



Effect of education based on theory of planned behavior in healthy cooking

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Introduction

Nutrition is among the most important factors affecting health and in the meantime, is one of the most important environmental factors that should be considered in this regard. Concerning this issue can help prevent occurrence of various diseases in the community [1].

Unhealthy eating behaviors are the primary determinant of three leading causes of death and morbidity in the United States including heart disease, cancer, and stroke. Healthy eating habits can decrease the risk of several chronic diseases and also reduce the overall mortality in women by 11%. Healthy food choices as well as consumption of fewer calories are both

Abstract

Healthy eating habits can reduce the risk of several chronic diseases and decrease overall mortality in women by 11%. Regarding the crucial role of women in feeding the family, we investigated the effect of education in healthy cooking behavior of rural women by applying the Theory of Planned Behavior (TPB). A sample of native women in rural areas of Chabahar (n=152), who aged 12-75 years old, were selected by multistage sampling. Pre and post intervention measures of TPB variables, knowledge, and behavior were conducted via questionnaire. The educational intervention was performed with the help of high school girl students for the intervention group. There were positive significant changes in healthy cooking behavior intention, knowledge, subjective norms, perceived behavioral control, and behavior in the intervention group, while none of these changes were significant in the control group. The results suggest that educational intervention based on the theory of planned behavior can be effective in healthy cooking behavior of rural women of Chabahar.

Keywords: Cooking, Education, Woman, theory of planned behavior

important in weight loss and reducing the risk of coronary heart disease, cancer, and stroke [2]. According to the United States Department of Agriculture (USDA), proper nutrition can reduce mortality from several diseases such as heart disease by %25, respiratory and infectious diseases and cancer by 20% and diabetes by %50. While the role of nutrition in diseases is indispensable, the fact remains that performance and health indicators in women are not satisfactory [3]. Studies in Sistan and Baluchistan province, Iran, indicate unsatisfactory awareness in society about different aspects of nutrition

and reveal poor function of families in this regard [4]. High prevalence of malnutrition and micronutrient deficiency in children of Sistan and Baluchistan province is also another sign of low nutritional knowledge among women of this community [5].

Women's knowledge of cooking techniques and storage of food and proper nutrition is fundamental for health and food processing, while we know that preparing, cooking, and preserving food is highly effective in healthy eating.

Thereupon, nowadays notifying social groups, particularly women, toward issues relevant to healthy eating including correct methods of cooking has generated wide interest in the field of health care services. But it is necessary to notice that, in the vast majority of families, women are in charge of preparation and cooking food; accordingly it is obvious that the higher their knowledge about health issues is, the better the level of family health will be. Hence, reforming women's beliefs about healthy eating is essential [3]. Based on what was said, we developed our intervention to promote nutrition behavior among women by using our model.

Theory of planned behavior (TPB) is widely recognized as one of the most important theories in the field of food selection [4]. TPB assumes that the most important determinant of every behavior is the intention to do it. This intention on its own is determined by attitude toward behavior (instrumental or affective evaluation of behavior), subjective norms (perceived social pressure from significant others toward doing that behavior), and perceived behavioral control (whether it is easy or difficult to do that behavior or whether it is under the control of the person or not) [4].

Thomas and Irwin [5] evaluated the effectiveness of a community-based program named "cook it up!" among in-danger adolescents. Another educational intervention was conducted in the United States to promote quality of nutrition among religious communities using healthy meal preparation training based on healthy eating principals as a part of educational program

[6]. Larson and colleagues [7] examined the provision of food by young people with a view to describe the food preparation behaviors, cooking skills and resources to provide food and also determine the correlation of these factors with the quality of nutrition in the youth in America in 2006. Hajikazemi and colleagues [8] evaluated knowledge of women toward cooking methods at home in Rey in Iran. According to literature review on scientific researches, there is not any research in the world conducted to examine the effect of education on healthy cooking behavior of women based on the theory of planned behavior. Additionally, studies in Iran which examined the impact of education based on the theory of planned behavior are mostly targeted the behaviors other than healthy cooking ones [9-15]. Hence, this study aimed to investigate the effect of education using the theory of planned behavior on healthy food preparation methods among rural women in Chabahar.

Method

This was a quasi-experimental research which was conducted in 2015 and sought to provide further evidence of whether educational intervention based on the theory of planned behavior is effective in increasing healthy cooking behaviors in rural women of Chabahar. The port city of Chabahar, the center of Part of Chabahar is one of the lowest regions of Sistan and Baluchistan province on the southern coast of the Sea of Oman. Chabahar generally has a sultry climate [16]. The study population comprised women of the villages in the central part of Chabahar. The inclusion criteria were females older than 12 years doing some part or all of cookery duties at home. Multistage sampling was used to recruit rural women. Firstly, we selected two villages (named Ramin and Tiss) which had girl's high school from the central part of Chabahar based on the target. Then, by cluster random sampling, we selected one class from each high school and invited all of the students of the classes as our assistants

to help us with distribution and filling out the questionnaires. In the village of Ramin, where the whole number of high school students was 16, all of the students having informed consent were recruited to participate in the study.

