

## The Effects of an Educational Program Based on Social Cognitive Theory in Adopting Behaviors to Prevent Excessive Consumption of Sugar-Sweetened Beverages in Children: Application of Shad Social Network Software

Nasser Sharafkhani<sup>1</sup>, Zamzam Paknahad<sup>2</sup>, Zahra Heidari<sup>3</sup>, \* Firoozeh Mostafavi<sup>4</sup>

<sup>1</sup> PhD Candidate, Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran.

<sup>2</sup> Professor of Nutrition, Department of Clinical Nutrition, School of Nutrition and Food Science, Isfahan University of Medical Sciences, Isfahan, Iran.

<sup>3</sup> Assistant Professor, Department of Biostatistics and Epidemiology, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran.

<sup>4</sup> Professor of Health Education and Promotion, Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran.

### Abstract

**Background:** Excessive consumption of Sugar-Sweetened Beverages (SSBs) is a health problem in most societies today, which has adverse consequences in health, social and economic areas. The aim of this study was to investigate the effect of the application of social cognitive theory (SCT) in the design and evaluation of an educational intervention in order to adopt behaviors to prevent excessive consumption of SSBs in students.

**Methods:** The current research was a quasi-experimental study. Using multistage sampling, 100 Junior High-school students in Urmia, Iran in 2021 were selected and assigned to two groups, namely intervention (n=100) and control (n=100). To collect the study data, the researchers utilized a researcher-made questionnaire including items about demographic information and SCT constructs such as awareness, outcome expectations, self-regulation, self-efficacy, social support, barriers and Preventive behaviors, which was completed in two stages before and three months after the last training session; the data were analyzed using the SPSS software version 25.0.

**Results:** The mean age of the participants in the intervention and control groups was  $13.71 \pm 0.71$  and  $13.84 \pm 0.81$ , respectively. Before the intervention, the mean scores of social cognitive theory structures and desired behavior were not significantly different between the two groups. But three months after the intervention, the mean scores of knowledge constructs, outcome expectations, self-regulation, self-efficacy, social support, perceived barriers, and desirable student behavior showed a significant difference between the two groups ( $P < 0.001$ ).

**Conclusion:** The results of the study revealed that social cognitive theory can be used as a theoretical basis for designing and evaluating interventions to encourage people to follow a proper diet and reduce the consumption of SSBs.

**Key Words:** Preventive Behaviors, Social Cognitive Theory, Student, Sugar Sweetened Beverages.

\* Please cite this article as: Sharafkhani N, Paknahad Z, Heidari Z, Mostafavi F. The Effects of an Educational Program Based on Social Cognitive Theory in Adopting Behaviors to Prevent Excessive Consumption of Sugar-Sweetened Beverages in Children: Application of Shad Social Network Software. *Int J Pediatr* 2022; 10 (6):16182-16194. DOI: **10.22038/ijp. 2021.57727.4526**

### \*Corresponding Author:

Firoozeh Mostafavi, Professor of Health Education and Promotion, Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran. Email: [f\\_mostafavi@yahoo.com](mailto:f_mostafavi@yahoo.com)

Received date: May.13,2021; Accepted date:May.20,2021

## 1-INTRODUCTION

In recent years, the source of energy intake among young people has shifted to consuming Sugar Sweetened Beverages (SSBs), and this change has made the high consumption of sugar, especially SSBs, a health problem and a challenge for policymakers (1-3). In the world, the consumption of SSBs is estimated at an average of 230 ml per day. Adolescents account for the largest share of consumption of these beverages, and the fact that the majority of children and adolescents (about 88%) report daily consumption of these beverages and receive an average of 271 kcal of energy from this consumption (4). Every Iranian typically consumes about 33 to 42 liters of SSBs in their diet per year, which is three or four times more than the global average consumption of these beverages, And in a study, 94% of children reported their habitual and daily consumption of these drinks (5). Excessive consumption of SSBs as one of the main behavioral risk factors in the development of diseases such as chronic metabolic diseases associated with obesity such as metabolic syndrome, type 2 diabetes, cardiovascular disease, various cancers, oral health in adolescence (Erosion and tooth decay), fatty liver disease, and elevated uric acid in the last three decades (6-8).

