3	.82
Total	309	100.0	207	100.0	

In Table 4, the intra-group and inter-group comparisons of the mean scores obtained from the dietary self-efficacy, health perception, dietary pattern and diet behavior components of the IMCHB were given. While there was no significant difference between the intervention and control groups in terms of health perception scores as obtained at the post-test, there were significant differences between the two groups in terms of the scores for dietary self-efficacy, dietary pattern, and diet behavior. A significant difference was found between the mean scores of the intervention group obtained at the pre-test and post-test in the area of dietary self-efficacy, health perception, dietary pattern, and diet behavior variables. Diet self-efficacy, health perception, and diet behavior scores in the experimental group increased, while the diet pattern scores decreased. However, there was no change in the control group. The effect sizes of the components of the model measured at the post-test of the students in the intervention and control groups were determined to be moderate to small or negligible (d=.11-.55).

Table 4: The Interaction Model of Client Health Behavior components scores obtained by the participants in the experimental and control groups at the pre- and post-tests

	Experimental group		Control group		p value of t[a]	d
Variables	**Mean**	**SD**	**Mean**	**SD**		
Dietary Self-Efficacy						
Pre-test	3.58	5.25	3.98	4.97	.391	
Post-test	4.97	5.68	3.97	4.70	.030	.19
p value of t[b]	<.001		.95			
Child's health perception						
Pre-test	3.13	0.77	3.12	0.75	.88	
Post-test	3.21	0.71	3.13	0.74	.17	.11
p value of t[b]	.001		.71			
Dietary Pattern						
Pre-test	9.59	3.78	9.93	3.68	.31	
Post-test	7.95	3.48	9.93	3.71	<.001	.55
p value of t[b]	<.001		1.00			
Diet Behavior						
Pre-test	0.27	6.03	-010	5.18	.572	
Post-test	1.78	6.84	0.10	5.18	.001	.28
p value of t[b]	.001		.82			

Note. d: effect size; a: Independent t test; b: paired samples t test;

Discussion

By acquiring adequate and balanced eating habits in the school environment, children can develop their knowledge, skills, and behaviors to prevent diseases likely to occur in the short term and long term. In many studies, it has been determined that nutrition education

given at as early age as possible yields beneficial results (12,20,31–35). The results of this study are important as it is the first IMCHB-based interventional study used to improve the nutritional behavior of Turkish children.

Since there are no IMCHB model-based interventional studies on children's nutrition, our study findings were compared with the results of other interventional studies. According to the results, it can be said that NEP improved the participants' self-efficacy and thus their intrinsic motivation. This is in line with the results of previous studies showing that nutrition programs for adult children increase children's dietary self-efficacy (6,7,12,20). The results showed that adolescents were able to make better decisions about choosing healthy foods and were able to act more autonomously about their own nutrition. While healthy nutrition initiatives for children increased their belief in making healthy food choices, increasing self-efficacy affected nutrition behavior.

While participants' health perception significantly increased in the intervention group, it did not change in the control group. As in the present study, Kürtüncü et al. found that the education program they implemented in adolescents had a positive effect on their perceived health status (33). It has been revealed that adolescents with high health perceptions have less risky eating behaviors (38). In a sense, adolescents with a good perception of health may have a more intrinsic motivation to understand the importance of nutrition and to acquire health behaviors that will improve nutritional behavior in a positive way.

In the present study, the dietary pattern of the students was evaluated as the affective response variable. The results of the present study, which are similar to those of other studies in the literature, showed that education had a positive effect on the dietary patterns. The study by Prelip et al. reported that the nutrition education given to the students improved their diet-related knowledge, attitudes, and habits (35). Another study indicating that nutrition education affected schoolchildren's eating habits positively was conducted by Coppinger et al (31). In another school-based study conducted in Israel, the participating students' eating habits changed positively and they developed healthy eating habits (32). School-based nutrition programs not only affect children's growth, development, and learning positively but also gain them correct dietary pattern and thus reduce their risk of developing chronic diseases in their lives after childhood (34,36).

The results of this study showed that IMCHB-based NEP affects students' diet behaviors positively. The participants unfortunately received seven and a half hours of education due to the time and cost constraints. Longer-term education will have a more positive effect on students' behavior change. The review of studies conducted on the subject demonstrated that Demir and Acar concluded that education had a positive impact on students' diet-related knowledge, attitude, and behaviors, and that Kürtüncü et al. determined that the mean diet behaviors score obtained after the education was significantly different from that obtained before the education (16,33). Similar results were obtained in two other studies (12,13). As a result, IMCHB-based NEP may have individually influenced the main variables of this study. On the other hand, changes in these variables may have created a cumulative effect by stimulating each other.