But in the high school of Tiss village, which had 80 students, one of the classes was selected randomly and all the students in the class having informed consent were recruited. Totally, 32 assistants were recruited. To determine subjects in each village, convenience sampling was used. Each of the assistants was asked to distribute 8 questionnaires among 8 women of her neighbor.

The sample size was calculated using the formula. The confidence interval ($Z_{1-\alpha/2}$) was set at the level of 90%. we accepted $p < 0.05$ as significant so it is 1.64. (the power was set at 80% so $z_{1-\beta}$ will be 0.85. according to previously published studies rate of healthy cooking behavior was about 36% and assuming that educational intervention will bring about a 20% improvement in behavior scores, after replacement in the formula, the required sample size was calculated as 74 in each group. Considering the risk of loss due to attrition and deletion of incomplete questionnaires, the sample size increased to 130 participants in each group. Two villages were divided randomly into two groups and 260 sets of questionnaires were distributed among rural women through trained volunteers. After eliminating incomplete questionnaires and attrition, data of 152 samples were analyzed at the end of the second stage.

The research tool was a questionnaire developed by the investigators after studying scientific documents in the field of nutrition and theory of planned behavior. The research variables were attitude, subjective norms, perceived behavioral control, intention, and behavior as well as questions related to respondents characteristics.

The first part of the questionnaire inquired demographic characteristics including age, marital status, size of family, number of children, level of education, and income. The second part contained questions related to

healthy cooking behavior as the past behavior. Healthy cooking methods in previous studies also had been investigated by past behavior [4]. To determine the participants' past behavior, the following question was used "On average how many times a week do you use the following methods for cooking?" Three segments included boiled, steamed, and grilled with the choices of never (score 1), once a week (score 2), 2-3 times a week (score 3), 4-6 times a week (score 4), and once a day (score 5). The last segment included fried with the choices of never (score 5), once a week (score 4), 2-3 times a week (score 3), 4-6 times a week (score 2), and once a day (score 1). The higher the score was, the better and healthier the cooking methods were used. The third part of questionnaire included questions related to knowledge that was measured using two multiple-choice questions; the correct answers scored 2 while the wrong answers or the choice of "I do not know" scored 1. The knowledge measuring section was comprised of the following questions: "If we fry vegetables more than enough, the useful nutrients will be damaged?" and "What is the healthiest cooking method?". Healthy cooking intention was measured using two questions: "I'm going to eat less fried foods" and "I'm going to eat more steamed, boiled, or grilled foods" and the choices were "Agree-Disagree".

The fourth part of the questionnaire was designed to investigate the constructs of theory of planned behavior. This section contained 4 items which measured attitudes toward behavior including "In my opinion, fried and fatty food is bad for health", "In my opinion, fried and fatty food is nutrient", "cooking low-fat and steamed food is hard for me", and "low-fat and steamed food is bad for my taste". The choices were 3 ranged from Agree to Disagree. Subjective norms were measured by questions "My family members and friends prefer to eat steamed, grilled or boiled foods rather than fried foods". "My family members and friends recommend me to eat steamed or boiled foods rather than

fried foods". The choices were 3 ranged from Agree to Disagree. In addition, the question "In general, how much do you care your family members and friend's opinion about whether or not you should eat less fried foods ?" was measured with 3 choices ranged from "I don't care at all" to "I care so much". Eventually, the construct of perceived behavioral control was measured by two questions "If I want, I can eat more steamed and boiled foods next month" and "If I want, I can eat less fatty and fried foods next month" which were answered with 3 choices ranged from Agree to Disagree. Additionally, another question was set into questionnaire to learn about the "important relevant others" from participants' perspective. To this end, the participants were asked "comment on which one of the following persons on the subject of cooking is important to you and you follow it? Spouse and children, parents, siblings, friends or neighbors, other relevant others were the choices and about this question, it was stipulated that respondents can mark more than one choice.

To determine the scientific validity of the data collection tool, the questionnaire was sent to 10 faculty members and experts to gain their reform advises for applying in the revisions. To determine the resolution of questions, the questionnaire was filled out by 20 women from the same population but study samples. The reliability of questionnaire was determined using test-retest method. The inventory's correlation coefficient values was 0.79 and given that amounts higher than 0.7 is desirable [17], it was adopted.