After identifying the health effects of sugar added to the diet, the necessity of controlling sugar intake, especially the consumption of SSBs, has been consistently mentioned in several national and global dietary guidelines; for example, the World Health Organization in 2015 recommended reducing the energy taking from free sugars to 10 percent of the body's total energy intake, mentioning that the reducing the ratio of total energy intake of sugars, especially sugary drinks, to less than 5 percent has various benefit and controls over adverse health effects (9). Challenges against reducing the

consumption of SSBs include the increased access to SSBs at home and school, widespread advertising of these products, low prices, careless parenting patterns, consumption of these drinks by parents, parental awareness of the harmful effects of health on sweet drinks, especially among parents (8, 10).

In order to develop effective strategies to reduce the consumption of SSBs in adolescents, a systematic identification of the determinants of SSBs consumption is needed (11). These determinants may be demographic (e.g. Education, socioeconomic status), environmental (e.g., the availability of SSBs) and psychological (e.g., attitudes, beliefs, motivations) variables (12). Therefore, nutritional behavior is one of the multi-causal issues related to health, and to affect this behavior, effective factors and abilities of individuals must be identified and strengthened, and barriers lessened. Then, other intervening factors should be used to improve nutritional behavior in line with health programs. In this regard, health education interventions can be considered as a major strategic plan to change people's behaviors with the aim of primary prevention.

It seems that educational programs in health care systems do not have the desired effectiveness on nutritional behaviors and interventions based on theory-based education and appropriate models are required. Because theories have great potential to increase the effectiveness of health education programs (13). One of the most effective theories used to predict and express nutritional behaviors is Albert Bandura's social cognitive theory (14). This theory emphasizes that personal, environmental, and behavioral factors interact with each other. According to this principle, learning happens as a result of the interaction between the three elements. Personal factors include beliefs and expectations, individual behaviors include

actions and choices, and the environmental variables consist of patterns and accessibility issues (15). In the study of Kolopaking et al., an intervention based on social cognitive theory, including nutrition education through a self-regulatory procedure, improved children's self-regulatory behaviors in terms of food selection and increased self-efficacy in food environments (16).

Evidence suggests that unhealthy eating habits such as the consumption of sweetened drinks with sugar are formed in early childhood. Therefore, understanding the relationship between the factors affecting these behaviors in children and designing effective and useful interventions with the aim of preventing and changing the undesired behaviors is a necessity (17, 18).

Given that the people all around the world have been affected by the corona epidemic for more than a year, and that many educational centers such as schools and face-to-face training programs are closed and banned by the corona epidemic management and control centers, this means that healthy eating audiences are unable to participate in face-to-face healthy eating promotion programs, indicating that more flexible methods of sending and receiving messages are needed to facilitate their attending in health promotion programs. Social media can be a great platform to share health-related ideas and education (19). Shad app is a social network and a native messaging service for Iranian students. Shad software, like WhatsApp, is an Internet messenger that delivers real-time texts and communicational messages (20). Shad software, similar to the other social networks, has advantages such as accessing and retrieving messages even in an offline mode, or when the phone is turned off before the message be completely sent (21). The results of several programs with the purpose of promoting

healthy nutrition through social networks emphasize the effectiveness of these educations in reducing the consequences of adopting unhealthy eating behaviors (22-24).

Given the above, this study seeks to answer the key question of what is the efficiency and effectiveness of education based on social cognitive theory in reducing the consumption of sugary drinks to the recommended amount in children and adolescents. By answering this question, we can reach more appropriate strategies to plan for the promotion of a healthy diet in order to prevent and control the burden of diseases caused by this problem.

## **2-MATERIALS AND METHODS**

### **2-1. Study design and population**

The present research was a controlled quasi-experimental study, carried out among junior high-school students in Urmia city, North West of Iran, in 2020-2021. The proposal of this research was approved by the Research Ethics Committee of Isfahan University of Medical Sciences and the necessary arrangements were made with schools for conducting the process of the study. The sample size was determined according to results of a similar study (25), considering a power of 90% with  $\alpha = 0.05$ , and the effect size of 0.45. Using the G\* Power SSC software (Version 3.1.9.2), the minimum sample size was calculated as 84 in each group and 168 in total. Subsequent to 15% attrition, 200 students were assigned to two groups of 100, namely intervention and control. The samples were selected using multistage sampling. First, from among junior high schools, four all-boy schools and four all-girl schools were selected using cluster random sampling. The participants in the intervention group were selected from these four schools, and the control group participants from the other schools. Finally, using quota

sampling, from among different grades of the two groups, in proportion to the number of students in each grade, 100 students were selected for each group and included in the study.

## 2-2. Inclusion and exclusion criteria

The inclusion criteria for the present study were providing written consents by the parents and school administrators for entering the students to the study, lack of metabolic diseases and other problems in students so that they were not required to follow a special diet. The students' unwillingness to continue their participation in the study and failing to attend training sessions were considered as the exclusion criteria.

