



## Effectiveness of Nutrition Education for Elementary School Children Based on Theory of Planned Behavior

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### Abstract

School children are facing rapid developments both mentally and physically – thus, good nutrition is very important in this phase of life to ensure their normal and healthy growth process. The current study aimed at examining the effect of peers education based on the Theory of Planned Behavior (TPB) on improving elementary female students' behavioral nutrition in Chabaha, Iran, in 2017. In this quasi-experimental study, a total of 160 female elementary fourth-grade students were sampled using multi-stage random sampling and randomly divided into two groups of control and intervention. Data were collected using a researcher-made questionnaire with confirmed validity and reliability. The questionnaire consisted of two parts, the first part consisting of demographic and awareness questions and the second part related to the constructs of the theory of planned behavior. The educational intervention was performed on the intervention group using question and answer method by trained peers (two 45-minute training session). Two months after the intervention, the same questionnaire was completed for the post-test. Data were analyzed by paired and independent t-test, Spearman correlation and regression with SPSS 16 software. The cognitive skills increased significantly from 8.01 to 9.95 after the intervention. All behavioral nutrition increased significantly from



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to 11.83 after implementing the intervention. The behavioral intention rose significantly from 8.82 to 10.05. Subjective norms showed a significant enhancement from 9.18 to 10.42. A significant increase was found in mean perceived behavioral control from 8.48 to 10.00. The results show that nutrition education based on TPB through training the peers is effective in the behavioral nutrition of elementary students that positively affects their behavior through increasing knowledge and TPB constructs.

## Introduction

School children are facing rapid developments both mentally and physically – thus good nutrition is very important in this phase of life to ensure their normal and healthy growth process.<sup>1</sup> In general, eating habits spread in children up to the age of juvenile and often continue to adulthood. Therefore, nutrition education should be conveyed to children from an early age.<sup>1</sup> The elementary school would be the best strategic location to develop a healthy lifestyle and a second front in the war against disease and malnutrition. This is also appreciated by the School Health Committee.<sup>2</sup> An unhealthy diet is one of the main risk factors for many chronic diseases, to which the tendency of the society especially children and adolescents indicates a warning situation.<sup>3</sup> Many diseases of adult life originate from nutritional practices mainly started in childhood.<sup>4</sup>

The prevalence of childhood overweight and obesity in both developed and developing countries is rapidly increase and is a major concern for many health authorities.<sup>5</sup> Changes in eating patterns towards frequent snacking, eating out of home foods, high energy consumption and low nutritional value of foods and sweetened drinks along with a sedentary lifestyle also impact the epidemic of childhood obesity.<sup>5</sup>

According to UNICEF report, the prevalence of highly and averagely underweight children in Iran is estimated to be 11%, of which 5% are highly or averagely thin and 15% are highly or averagely small.<sup>6</sup> In addition, the results of Caspian studies performed on eating habits of children and adolescents in 21 cities of Iran showed that the poor quality of the oil consumed by most families, frequency of whole grain consumption, inadequate intake of milk and dairy products, unhealthy snack food consumption, and the habit of adding salt at

the table are the warning signs of an endangered health in today's life and also an increased rate of chronic diseases in coming years, for which the early prevention requires attention.<sup>7</sup>

Students make up a significant portion of the population, who are at the growth age being highly vulnerable due to their physical, psychological and social traits.<sup>8,9,10</sup> Based on scientific studies, there is a relationship between nutritional indicators and educational indicators such as learning, scores, academic achievement, IQ, intellectual and scientific skills and concentration in the class.<sup>8,11</sup>

There is evidence that children in developing countries increasingly consume unhealthy foods due to lack of information and misunderstanding about the use of healthy foods.<sup>12, 13, 14</sup> Based on previous studies, education has been shown to be effective in increasing knowledge and appropriate nutritional performance.<sup>15</sup> Health education focuses on building and changing health behavior of people through their own participation. Adopting a behavior, especially nutritional behavior, depends on one's beliefs. Selecting a model for health education is the first step in planning the process of any educational program. Sociologists, psychologists, and anthropologists suggest a range of different theories and models for understanding different factors that may influence individual behavior, one of which is the TPB.<sup>16</sup> The elements of this theory has been used given that the aim of current study is to enhance nutritional behavior in students, and that this theory emphasizes the role of thinking in making decisions to engage in such behaviors.<sup>16</sup>