Through a scientific practical session, the way of completing the questionnaire and communicating with audiences was taught to research volunteers of both villages. The first phase of filling questionnaires in both intervention and control groups was carried out. The educational program based on the theory of planned behavior was developed based on the results of the first stage. Enabling volunteers of intervention group about training materials, training methods, and implementation of process was accomplished in one training session in the

form of speech and another group discussion session. The impact of educating volunteers was measured using the written test-retest exam before and after training.

Since the group discussion is known as one of the most successful educational methods in order to solve problems, practice some of skills, and shape attitudes of small groups [11], each one of the volunteers was asked to run a group discussion among their participants to change their attitude towards the behavior. As regards adults learn more difficult than children and they are more likely to forget due to being concerned with kids and daily life, providing printed material that allows women to engage in education during the rest time or at home is preferable [11]. Therefore, a colorful booklet containing images was prepared and provided by volunteers in the intervention group. Since the scores of subjective norms in the study population was high and furthermore, according to the participants self-reports, women mostly reported their husbands and children and girls reported their parents as the most important persons whose nutritional behaviors and expectations affects their behavior, encouraging and persuasive letters was designed and was sent to the "significant others" through training volunteers and they were asked to support and encourage the participants.

During the intervention period, no training program was considered by the researchers to the participants of the control group. The healthy cooking methods as well as other structures of theory of planned behavior in both groups were evaluated by questionnaire based on self-report of research sample 2 months after the intervention. Data obtained were analyzed using SPSS software version 19 by applying methods including paired/independent t-test, Pearson correlation, and stepwise regression.

Results

Prior to the intervention, control and intervention groups were compared to each other in terms of demographic factors such

as age, height, weight, marital status, having job outside home, education level, income, household population, and the number of children using independent statistical tests. The results showed that there was not any statistically significant difference between the two groups in this regard. The variables were categorized using the recode command. The age of participants ranged from 12 to 72 years, with an average of 26.66 and a standard deviation of 9.72 years.

According to the results, the majority of

participants (84.8%) were 12 to 34 years old; most of them (55.9%) had passed only elementary or middle school. BMI of the majority of participants (54.6%) was less than 24, meaning that they were mostly in the range of fit or slim. Most households (59.9%) had a size of more than five; yet, the majority of participants (59.2%) had less than 2 children. According to the participants, the majority of households (54.6%) had a monthly income less than 400 thousand toomans. 86.5% were housewives and 67.1% had spouse.

Table 1 Data on the structures of the theory of planned behavior in both intervention and control groups before and after the intervention

Indicators	Mean ±Standard deviation				p-value*	
	Intervention group		Control group		Before	After
	Before	After	Before	After		
Knowledge	0.61 ±0.65	1.65 ±0.60	0.66 ±0.69	0.62 ±0.70	0.657	0.000
Attitude	4.05 ±1.65	5.37 ±1.85	4.90 ±1.92	4.51 ±1.69	0.004	0.004
Perceived behavioral control	2.72 ±1.25)	3.22 ±1.06	2.48 ±1.24	2.35 ±1.16	0.239	0.000
Subjective norms	3.20 ±1.42	4.34 ±1.39	3.10 ±1.59	2.90 ±1.28	0.696	0.000
Intention	2.65 ±1.04	3.14 ±0.98	2.29 ±1.17	2.12 ±1.20	0.051	0.000
Behavior	5.37 ±33%	6.97 ±43%	6.33 ±39%	6.77 ±42%	0.015	0.668

*Independent T –test

Data on the theory of planned behavior constructs before and after the intervention in both groups can be seen in Table 1. As is observed, there was a significant difference in all variables between the two groups after the intervention. The average scores of healthy cooking knowledge and behavior in the study population was poor before the intervention (<33% of the maximum score) and the range of knowledge in the intervention group rose to desirable range (>66% of the maximum score) and the behavior score reached to the average range (33% -66% of the maximum score) after the intervention.

Scores of subjective norms, intention, and attitude in both groups were in the middle range before the intervention while they all rose to

desirable range (>66% of the maximum score) after the intervention. Perceived behavioral control was in the optimal range and improved after the intervention.

The results of the present study shows that the changes in the scores of behavior, knowledge, attitude, intention, perceived behavioral control, and subjective norms were significant in the intervention group, whereas the changes in the scores of the control group was not significant in any of the variables. The most positive changes were observed in knowledge, attitude, behavior, and subjective norms (p<0.001), followed by perceived behavioral control (p<0.003) and intention (p<0.001).

Table 2 Regression analyses for predicting changes in healthy cooking behavior

Independent variable	B(SE)	Beta	p-value	R ²
Subjective norms	0.855(0.239)	0.203	<0.001	0.041

The results of the regression analysis by placing healthy cooking behavior as dependent variable indicated that only changes in subjective norms can predict the changes in

the healthy cooking behavior significantly. The results of the regression analyses for predicting changes in healthy cooking behavior is shown in Table 2.