## 2-3. Measuring tools

The data collection tool was a researcher-made questionnaire consisting of the following parts:

Part 1. Demographic characteristics of the student and his/her amount of SSBs consumption.

Part 2. Knowledge Questions (with 9 items) For example, "How many calories are in a teaspoon of sugar?" A correct answer received a score of 1 and an incorrect one received a score of 0.

Part 3. Questions related to various structures of SCT and the structure of perceived barriers in performing behaviors that reduce the consumption of sugary drinks by the student; outcome expectations (with 12 items) For example, "I expect that by reducing the consumption of Sugar Sweetened Beverages, I will have healthier teeth.", Self-regulation (with 10 items) For example, "I know how to evaluate my consumption of different types of drinks", Self-efficacy (with 8 items) For example, "I am confident in my ability to choose healthy drinks over unhealthy drinks.", Social Support (with 6 items) For example, "My teachers' advice makes me use water instead of sugary

drinks.", Perceived barriers (with 9 questions) For example, "Sugar-Sweetened Beverages are served with most of the meals at home."; All items related to subscales of SCT and perceived barriers structure were scored based on a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree".

Part 4. Preventive behavior questions (with 6 items): "I avoid being in the service environment of SSBs such as fast foods, these items are rated on a 4-point Likert scale (0 = never, 1= seldom, 2= often, 3= always). The total score of the questionnaire was transformed linearly to a 0–100-point scale, with 100 indicating the best status and 0 the worst. The distance between the lowest and highest test scores was conventionally classified into three categories: weak (0-50% score), medium (51-75 score) and good (76-100% score).

To determine the validity of the researcher-made questionnaire based on a review of the valid sources (26-31), the qualitative method of content validity was used, i.e. using a panel of 10 experienced experts ((including the specialists in health education, epidemiology, nutrition and preventive and social medicine). In this method, the experts were asked to examine the items of the questionnaires in terms of simplicity, clarity, relevance and necessity and to express their opinions and suggestions. After receiving feedback and suggestions from the experts, the necessary amendments were made to the study tool. Finally, the validity of the tool was confirmed.

The reliability of the questionnaire was measured through Cronbach's alpha test on 30 students who were similar to the sample of the study. Cronbach's alpha coefficients of the construct of Outcome expectations towards the consumption of SSBs, Self-regulation, Self-efficacy, Social Support, Perceived barriers, and Preventive behavior were 0.71, 0.90, 0.84, 0.85, 0.87 and 0.87 respectively; and ultimately the

instrument's reliability was also confirmed.

#### 2-4. Intervention

The educational intervention in the experimental group was held in 7 training sessions (60 minutes each) 3 days a week for 3 weeks. In these sessions, which were designed based on the structures of social cognitive theory, the students were educated to manage the optimal consumption of sugary drinks with an emphasis on self-regulatory structures, social support, perceived barriers, self-efficacy, awareness, and outcome

expectations, ordered based on their priorities, identified in a study of diagnostic evaluation and measurement of the predictive power of the structures (32). The methods used for teaching included lectures, brainstorming, group discussion, questions and answers, PowerPoint presentation of educational materials in the platform of the social network (Shad App). To evaluate the impact of the educational intervention, three months after the last training session, the initial electronic questionnaire was completed online by the participants of the intervention and control groups.

**Table-1:** Educational intervention program for optimal management of sugar-sweetened beverages

Training session	Educational priority of each session	Practical educational activities, learning experiences, content of the messages	Structures of social cognitive theory
First	Familiarity with the food pyramid and the place of drinks in the food pyramid	<ul style="list-style-type: none"> <li>- Mentioning the goals of the educational intervention for the participants</li> <li>- Providing the students with the definition of sugar-sweetened beverages</li> <li>- Introducing the criteria for distinguishing healthy from unhealthy drinks</li> <li>- How to calculate the nutritional share of beverages in the food pyramid</li> </ul>	knowledge and awareness
Second	The importance of consuming healthy drinks	<ul style="list-style-type: none"> <li>- Expressing different attitudes about the consumption of SSBs and discussing them</li> <li>- Showing videos and posters related to the side effects of consuming sugary drinks</li> <li>- Expressing national and regional statistics about the consumption of different beverages</li> <li>- Expressing experiences of success or failure in performing behaviors that control the consumption of SSBs</li> </ul>	outcome expectations
Third	Self-monitoring and self-evaluation in relation to sugary drinks	<ul style="list-style-type: none"> <li>- Explaining about the ways to develop goals and prescribing behaviors that control a healthy diet in relation to SSBs</li> <li>- Asking them to practice alternative behaviors (providing them with the definition and appropriate using patterns of the healthy drinks)</li> <li>- Teaching how to read food labels for drinks</li> <li>- Teaching how to draw daily calorie intake registration cards</li> <li>- Teaching how to record energy and calorie</li> </ul>	Self-regulation