TPB has been applied for generating health behaviors more than any other model.<sup>16</sup> Assuming that individuals make rational use of available information when making behavioral decisions

while examining the results of their decisions before adoption, Ajzen and Fishbin (1975) developed the Theory of Reasonable Action for predicting and explaining individuals' behaviors.<sup>17</sup> TPB consists of constructs including subjective norm, behavioral intention, and perceived behavioral control. Subjective norm is referred to as an individual's perception or opinion of social normative pressures to make that person do/not do an action. Perceived behavioral control is an actual control of people's behavior, as well as the behavioral intention, with the aim of doing an action.<sup>16</sup> The influence that education may have on children nutrition has been addressed by different studies based on this theory, such as people's attitude towards breastfeeding,<sup>18</sup> prevention of cardiovascular risk factors,<sup>19</sup> and the effect of educational intervention on children nutrition.<sup>20</sup>

School-age children spend more time away from their parents, so friends and the mass media have a great impact on the formation and consolidation of eating patterns.<sup>21</sup>

The peer education programs include programs meant for peers to publish detailed information, such as model responsible behavior, and provide the necessary skills and motivation to their peers.<sup>22</sup>

Peer education is used in many health education settings to change knowledge, attitudes, and behaviors,<sup>22</sup> and the use of peers has been utilized in evidence-based bystander programs such as bringing in the bystander.<sup>23, 24</sup>

Due to the sensitive nature of school age and formation of eating habits at this age and their continuance till adulthood as well as the difficulty of breaking bad eating habits at this stage, it is necessary to implement a healthy eating habit education for students to ensure their eating future by adopting healthier eating habits. Health education with no program will be ineffective and futile.<sup>25</sup> Selection of an education model keeps the program in the right direction. Selection of a suitable model, studying the behavior, a cost-effective and efficient teaching method to teach healthy behavioral intention and eliminating unhealthy behaviors all increase the effect of education.<sup>26</sup> Regarding the unhealthy behaviors and habits among elementary students<sup>27</sup> the current study aimed at studying the

effect of peer education via TPB on improving the behavioral nutrition of female elementary students in Chabahar City in 2017.

### Materials and Methods

The Ethics committee of the Zahedan University of Medical Sciences approved this study. Ethic code: IR.ZAUMS.SPH.REC.1395.241. This quasi-experimental study (before and after) was performed on the behavioral nutrition of 160 female elementary students in Chabahar. Based on the study performed on elementary students' behavioral nutrition, the nutritional performance of the students was considered to be 45%,<sup>28</sup> which was to be increased to 70%. Therefore, the sample size was 80 students in control group and 80 in the intervention group selected through multi-stage random sampling. In other words, at the first stage, two schools were randomly selected as the intervention group and the control group. At the second stage, the samples were randomly selected in each school in proportion to the number of classes. Notably, the control group was selected from the schools close to the intervention group so that they matched geographically, culturally and socially. The study inclusion criteria consisted of the ability to answer the questionnaire items, fourth grade education, ability to attend educational sessions. The exclusion criteria consisted of mentally retarded students. A questionnaire was developed and distributed among 20 similar students not engaged in the groups to answer the questions, based on which necessary changes were determined and applied to the items to make them as clearer as possible.

Data were collected using a researcher-made questionnaire. To determine the face and content validity of the questionnaire, 10 copies of the questionnaire were given to 10 health and nutrition education experts, who confirmed the face and content validity of the questionnaire; in addition, their comments were applied to the questionnaire. To confirm reliability, the questionnaire was distributed among 30 students (not included the study groups) to be completed followed by Cronbach's alpha test with a value of 0.79.

The whole questionnaires were then completed by the intervention and control students. There were two sections in the questionnaire: demographic

questions and knowledge questions (9 Qs), attitude (5 Qs), behavior (6 Qs), perceived behavioral control, subjective norms and behavioral intention (each 5 Qs). The questions were scored as: knowledge questions (correct answer = 2, incorrect answers = 0 and "I do not know" = 1); attitude questions ("I agree"=3, "no idea"=2 and "I don't agree"=1); behavioral questions ("the most desirable state"=3, "lack of healthy behavior"=0); the questions of perceived behavioral control and subjective norm ("I agree"=3, "no idea"=2 and "I don't agree"=1); and the questions of behavioral intention ("always"=3, "sometimes"=2 and "never"=1). Then, the completed questionnaires were analyzed and, accordingly, the training needs were determined followed by designing the educational content. Afterward, two 45-minute training sessions (question and answer) were held within two weeks by trained peers with the presence of the teacher and the researcher.<sup>27, 29</sup> After the end of the training session, a researcher-made educational pamphlet on Proper nutrition and food hygiene was distributed among students. Once the training course was completed, the waiting period was considered to be 2 months, after which the same pre-test questionnaire was completed again by the same students (intervention and control). The results obtained from this questionnaire (post-test) and those from completed questionnaires at the beginning of the program (pre-test) were collected

and analyzed with SPSS software using Paired t-test, independent t-test, regression and correlation at a significance level of <0.05.

