

## Effect of educational interventions based on theory of planned behavior to promote breakfast consumption behavior in students

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### ABSTRACT

**Introduction:** Frequency of breakfast consumption has declined in the last half century. This meal is ignored by children and adolescents. This study was aimed at determining the effect of a training program based on theory of planned behavior on promotion of breakfast consumption in students.

**Methods:** This interventional quasi-experimental study was carried out in Bandar Abbas in 2011 on 88 middle-school students who were selected through the multistage cluster-sampling method. The data collection instrument was a questionnaire, designed based on the structured theory of planned behavior, whose validity and reliability were determined in the pilot study. The collected data were analyzed with SPSS 18 through linear regression, t-test, paired t-test, Wilcoxon, and Mann-Whitney tests.

**Results:** After the completion of the training program, perceived behavioral control and intention of having breakfast were increased in the intervention group, and the change was significant based on Wilcoxon test ( $P=0.000$ ).

**Conclusion:** According to the results, instructional strategies based on theory of planned behavior should be taken into account in order to increase intention toward and consumption of breakfast by students. Considering the subjective norms encouraging students to have breakfast especially in peer groups and parents can be helpful in designing educational programs.

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### Introduction:

Regular consumption of breakfast is associated with physical health and prolonged survival. It can significantly help daily intake of micronutrients such as calcium, iron, and vitamins which are essential for healthy development during adolescence (1). Therefore, the quantity and quality of breakfast is of great importance in the diet (2). In Brandi's research, it was found that students who breakfasted had the highest levels of vitamins A, B6, B12,

thiamin, riboflavin, and niacin absorption and the lowest level of fat absorption (3).

Eating breakfast is also associated with other healthy behaviors such as regular physical activity (4) and brushing (1). Despite these findings, studies have shown that the frequency of breakfast consumption has decreased in the last half century and this meal is ignored by children and adolescents (5). Research has shown that skipping breakfast is associated with poor performance of students in

school and is positively correlated with behaviors that endanger health such as smoking, drinking alcohol, irregular exercise, reduced amount of sleep, lack of behavioral inhibition (1), and increased body mass index (6). Breakfast strengthens cognitive performance of children and improves long- and short-term memories (7).

Given the high rate of skipping breakfast among students and with regard to the importance of this meal, and that many studies in Iran have investigated the overall status of breakfast (8), in this study, we have tried to design a suitable educational program and to predict the intention to breakfast, because meta-analysis studies of theory of planned behavior (TPB) show that the constructs of TPB can well predict the intention and then the behavior (9,10). In this study, TPB was used as the theoretical framework for designing an educational program of correct model of eating breakfast in students. Several studies performed on this model have proved its efficiency particularly in the area of nutrition education (20,21). In a study by Dunn, the constructs of TPB predicted 50% of intention and 40% of behavior of fast food consumption (13).

The theory of planned behavior can predict the behavior provided that person intends to perform it (14). According to TPB, the intention to perform a behavior is predicted by three factors including attitude towards behavior which is positive or negative evaluation about performing a behavior, subjective norms which address the social pressure perceived by individual about doing or not doing the target behavior, and perceived behavioral control which refers to the degree of individual's feeling about the extent of his/her voluntary control for doing or not doing a behavior. Behavior intention represents the will of people to perform behavior (15). The relationship between behavioral intention and behavior shows that people tend to engage in behaviors that intend to do. The theory assumes that behavior is exclusively under the control of behavioral intention, therefore this theory is mostly applied in voluntary behaviors (16).

## Methods:

This interventional, semi-experimental study was conducted in Bandar Abbas on middle school students who were selected through the multi-stage

cluster sampling method. To this end, from two educational zones of Bandar Abbas, one was randomly selected from which four middle schools (2 girls and 2 boys) were randomly selected and divided into two groups of intervention and control, each including one boys' and one girls' schools, using the random numbers table.

Twenty five students were randomly selected from each school of the intervention and control groups (50 in each group), and 6 students in each group were excluded because they did not complete the questionnaire, and finally 44 students in the intervention group and 44 in the control group were included in the study. Since this research was an interventional study, according to the amount of expected difference based on similar studies (27), sample size was calculated 3% before and after the intervention with a standard deviation of 5, and with test power of 90% and reference interval of 95%.