Training session	Educational priority of each session	Practical educational activities, learning experiences, content of the messages	Structures of social cognitive theory
		intakes on the card	
Fourth	Self- evaluation, self-enhancement, planning and performance control associated with SSBs	<ul style="list-style-type: none"> <li>- Expressing desirable and standard behaviors and how to evaluate and compare the behavior of consuming SSBs with the ideal consumption of these drinks</li> <li>- Asking the students to encourage themselves if they have positive behaviors.</li> <li>- Planning for healthy eating behaviors in relation to the consumption of SSBs</li> </ul>	Self-regulation
Fifth	Providing skills to empower students to choose healthy drinks versus undesirable drinks	<ul style="list-style-type: none"> <li>- Providing the students with the experiences of patients who have controlled the side effects of consuming sugary drinks by adopting healthy drinking behaviors.</li> <li>- Providing alternative behaviors through group discussion</li> <li>- Asking the students to control behaviors that encourage the consumption of sugary drinks verbally and materially</li> <li>- Encouraging the students to support each other in performing healthy eating behaviors</li> <li>- Encouraging the students to participate in decisions to provide a healthy food basket for the household</li> <li>- Teaching the skill of saying no and daring to deal with incompatible requests regarding the consumption of SSBs</li> </ul>	Self-efficacy
Sixth	Providing solutions for reducing the access to SSBs	<ul style="list-style-type: none"> <li>- Expressing possible barriers in performing control behaviors related to SSBs consumption</li> <li>- Explaining the ways to remove Barriers</li> </ul>	Barriers
Seventh	<ul style="list-style-type: none"> <li>-Information support</li> <li>-social support</li> <li>-Evaluation support</li> </ul>	<ul style="list-style-type: none"> <li>- Introducing desirable information sources related to healthy eating and consumption of healthy drinks</li> <li>- Helping to choose the optimal patterns in the family and the surrounding environment in relation to nutrition</li> <li>- Raising the level of information of parents or a family member of students about having a healthy diet</li> <li>- Training a family member to evaluate the students' nutritional behaviors.</li> </ul>	Social Support

## 2-5. Data Analyses

The data was analyzed using the SPSS software version 25.0. In order to examine

the difference between the groups, the presumptions of each test were, first, checked. Moreover, in order to analyze the data, the Kolmogorov-Smirnov test (KS-

test) was, first, used to confirm that the research variables had a normal distribution. In order to compare the intervention group with the control group, at each evaluation stage, independent and paired t-tests were used for quantitative variables and chi-square test was used for the qualitative variables.

## 2-6. Ethical consideration

This manuscript was extracted from a study with the Code of Ethics (IR.MUI.RESEARCH.REC.1399.213) approved by the Ethics Committee of Isfahan University of Medical Sciences. In addition, written consent was received from all participants and all the principals of the research ethics related to the Helsinki Statement were respected.

## 3- RESULTS

In this controlled quasi-experimental research, 200 students were assigned to the intervention group ( $n = 100$ ), and the control group ( $n = 100$ ). The mean age of the intervention group was  $13.90 \pm 0.71$  years and that of the control group was  $13.84 \pm 0.81$  years. **Table 2** demonstrates that before the study, the two groups were not significantly different from each other in terms of the demographic variables ( $P > 0.05$ ). The results also show that more than 70% of the students had reported not holding a healthy nutrition-focused training class during the school year, which requires the stakeholders' attention to plans for the training classes of this kind to promote healthy eating behaviors in educational settings. **Table 3** shows that there was no significant difference between the two groups in the mean scores of Adopting preventive behaviors of consuming SSBs, Average consumption of SSBs, and the mean scores of the SCT constructs (i.e. awareness, outcome expectations, self-regulation, self-efficacy, social support and perceived barriers) related to the consumption behavior of SSBs before the intervention ( $P > 0.05$ ).

As **Tables 3** presents, there was a significant difference between the two groups in all of the SCT constructs (after intervention,  $P < 0.001$ ). The results highlighted a significant difference in the mean scores of the constructs in the intervention group before and three months after the intervention. However, no significant difference was observed in the control group ( $P > 0.05$ ).