**Results**

A total of 160 female elementary students took part in the present study. Moreover, 23% of the test students' fathers were illiterate, 39% of the control students' father had only primary level of education, 39% of the test students' mothers were illiterate and 37% of the control students' mothers had only primary level of education. Based on Chi-square test, no significant differences appeared to exist between the two intervention and control groups in terms of demographic data (parents' education) (P>0.05).

Paired sample T test was used to compare the results before and after the intervention. The findings revealed that the mean score of knowledge and behavior before and after intervention was not significant in the control group (P>0.05) but it was significant in the intervention group (P<0.001). Independent sample T test was run to compare the control and intervention groups and showed that the mean score changes of knowledge and behavior in the control group was not significant (P>0.05), but the intervention group showed a significant difference (P<0.001) (Table 1).

**Table 1: Comparison of mean changes and standard deviations of knowledge and behavior scores before and after intervention in the of intervention and control groups**

Group		Before	After	Mean of	P value
knowledge / behavior		intervention	intervention	the changes	(Paired sample T test)
		Mean ± SD	Mean ± SD		
Knowledge	Intervention	8.01± 6.18	9.95± 5.78	1.93± 1.61	P<0.001
	Control	8.13± 6.09	8.06± 6.00	0.08± 0.37	P=0.113
	P value	P=0.908	P<0.001	P<0.001	
(Independent sample T test)					
Behavior	Intervention	10.41± 4.06	11.83± 4.00	1.42± 1.27	P<0.001
	Control	10.49± 4.07	10.45± 4.07	0.03± 0.19	P=0.302
	P value	P=0.907	P<0.001	P<0.001	
(Independent sample T test)					

Regarding the constructs of TPB, paired sample T-test was used for comparing the results before and after the intervention. The findings showed

that the mean differences of behavioral intention, subjective norm and perceived behavioral control before and after intervention were significant in

the intervention group ( $P < 0.001$ ); however, the differences were not significant in the control group ( $P > 0.05$ ). Moreover, Independent sample T-test was conducted for comparing the results between the control and intervention groups. The results showed that the mean differences in the scores of behavioral intention, subjective norm and perceived behavioral

control were significant between the control and intervention groups ( $P < 0.05$ ). These changes were higher and positive in the control group suggesting that education significantly increases behavioral intention, subjective norm and perceived behavioral control of the intervention students (Table 2).

**Table 2: Comparison of mean scores of behavioral intention, subjective norm and perceived behavioral control in the control and intervention groups before and after educational intervention**

Group		Before intervention Mean ± SD	After intervention Mean ± SD	Mean of the changes	P value (Paired sample T test)
Behavioral Intention	Intervention	8.82± 3.59	10.05± 3.48	1.23± 1.11	$P < 0.001$
	Control	8.88± 3.50	8.82± 3.44	0.06± 0.06	$P = 0.103$
	P value	$P = 0.929$	$P < 0.001$	$P < 0.001$	
(Independent sample T test)					
Subjective Norm	Intervention	9.18± 3.36	10.42± 3.20	1.24± 0.16	$P < 0.001$
	Control	9.26± 3.30	9.20± 3.22	0.06± 0.02	$P = 0.199$
	P value	$P = 0.868$	$P < 0.001$	$P < 0.001$	
(Independent sample T test)					
Perceived behavioral control	Intervention	8.48± 2.74	10.00± 2.75	1.52± 0.03	$P < 0.001$
	Control	8.53± 2.64	8.46± 2.49	0.07± 0.15	$P = 0.322$
	P value	$P = 0.907$	$P < 0.001$	$P < 0.001$	
(Independent sample T test)					

Spearman correlation test showed positive and significant correlations between the behavioral changes in intervention students with knowledge

changes and the constructs of TPB ( $P < 0.05$ ) (Table 3).

**Table 3: Determination of coefficient correlation between changes in behavior and those in knowledge and model constructs (behavioral intention, subjective norm, and perceived behavioral control) in the intervention group**

variable	Knowledge	Behavioral intention	Subjective norm	Perceived behavioral control	Behavior control
Knowledge	1				
Behavioral intention	*0.345	1			
Subjective norm	*0.457	*0.293	1		
Perceived behavioral control	*0.267	*0.257	0.135	1	
Behavior	*0.241	*0.291	*0.313	*0.303	1

\* $P < 0/05$

In addition, regression analysis indicated the significance of regression model (dependent variable of the model: behavior, independent variables (predictors): knowledge, behavioral intention, subjective norm and perceived behavioral control) ( $P=0.002$ ); in other words, this model can explain (predict) the changes of dependent variable of behavior. The value of this change based on the adjusted coefficient of determination equals 0.11, that is, the model can explain  $\approx 11\%$  of the dependent variable (behavior) changes.