The data collection questionnaire contained demographic information, items which measured the knowledge of students regarding the importance of breakfast consumption, and items based on constructs of TPB. The questionnaire was translated into Persian from the questionnaire of Sungperm research (28), and was used after determining its validity and reliability. The construct of attitude towards breakfast consumption had 13 items with 5-point Likert scale and minimum and maximum scores of 13 and 65, respectively, subjective norms towards breakfast consumption had 17 items including 3 parts of descriptive norms (5 items), moral norms (6 items), and imperative norms (6 items) with 3-point Likert scale and minimum and maximum scores of 17 and 51, respectively, perceived behavioral control for breakfast consumption had 10 items including 2 parts of controlling thoughts (5 items) and perceived power (5 items) with 3-point Likert scale and minimum and maximum scores of 10 and 30, respectively, and the construct of behavioral intention for breakfast consumption had 3 items with 5-point Likert scale and minimum and maximum scores of 3 and 15, respectively. The behavior questionnaire included items about foodstuffs consumed usually at breakfast based on the unit of that food consumed during the past week; 13 foodstuffs were scored from 0 to 3 for each day of the week, with

minimum and maximum scores of foods consumption of zero and 276, respectively, in which a higher score indicates more consumption. The questionnaire of knowledge on breakfast consumption and nutrients had eight 4-choice items scored zero and one, with minimum and maximum scores of zero and 8, respectively.

Validity of the questionnaire was assessed by a panel of experts and through a pilot study on 30 students from the target population, and their comments was used to modify the items. To determine the reliability, internal consistency and Cronbach's alpha coefficient were applied. Cronbach's alpha coefficients for the constructs attitude, subjective norms, perceived behavioral control, and behavioral intention were 0.68, 0.82, 0.73, and 0.75, respectively, which suggest that a good internal consistency existed for items in each section of the questionnaire. Cronbach's alpha coefficient of the total questionnaire was 0.8.

The project was implemented through the following steps. Step one: guiding students by the researcher to participate in the study. Step two: selecting the intervention and control groups. Step three: measurement of independent variables including age, gender, and parents' occupation, and dependent variables including attitude, subjective norms, perceived behavioral control, breakfast intention, and breakfast behavior before the intervention. Step four: diagnostic evaluation in which the prognostic value of each variable studied based on TPB for behavioral intention was measured using linear regression analysis in order to set up the educational content for intervention, and that perceived behavioral control was the stronger predictor of behavioral intention (Table 1). Step five: providing educational content based on training needs identified during the diagnostic evaluation step (Table 2). Step six: educational intervention through communication methods, lecture, group discussion, and question and answer in five 60-minute sessions, as well as preparing the booklet of Healthy Nutrition provided to the students for free. Step seven: assessment of the

effect of educational intervention regarding breakfast consumption, personal attitudes and beliefs about breakfast consumption, subjective norms encouraging breakfast consumption, perceived behavioral control of breakfast consumption, and intention to breakfast. The assessment was performed both during the educational process through questions and answers and 2 months after the intervention through questionnaires. According to ethical standards, the project was coordinated with the Education authorities, the students were participated voluntarily, and the educational booklets were provided for free. The data were analyzed using SPSS-18 through paired t-test, independent t-test, Mann-Whitney, and Wilcoxon tests.

## Results:

Both the intervention and control groups included 44 students. The mean age of the intervention group and the control group was 13.88 and 13.90 years, respectively, and no significant difference existed between them. The mean weight and height of the students in the intervention group was 46.27 kg and 153.15 cm and in the control group 45.9 kg and 154 cm, respectively, and there was no significant difference between them. Sleeping time at night was 10:47 PM in the intervention group and 10:50 PM in the control group.

Most mothers of students in both intervention and control groups were housewives. Food was prepared for the family by 95.5% of mothers in the intervention group and 93.2% of mothers in the control group. Most students in both intervention and control groups had fathers with educational levels of higher than diploma, while unemployed fathers had the lowest frequency in both groups. There was no statistically significant difference between the intervention and control groups in none of the above results.

**Table 1. Linear Regression Analysis for Model's Variables as Predictors of Behavioral Intention**

Variables	B	Standard error	t	p-value
Knowledge	-0.141	0.279	-0.505	0.616
Attitude	-0.041	0.043	-0.959	0.343
Social norms	0.154	0.096	1.608	0.116
Perceived behavioral control	0.141	0.142	2.886	0.006