According to **Table 3**, before the educational intervention, the average consumption of SSBs during the day was 3.27 glasses (220 ml) in the intervention group, which after the intervention, the consumption of SSBs in the students of the intervention group was reduced to 2.16 glasses per day. Also, in the control group before the educational intervention, the average consumption of SSBs during the day was 3.34 glasses (220 ml), which after 3 months, no significant change in the consumption of SSBs was observed.

## 4- DISCUSSION

An unhealthy diet, like the consumption of SSBs, is a major risk factor for many non-communicable diseases. And health education interventions, especially the theory-based ones, can be considered as a key strategic plan to correct and change people's behaviors in the form of an initial prevention goal. Therefore, this study investigated the effect of a theory-based educational intervention on the adoption of health-promoting behaviors to reduce the consumption of SSBs. Based on the findings, the average consumption of sugar-sweetened beverages and adopting behaviors to prevent excessive consumption of these beverages after the educational intervention showed a significant difference between the intervention and control groups, indicating the effectiveness of the intervention in the adoption of health-promoting behaviors by the participants.

**Table-2:** The demographic characteristics of the students in the two groups

Variables	Sub-group	Intervention (n= 100)		Control (n = 100)		P-value*
		Mean or No.	SD or %	Mean or No.	SD or %	
Age		13.90	0.71	13.84	0.81	0.581
Gender	Female	47	47%	46	46%	0.867
	Male	53	53%	54	54%	
Grade	First	40	40%	41	41%	0.909
	Second	35	35%	35	35%	
	Third	25	25%	24	24%	
Holding a training class with a focus on healthy eating	Never	73		80		0.482
	Once a year	22		17		
	Twice a year	5		3		
	Three or more times a year	Zero	Zero	Zero	Zero	
BMI		22.09	3.46	21.58	3.59	0.313

\* The quantitative variables were tested using the independent t-test and the qualitative variables were tested using Chi-square; SD: Standard Deviation; BMI: Body Mass Index.

**Table-3:** A comparison of the means and standard deviations of the SCT constructs in the two groups before and three months after the intervention with regard to the consumption of SSBs

Variables	Time	Intervention		Control		Independent t-test $\alpha$
		Mean	SD	Mean	SD	
knowledge	Before	30.77	16.40	33.11	15.39	0.301
	After	60.55	18.57	31.77	14.47	0.001
Paired t-test $\alpha$		0.001		0.083		
outcome expectations	Before	57.18	4.77	58.11	5.05	0.183
	After	68.02	3.55	58.88	4.20	0.001
Paired t-test $\alpha$		0.001		0.114		
Self-regulation	Before	61.36	9.21	60.90	9.80	0.733
	After	68.34	4.66	61.44	8.77	0.001
Paired t-test $\alpha$		0.001		0.055		
Self-efficacy	Before	59.32	10.74	58.95	9.73	0.796
	After	71.32	7.82	59.40	8.61	0.001
Paired t-test $\alpha$		0.001		0.101		
Social Support	Before	58.53	9.78	57.03	12.14	0.337
	After	73.36	6.52	58.36	9.04	0.001
Paired t-test $\alpha$		0.76		0.001		
Barriers	Before	54.57	10.72	56.84	10.07	0.125
	After	47.91	6.16	56.06	9.58	0.001
Paired t-test $\alpha$		0.001		0.58		
Preventive behaviors	Before	51.16	15.91	54.88	6.66	0.108
	After	68.77	9.09	55.22	6.10	0.001
Paired t-test $\alpha$		0.001		0.259		
Daily intake of SSBs (per glass=220 ml)	Before	3.27	1.21	3.34	1.21	0.684
	After	2.16	0.69	3.18	1.04	0.001
Paired t-test $\alpha$		0.001		0.064		

SCT: Social Cognitive Theory; SD: Standard Deviation; ml: milliliter.

Various studies have pointed to the positive effects of using social cognitive theory in designing interventions in the field of nutritional behaviors and correcting undesirable eating behaviors (33-37).

Due to the high consumption of SSBs in children and adolescents, training to properly guide this behavior is recognized as a necessity; The effect of knowledge on behavior cannot be denied, sufficient knowledge about the content and consequences of food and drinks is often considered as a prerequisite for healthy decision making and plays a key role in designing health interventions to improve eating behavior, including the consumption of SSBs (38); In the present study, considering SSBs as the unhealthy beverages, the effects of these beverages on the body and the place of beverages in the food pyramid were introduced, and that after the educational intervention, a significant increase was observed in the students' knowledge about sweetened beverages.