\*The dependent variable of the model: behavior; independent variables (predictors): knowledge, behavioral intention, subjective norm and perceived behavioral control.

A survey of individual independent variables showed that knowledge had the highest influence on behavior such that for any one-unit increase in knowledge, 0.348-unit increase occurs in behavior. Then, the highest influences go to behavioral intention and perceived behavioral control, respectively (Table 4).

**Table 4: Absolute impacts of the changes in independent variables (knowledge, behavioral intention, and perceived behavioral control) on the changes in dependent variable (behavior) in the intervention group**

Model	Variables	B	SE	Beta	T	Sig
	Knowledge	0.507	0.155	0.348	3.277	0.002
	Behavioral intention	0.603	0.152	0.380	4.236	0.0001
	Perceived behavioral control	0.397	0.142	0.254	2.553	0.034

## Discussion

Findings of the current study suggested that peer education intervention based on the TPB influenced the improvement of health behavioral nutrition among the study participants. Peer education approach can be effective based on the fact that sensitive information is more easily transferred among individuals of the same age. In the study conducted by Woodward<sup>30</sup> and Maretha,<sup>31</sup> the impact of peer education on improving health behaviors was confirmed compared to other techniques.

No significant differences were observed between the control and intervention groups in terms of the mean changes and standard deviations of knowledge scores prior to the intervention. After the intervention, the control group showed no significant difference in their mean scores of knowledge, while the intervention group displayed a significant difference in this regard. In the intervention group, the knowledge mean scores increased significantly after the intervention. Our results are consistent with findings of other studies carried out over the effect of education on nutritional knowledge of the students especially those reported by Alicia Raby Powers,<sup>32</sup> Shariff,<sup>33</sup> and Ghaffari.<sup>34</sup> Knowledge scores were significantly higher in the intervention group than the

control group, confirming the effect of educational intervention on the students' nutritional knowledge.

A comparison of the mean changes and standard deviation of the behavior scores revealed that education had a positive effect on improving the nutritional behavior in the intervention group. Education based on TPB increased the students' perception of breakfast and meal. The behavior mean scores of the intervention group increased significantly after the intervention. Nutritional behavior improvement was also confirmed in a study by Vassallo.<sup>35</sup>

In the present study, mean score of the Behavioral intention showed a significant increase among the intervention group after the educational intervention. The results of some studies were similar to the findings of our research. As reported by Mohammadi Zeidi *et al.*,<sup>36</sup> and Qasvandi *et al.*,<sup>37</sup> the mean score of this construct increased significantly among members of the intervention group.

With regard to the subjective norm, we found a significant increase in scores of the experimental group after the educational intervention and findings of different studies confirmed our findings.<sup>38,39</sup>

However, some other studies reported contradictory results. For example, Vakili *et al.*,<sup>40</sup> as well as Lautenschlager and Smith<sup>41</sup> revealed that scores of the subjective norm decreased after the educational intervention in the experimental group. This discrepancy can be due to application of different educational programs, educational program contents, study period, participants, as well as social, cultural, and economic characteristics of the study groups, etc.

The third construct was "perceived behavior control", which deals with the people's beliefs about their abilities to control behavior. This construct is attributed to the ease or difficulty in performing a behavior.<sup>16</sup> In the current study, mean scores of the perceived behavioral control increased significantly after the intervention. In a study conducted by White, the mean score of perceived behavioral control showed a significant increase after the educational intervention.<sup>15</sup> Several studies reported increased mean levels of perceived behavioral control after the education.<sup>42, 43</sup>

The results of Spearman correlation test showed that the behavior scores changed positively and significantly by increased scores of the knowledge, behavioral intention, subjective norm, and perceived behavioral control constructs. The increase in each of these constructs leads to promotion of the healthy nutritional behavior. In addition, the results of regression analysis showed significance of the regression model (dependent variable: behavior; independent variables: knowledge, behavioral intention, subjective norm, and perceived behavioral control). In other words, this model can predict the

changes in dependent variables of behavior. The value of this prediction was 0.11 based on the adjusted determination coefficient; the model can explain 11% of the dependent variable changes (behavior).

A survey of individual independent variables showed that knowledge had the highest influence on behavior, so that for a one-unit increase in knowledge, 0.348-unit increase was observed in the behavior. Moreover, the highest influences were recorded for behavioral intention and perceived behavioral control, respectively.

### Conclusions

Results of the current study show that nutrition education peer education based on the TPB approach may influence the nutritional behavior of the elementary students. However, it affected the individuals' behavior positively by increasing their knowledge, behavioral intention, and perceived behavioral control.

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### Conflict of Interest

The authors do not have any conflict of interest.

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