Conclusions
In conclusion, it was observed that IMCHB-based NEP given to the students had a positive effect on their dietary self-efficacy, health perception, dietary pattern and diet behavior. However, it is difficult to change adolescents' nutrition-related behaviors. Therefore, in order to transform knowledge into behavior, nutrition education programs should be organized for school children, and the continuity of these programs should be ensured. Interventions with children using this model have been effective in improving nutritional health outcomes. The IMCHB is thought to guide healthcare professionals not only on nutrition but also in gaining other healthy living activities in children. For future research, it is recommended to apply this model in order to develop evidence-based nursing practices in different sample groups and various health promotion activities.

Limitations
Randomized controlled studies have an important place in evidence-based practices. Complete randomization was not achieved in this study. Therefore, the study was carried out quasi-experimentally.

Conflict of Interests
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Contribution of authors
FHİ: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing-original draft, Writing-review& editing, Project administration. **AK:** Conceptualization, Investigation, Resources, Visualization. **İÖÇ:** Data curation, Writing - Review & Editing. **NK:** Data curation, Writing-Review & Editing, Visualization. **GKA:** Data curation, Writing-Review & Editing

References
1. Ahrens W, Bammann K, de Henauw S, Halford J, Palou A, Pigeot I, et al. Understanding and preventing childhood obesity and related disorders-IDEFICS: a European multilevel epidemiological approach. Nutr Metab Cardiovasc Dis. 2006;16(4):302–8.
2. Nicklas TA, Baranowski T, Baranowski JC, Cullen K, Rittenberry L, Olvera N. Family and child-care provider influences on preschool children's fruit, juice, and vegetable consumption. Nutr Rev. 2001;59(7):224–35.
3. Jezewska-Zychowicz M, Wadolowska L, Kowalkowska J, Lonnie M, Czarnocinska J, Babicz-Zielinska E. Perceived Health and Nutrition Concerns as Predictors of Dietary Patterns among Polish Females Aged 13–21

Years (GEBaHealth Project). Nutrients. 2017;9(6):613.

4. Kulik NL, Moore EW, Centeio EE, Garn AC, Martin JJ, Shen B, et al. Knowledge, Attitudes, Self-Efficacy, and Healthy Eating Behavior Among Children: Results From the Building Healthy Communities Trial. Heal Educ Behav. 2019;46(4):602–11.

5. Villaécija J, Luque B, Martínez S, Castillo-Mayén R, Cuadrado E, Domínguez-Escribano M, et al. Perceived social support and healthy eating self-efficacy on the well-being of children and adolescents. Rev Iberoam Psicol y Salud. 2021;13(1):56.

6. Efthymiou V, Charmandari E, Vlachakis D, Tsitsika A, Pałasz A, Chrousos G, et al. Adolescent Self-Efficacy for Diet and Exercise Following a School-Based Multicomponent Lifestyle Intervention. Nutrients. 2021;14(1):97.

7. Kuroko S, Black K, Chryssidis T, Finigan R, Hann C, Haszard J, et al. Create Our Own Kai: A Randomised Control Trial of a Cooking Intervention with Group Interview Insights into Adolescent Cooking Behaviours. Nutrients. 2020;12(3):796.

8. Demirezen E, Coşansu G. Evaluating dietary pattern in adolescence. STED. 2005;14(8):174–8.

9. Agras WS. Health and behavior. In: Knickman J., Elbel B, editors. Current Opinion in Psychiatry. 12th ed. New York: Springer Publishing Company; 1990. p. 795–9.

10. Halfon N, Forrest CB, Lerner RM, Faustman EM, Tullis E, Son J. Handbook of Life Course Health Development. Halfon N, Forrest CB, Lerner RM, Faustman EM, editors. Cham: Springer International Publishing; 2018. 1–16 p.

11. Hernández-Garbanzo Y, Brosh J, Serrano EL, Cason KL, Bhattarai R. Psychosocial measures used to assess the effectiveness of school-based nutrition education programs: review and analysis of self-report instruments for children 8 to 12 years old. J Nutr Educ Behav. 2013;45(5):392–403.

12. Meydanlıoğlu A, Ergün A. A sample training program for development of healthy diet and physical activity behavior of children. Turkey Clin J Public Heal Nurs-Special Top. 2016;2(1):102–8.

13. Powers AR, Struempler BJ, Guarino A, Parmer SM. Effects of a nutrition education program on the dietary behavior and nutrition knowledge of second-grade and third-grade students. J Sch Health. 2005;75(4):129–33.

14. Van Lippevelde W, Verloigne M, De Bourdeaudhuij I, Brug J, Bjelland M, Lien N, et al. Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials. Int J Public Health. 2012;57(4):673–8.