Outcome expectation is one of the constructs of social cognitive theory that deals with predicting the possible consequences of performing a desired behavior. In the present study, the three dimensions of physical health, expected costs and benefits of limiting the consumption of sugary drinks were addressed in an educational intervention. The results showed that the mean score of outcome expectations in the intervention group increased significantly compared to the control group. In another study, Su emphasized and recommended the effect of the outcome expectations structure with negative and positive results in relation to these drinks; which should be considered in the strategies adopted to limit the consumption of undesirable beverages (39).

Another result of the present study dealt with the effects of the educational

intervention on increasing self-regulation of SSBs consumption behavior in the intervention group compared to the control group. It seems that using several strategies simultaneously, including verbal persuasion and reinforcements based on the participants' reports on their daily consumption of healthy drinks, teaching them how to read food labels, teaching them to draw daily calorie registration cards, and practicing desirable behaviors (Alternative to healthy drinks) for the students participating in the present study has led to improved self-regulation of beverage intake in the intervention group; This result is consistent with the findings of similar studies in this field (34, 40).

Self-efficacy is another construct of social cognitive theory, based on which the individuals' confidence in their ability to choose healthy daily foods, even when difficult, determines a person's success in achieving a healthy eating pattern. In the present study, techniques affecting self-efficacy such as encouraging, rewarding, along with teaching the skill of saying no and daring were used to deal with controlling the consumption of SSBs. As a result of the intervention, the mean score of the participants' self-efficacy in limiting the consumption of SSBs showed a significant increase of about 12% in the intervention group, while there was no significant change in the control group. Karimi et al. have also acknowledged the effectiveness of the self-efficacy structure in managing the consumption of SSBs and reported its application in adopting strategies to limit the consumption of these beverages (2).

The participants' perceived social support in relation to reducing the consumption of sugar-sweetened beverages and adopting preventive behaviors had also increased significantly after the educational intervention in the intervention group; however, no significant change was found in the control group. Therefore, the

educational method used in this study, which includes the introduction of appropriate practice patterns in relation to the consumption of sugar-sweetened beverages through information support, social support and evaluation support can be considered effective. Several studies point to the important role of the perceived support, especially by important people such as family and friends, in healthy eating; and consider it an integral part of healthy diet management programs (34, 41, 42).

It should be noted that the perceived barriers variable is not considered as social cognitive theory constructs, but it can be influential in the improvement of self-efficacy in overcoming the existing barriers and providing appropriate facilitators for the strong willpower and motivation needed to maintain healthy eating habits. However, since the barriers can reduce adherence, action should be taken to reduce the consumption of sugary drinks by using facilitators and removing barriers (43).

In the present study, improving awareness, outcome expectations, self-regulation, self-efficacy, social support and reducing perceived barriers after educational intervention led to the adoption of preventive behaviors to reduce the consumption of SSBs in the intervention group compared to the control group.

#### **4-1. Limitations of the study**

The main limitation of the study was related to the fact that the data were collected through a self-report instrument, which is likely not to show the students' real performance with regard to the topic of the study.

#### **5-CONCLUSION**

The results of this study showed the positive effectiveness of an educational intervention based on social cognitive theory in improving the participants scores

in the constructs of awareness, outcome expectations, self-regulation, self-efficacy, social support and reduction of perceived barriers associated with adopting behaviors to prevent excessive consumption of SSBs; and that following the intervention, a decrease in the consumption of SSBs was observed in the students of the intervention group.

#### **6-CONFLICT OF INTEREST:**

None.

#### **7- ACKNOWLEDGMENT**

This article was extracted from a research project approved by the Department of Research of Isfahan University of Medical Sciences with No. 339080. The authors would like to express their gratitude and appreciation to the Research Director of Isfahan University of Medical Sciences, Vice-Chancellor for Research in the Educational Organization of Urmia, Iran, and the participants of the study.