Table 3 Regression analyses for predicting changes in intention

Independent variable	B(SE)	Beta	p-value	R ²
Changes in knowledge	0.456(0.112)	0.312	<0.001	0.153
Changes in Subjective norms	0.183(0.056)	0.249	<0.001	0.208

Whereas, replacing intention as dependent variable showed that changes in knowledge and subjective norms was significantly capable of predicting changes in intention. Changes in the constructs of intention, perceived behavioral control, attitude, and knowledge could not predict changes in healthy cooking intention and behavior. The results of the regression analyses for predicting changes in intention is shown in Table 3.

Discussion

The results of the present study suggest that implementation of educational program based on the theory of planned behavior (TPB) leads to a promotion in knowledge, behavior, and other constructs of TPB. Accordingly, one can conclude that the use of rural indigenous girls along with education in the form of group discussion, brochures, poster as well as encouraging letters for husbands and parents was helpful to achieve goals and promote the variables of the study.

However, Carson reported different results suggesting that educational intervention based on the theory of planned behavior could not lead to a change in nutritional behavior whereas it contributed to a promotion in attitude as well as perceived behavioral control of participants [17]. It should be noted that the aforementioned study focused on adolescents in Texas, while our study included mothers and other female cooks in household. Also, that study targeted obesity-related food behavior while our study aimed to promote healthy cooking behavior which is definitely much different from obesity-related food behaviors.

However, the study of Kothe et al. drew similar conclusions with our study. They reported that all constructs of theory of planned behavior

and behavior of fruit and vegetable intake increased in the experimental group after the intervention [18].

Also, the study results of Psych showed that educational intervention can change intention to eat fast food as well as fast food consumption behavior. In the latter study, 5% of the variance of behavior and intention was explained by the model [19]. The findings of the study of Paranjape which sought to evaluate the differences of behavioral intention, attitude, and perceived behavioral control towards healthy nutrition between individuals who had participated in a group counseling program and people who had received individual counseling illustrated that scores of the constructs of theory of planned behavior in both groups were improved. However, the scores of intention of participants in group counseling were significantly more than the scores of participants in individual counseling. There was not any significant difference between the scores in perceived behavioral control in both groups [20]. The study result of Pakpur Haji Agha and Zaidi in Qazvin, as well as the results of Zamani study in Arak in which the effect of education on eating breakfast behavior of elementary school students was examined, demonstrated that the intervention based on the theory of planned behavior lead to an improvement in behavior of intervention group [21,22]. A systematic review study by Hardman and colleagues about the application of theory of planned behavior in behavior change interventions concluded that half of the educational interventions based on the theory of planned behavior lead to a change in intention and two-thirds lead to a change in behavior, In addition, the total impact was

minimal [23]. The results of the present study showed that in the rural community of Chabahar, attitude and perceived behavioral control could not predict behavior intention of women to use healthy cooking methods, instead subjective norms owns this capability. This maybe stem from the social and cultural texture of society under the subject of study as native Chabahar's people are mostly Baluchs [24]; accordingly it can be concluded that women considerably tend to compliance with and observance of expectations from the significant others, such as husbands and parents in rural and ethnic community of Chabahar.

Moreover, our results suggest that the intention failed to predict behavior. Inability of intention to predict behavior can indicate that there might be some barriers against healthy cooking behavior of participants in this study or on the contrary, facilitators of healthy cooking behavior are deficient or weak. This finding also prompts a re-thinking of the main determinants of behavior. For instance, Salehi and colleagues studied the factors affecting the behavior other than constructs of theory of planned behavior in the elderly population in Tehran. Their results presented that knowledge, self-efficacy, family support, and perceived barriers and benefits are significantly associated with behavior [25].

The strengths of this study include conducting a theory-based intervention as well as selection of Chabahar rural women as the study samples. The limitations of this study might be the using self-report questionnaires to collect data and investigation of healthy cooking behavior as past behavior [26].

Conclusion

The findings provide support for effect of educational interventions based on the theory of planned behavior to promote healthy behaviors and improve determinants of healthy cooking intention and behavior. Low impact of training program on attitudes also offers insight into the rigidity of women's attitudes and beliefs about healthy cooking behavior in this society and furthermore, it claims meticulous efforts to plan future programs for education on healthy eating.

Implementation of educational programs simultaneously removing barriers against application of healthy cooking methods can provide a cornerstone for improving nutritional health in women. More extensive studies are needed to evaluate the impact of interventions over time.

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Contribution

Study design: RA, FM, IZ

Data collection and analysis: RA, MS

Manuscript preparation and edition: RA, IZ

Conflict of Interest

"The authors declare that they have no competing interests."

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