15. Hamulka J, Wadolowska L, Hoffmann M, Kowalkowska J, Gutkowska K. Effect of an Education Program on Nutrition and Methodology. Nutrients. 2018;10(1439):1–23.

16. Demir Acar M, Bayat M. The Effect of Diet-Exercise Trainings Provided to Overweight and Obese Teenagers through Creative Drama on Their Knowledge, Attitude, and Behaviors. Child Obes. 2018;15(2):93–104.

17. Uzşen H, Başbakkal ZD. A Game-based Nutrition Education: Teaching Healthy Eating to Primary School Students. J Pediatr Res. 2019;6(1):18–23.

18. Lee JE, Lee DE, Kim K, Shim JE, Sung E, Kang JH, et al. Development of tailored nutrition information messages based on the transtheoretical model for smartphone application of an obesity prevention and management program for elementary-school students. Nutr Res Pract. 2017;11(3):247–56.

19. Naghashpour M, Shakerinejad G, Lourizadeh MR, Hajinajaf S, Jarvandi F. Nutrition education based on health belief model improves dietary calcium intake among female students of junior high schools. J Heal Popul Nutr. 2014;32(3):420–9.

20. Regina LL, Loke AY. A Quasi-Experimental Intervention to Improve Self-Efficacy for Eating and Exercise Weight Management: Short-Term Effects. J Nutr Disord Ther. 2013;3(1):1–7.

21. Smith A, Petty S, Drake T. Applying the Transtheoretical Model to Nutrition Facts Label Use Among College Students. J Nutr Educ Behav. 2018;

22. Fathi A, Sharifirad G, Gharlipour Z, Hakimelahi J, Mohebi S. Effects of a Nutrition Education Intervention Designed based on the Health Belief Model (HBM) on Reducing the Consumption of Unhealthy Snacks in the Sixth Grade Primary School Girls. Int J Pediatr. 2017;5(2):4361–70.

23. Öztürk Haney M, Erdoğan S. Interaction model of client health behavior: a guide to determination of childrens' diet habits. DEUHYO ED. 2013;6(4):218–23.

24. Hozawa A. Attributable fractions of risk factors for cardiovascular diseases. J Epidemiol. 2011;21(2):81–6.

25. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods. 2007;39:175–91.

26. Centers for Disease Control and Prevention. Defining adult overweight and obesity. Centers for Disease Control and Prevention. 2016.

27. Ware JE. Scales for measuring general health perceptions. Health Serv Res. 1976;11(4):396–415.

28. Ozturk Haney M, Erdogan S. Factors related to dietary habits and body mass index among Turkish school children: a Cox's interaction model-based study. J Adv Nurs. 2013;69(6):1346–56.

29. Edmundson E, Parcel GS, Perry CL, Feldman HA, Smyth M, Johnson CC, et al. The effects

of the child and adolescent trial for cardiovascular health intervention on psychosocial determinants of cardiovascular disease risk behavior among third-grade students. Am J Health Promot. 1996;10(3):217–25.

30. Parcel GS, Edmundson E, Perry CL, Feldman HA, O'Hara-Tompkins N, Nader PR, et al. Measurement of self-efficacy for diet-related behaviors among elementary school children. J Sch Health. 1995;65(1):23–7.

31. Coppinger T, Lacey S, O'Neill C, Burns C. "Project Spraoi": A randomized control trial to improve nutrition and physical activity in school children. Contemp Clin Trials Commun. 2016;3:94–101.

32. Eilat-Adar S, Koren-Morag N, Siman-Tov M, Livne I, Altmen H. School-based intervention to promote eating daily and healthy breakfast: a survey and a case-control study. Eur J Clin Nutr. 2011;65(2):203–9.

33. Kürtüncü M, Uzun M, Ayoğlu FN. The Effect of Adolescent Training Program on Risky Health Behaviours and Health Perception. J High Educ Sci. 2015;5(2):187–95.

34. Mhurchu CN, Gorton D, Turley M, Jiang Y, Michie J, Maddison R, et al. Effects of a free school breakfast programme on children's attendance, academic achievement and short-term hunger: results from a stepped-wedge, cluster randomised controlled trial. J Epidemiol Community Health. 2013;67(3):257–64.

35. Prelip M, Kinsler J, Thai C Le, Erausquin JT, Slusser W. Evaluation of a School-based Multicomponent Nutrition Education Program to Improve Young Children's Fruit and Vegetable Consumption. J Nutr Educ Behav. 2012;44(4):310–8.

36. Hayes D, Contento IR, Weekly C. Position of the Academy of Nutrition and Dietetics, Society for Nutrition Education and Behavior, and School Nutrition Association: Comprehensive Nutrition Programs and Services in Schools. J Nutr Educ Behav. 2018;50(5):425-431.e1.