#### **8- REFERENCES**

1. French SA, Lin B-H, Guthrie JF. National trends in soft drink consumption among children and adolescents aged 6 to 17 years: prevalence, amounts, and sources, 1977/1978 to 1994/1998. *Journal of the American Dietetic Association*. 2003; 103(10):1326-31.
2. Karimi M, Zare Haroftah F, Baghianimoghadam MH, Bahrevar V, Ghiyasi H. Prediction of the Students' Intention to the Consumption of Soft Drinks: Using the Extended Parallel Process Model. *Journal of Health Sciences & Surveillance System*. 2017; 5(2):94-9.
3. Vartanian LR, Schwartz MB, Brownell KD. Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. *American journal of public health*. 2007; 97(4):667-75.
4. Wang YC, Bleich SN, Gortmaker SL. Increasing caloric contribution from sugar-

- sweetened beverages and 100% fruit juices among US children and adolescents, 1988–2004. *Pediatrics*. 2008; 121(6):e1604-e14.
5. Dehdari T, Mergen T. A survey of factors associated with soft drink consumption among secondary school students in Farooj city, 2010. *Journal of Jahrom University of Medical Sciences*. 2012; 9(4):33-9.
6. Bowen KJ, Sullivan VK, Kris-Etherton PM, Petersen KS. Nutrition and cardiovascular disease—an update. *Current atherosclerosis reports*. 2018; 20(2):1-11.
7. Bleich SN, Vercammen KA. The negative impact of sugar-sweetened beverages on children’s health: an update of the literature. *BMC obesity*. 2018; 5(1):1-27.
8. Europe E. Reducing the consumption of sugar-sweetened beverages and their negative health impact in Estonia. Copenhagen: World Health Organization. 2017.
9. Organization WH. Guideline: sugars intake for adults and children: World Health Organization; 2015.
10. Eck KM, Dinesen A, Garcia E, Delaney CL, Famodu OA, Olfert MD, Byrd-Bredbenner C, Shelnett KP. “Your body feels better when you drink water”: parent and school-age children’s sugar-sweetened beverage cognitions. *Nutrients*. 2018; 10(9):1232.
11. Bere E, Glomnes ES, te Velde SJ, Klepp K-I. Determinants of adolescents’ soft drink consumption. *Public health nutrition*. 2008; 11(1):49-56.
12. Hagger M, Weed M. DEBATE: do behavioral interventions work in the real world. *Int J Behav Nutr Phys Act*. 2019; 16:36.
13. Nutbeam D, Harris E, Wise W. Theory in a nutshell: a practical guide to health promotion theories: McGraw-Hill; 2010.
14. Glanz K, Rimer BK, Viswanath K. Health behavior and health education: theory, research, and practice: John Wiley & Sons; 2008.
15. Gaines A, Turner LW. Improving Fruit and Vegetable Intake among Children. *Californian Journal of Health Promotion*. 2009; 7(1):52-66.
16. Kolopaking R. Use of the Self-Regulatory Approach to Develop and Evaluate the Nutrition Education Effectiveness: Jakarta: University of Indonesia; 2010.
17. Nixon C, Moore H, Douthwaite W, Gibson E, Vogeles C, Kreichauf S, Wildgruber A, Manios Y, Summerbell CD, ToyBox-study group. Identifying effective behavioural models and behaviour change strategies underpinning preschool-and school-based obesity prevention interventions aimed at 4–6-year-olds: a systematic review. *Obesity reviews*. 2012; 13:106-17.
18. Mazarello Paes V, Hesketh K, O'Malley C, Moore H, Summerbell C, Griffin S, et al. Determinants of sugar-sweetened beverage consumption in young children: a systematic review. *Obesity reviews*. 2015; 16(11):903-13.
19. Choudhary SR, Momin MIH, Kantharia S. Facebook and WhatsApp: Beneficial or harmful. *Journal of Evidence Based Medicine and Healthcare*. 2015; 2(17):2306-11.
20. Ahad AD, Lim SMA. Convenience or nuisance? The ‘WhatsApp’ dilemma. *Procedia-Social and Behavioral Sciences*. 2014; 155:189-96.
21. Susilo A, editor Exploring Facebook and WhatsApp as supporting social network applications for English learning in higher education 2014: Conference On Professional Development In Education (PDE2014), Widyatama.

22. Winnie W, Cheung K. A feasibility study of a WhatsApp-delivered transtheoretical model-based intervention to promote healthy eating knowledge and habits for firefighters in Hong Kong: A cluster randomized controlled trial. 2020.
23. Inauen J, Bolger N, ShROUT PE, Stadler G, Amrein M, Rackow P, Scholz U. Using smartphone-based support groups to promote healthy eating in daily life: A randomized trial. *Applied Psychology: Health and Well-Being*. 2017; 9(3):303-23.
24. Leme ACB, Lubans DR, Guerra PH, Dewar D, Toassa EC, Philippi ST. Preventing obesity among Brazilian adolescent girls: six-month outcomes of the Healthy Habits, Healthy Girls–Brazil school-based randomized controlled trial. *Preventive medicine*. 2016; 86:77-83.
25. Knol LL, Myers HH, Black S, Robinson D, Awololo Y, Clark D, Parker CL, Douglas JW, Higginbotham JC. Development and feasibility of a childhood obesity prevention program for rural families: Application of the social cognitive theory. *American journal of health education*. 2016; 47(4):204-14.
26. Poddar KH, Hosig KW, Anderson ES, Nickols-Richardson SM, Duncan SE. Web-based nutrition education intervention improves self-efficacy and self-regulation related to increase dairy intake in college students. *Journal of the American Dietetic Association*. 2010; 110(11):1723-7.
27. Poddar KH, Hosig KW, Anderson-Bill ES, Nickols-Richardson SM, Duncan SE. Dairy intake and related self-regulation improved in college students using online nutrition education. *Journal of the Academy of Nutrition and Dietetics*. 2012; 112(12):1976-86.
28. Poddar KH. Using social cognitive theory to improve intake of dairy products by college students: Virginia Tech; 2009.
29. Blomain D. Social cognitive theory and nutrition behavior: Effects of an introductory nutrition course intervention among college students: Drexel University; 2016.
30. Hoppe CS. Sugar sweetened beverage consumption and behavioral correlates in a pilot study of high school students in Austin, Texas. 2012.
31. Heeman VG. A Social Cognitive Model of Parental Nutritional Communication and Parental Perceptions of Preschoolers' Eating-Related Attitudes and Behaviors: Kent State University; 2016.
32. Sharafkhani N, Heidari Z, Paknahad Z, Mostafavi F. Psychological determinants of Sugar-Sweetened Beverages consumption among Secondary School Students: An Integrated Application of Social Cognitive Theory and Perceived Barriers Structure. *International Journal of Pediatrics*. 2020.
33. Rinderknecht K, Smith C. Social cognitive theory in an after-school nutrition intervention for urban Native American youth. *Journal of nutrition education and behavior*. 2004; 36(6):298-304.
34. Ahmadi Z, Pirzadeh A, Hasanzadeh A, Mostafavi F. The effect of a social cognitive theory-based intervention on fast food consumption among students. *Iranian Journal of Psychiatry and Behavioral Sciences*. 2018; 12(2).
35. Healthy Hidayanty M, Saptawati Bardosono M, Rita Damayanti M. A social cognitive theory-based programme for eating patterns and sedentary activity among overweight adolescents in Makassar, South Sulawesi: a cluster randomized controlled trial. *Asia Pacific journal of clinical nutrition*. 2016; 25:S83.
36. Penaranda E, Modave F, Diaz M. A social cognitive theory: Perspective of the

sugary drink cup size policy. *The Open Obesity Journal*. 2014; 6(1).

37. Anderson ES, Winett RA, Wojcik JR. Self-regulation, self-efficacy, outcome expectations, and social support: social cognitive theory and nutrition behavior. *Annals of behavioral medicine*. 2007; 34(3):304-12.

38. Ball K, McNaughton SA, Mhurchu CN, Andrianopoulos N, Inglis V, McNeilly B, Le HND, Leslie D, Pollard C, Crawford D. Supermarket Healthy Eating for Life (SHELf): protocol of a randomized controlled trial promoting healthy food and beverage consumption through price reduction and skill-building strategies. *BMC Public Health*. 2011; 11(1):1-11.

39. Su AY-L. Factors influencing the consumption of sugar-sweetened beverages by Taiwanese hospitality students. *Journal of Hospitality Marketing & Management*. 2012; 21(3):295-310.

40. Bashirian S, Jalili M, Karimi-Shahanjarini A, Soltanian A, Barati M. Effectiveness of educational programs based on social cognitive theory constructs to promote nutritional behaviors among pregnant women in Tabriz. *Iranian Journal of Nutrition Sciences & Food Technology*. 2017; 12(3):1-10.

41. Steptoe A, Perkins-Porras L, Rink E, Hilton S, Cappuccio FP. Psychological and social predictors of changes in fruit and vegetable consumption over 12 months following behavioral and nutrition education counseling. *Health Psychology*. 2004; 23(6):574.

42. Baranowski T, Watson K, Missaghian M, Broadfoot A, Cullen K, Nicklas T, Fisher J, Baranowski J, O'Donnell S. Social support is a primary influence on home fruit, 100% juice, and vegetable availability. *Journal of the American Dietetic Association*. 2008; 108(7):1231-5.

43. Teng NIMF, Sulong AS. The facilitators and barriers to reduce sugar sweetened beverages intake among overweight females. *Healthscope: The Official Research Book of Faculty of Health Sciences, UiTM*. 2019; 2.