**Table 2: Outlines of Educational Topics Based on the Constructs of TPB to Enhance Breakfast Consumption by Students**

Sessions	Session goal	Educational goals	Educational method	Educational materials
1	Increased knowledge	Students' familiarity with the concept of food, the role of food in the body, food groups, various nutrients, the importance of breakfast and its effects on memory and learning	Lectures, slides, questions and answers	Whiteboard, projector
2	Development of positive attitude	Breakfast benefits such as increased absorption of vitamins, reduced absorption of fat, increased energy and vitality, and disadvantages of skipping breakfast such as poor performance in tasks, increased BMI, fatigue, and lack of interest in learning	Showing clip questions and answers	Projector, booklet
3	Enforcement of objective norms	Encouraging students to eat breakfast through applauding by classmates in case of breakfast consumption, encouraging students to educate parents about early serving of breakfast and use of healthy food in breakfast such as bread, cheese and walnuts, eggs, milk, lentil, etc.	Group discussion, questions and answers	Booklet, whiteboard
4	Perceived behavioral control	Identification of inhibitory factors such as lack of time for eating breakfast, unprepared breakfast, lack of appetite for breakfast	Group discussion	Booklet, whiteboard
5	Perceived behavioral control	Providing strategies to reduce or eliminate barriers to breakfast such as: dinner should be eaten early at evening to have appetite for breakfast and students should sleep at a certain time to have enough time for breakfast, encouraging students to learn more about reducing barriers for breakfast in the booklet developed by researchers	Group discussion	Booklet

**Table 3: Comparison of Knowledge, Attitude, Subjective Norms, and Perceived Behavioral Control in Intervention and Control Groups before and after Training**

Variable	Group	Intervention	Control	P-value
		Mean (SD)	Mean (SD)	
Knowledge	Before education	3.93 (1.46)	3.88 (1.57)	0.746 (Mnn-Whitney) 0.001 (Mnn-Whitney)
	After education	5.34 (1.5)	3.97 (2.16)	
	P-value (Wilcoxon)	0.000	0.661	
Attitude	Before education	50.63 (10.2)	53.22 (6.66)	0.163 (t-test) 0.006 (t-test)
	After education	57.63 (6.53)	53.88 (5.95)	
	P-value (paired t)	0.000	0.599	
Objective norms	Before education	43.09 (4.56)	42.84 (8.57)	0.865 (t-test) 0.000 (t-test)
	After education	51.84 (10.37)	44.88 (5.03)	
	P-value (paired t)	0.000	0.102	
Behavior control	Before education	22.97 (2.88)	22.7 (3.6)	0.843 (Mnn-Whitney) 0.003 (Mnn-Whitney)
	After education	25 (3.22)	22.7 (2.33)	
	P-value (Wilcoxon)	0.005	0.799	

**Table 4. Comparison of Intention of Having Breakfast in the Intervention and Control groups before and after Training**

Behavioral intention	Before intervention		Control		After intervention		Control		P-value (Wilcoxon)
	Interventio		Control		Interventio		Control		
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
No intention to breakfast	6	13.6	1	2.3	0	0	8	18.2	Control 0.058
Unsure of breakfasting	11	25	16	36.4	0	0	13	29.5	
Intention to breakfast	27	61.4	27	61.4	44	100	23	52.3	Intervention 0.000
<b>Total</b>	44	100	44	100	44	100	44	100	
<b>P-value (Mann-Whitney)</b>	<b>0.68</b>				<b>0.68</b>				

**Table 5. Comparison of Breakfast Consumption in the Intervention and Control Groups before and after Training**

Breakfast behavior	Before intervention	After intervention	P-value (paired t)
	Mean (SD)	Mean (SD)	
<b>Intervention group</b>	74.31 (38.21)	98.29 (39.01)	0.007
<b>Control group</b>	76.65 (35.55)	71.02 (35.76)	0.334
<b>p-value (t-test)</b>	0.767	0.001	

Mann-Whitney, Wilcoxon, paired t-test, and independent t-test revealed that no significant difference existed between the two groups before intervention in terms of variables knowledge, attitudes, subjective norms, and perceived behavioral control (Table 3). But according to by Wilcoxon test, mean score of knowledge in the intervention group increased from 3.93 to 5.34 after the intervention and this difference was statistically significant (P=0.000), while no significant difference was seen in the control group. The mean score of attitude towards breakfast in the intervention group was increased from 50.63 before the intervention to 57.63 after completion of the training course, and difference was significant based on paired t-test (P=0.000), but there was no significant difference in the control group. After completing the training program, a significant increase was observed in the intervention group in the levels of subjective norms based on paired t-test and perceived behavioral control based on Wilcoxon test (P=0.000), while there was no significant difference in the control group. Regarding the intention to breakfast before training in the intervention group, 61.4% intended to breakfast, 25% were unsure of breakfasting, and 13.6% not intended to breakfast. After completing the training program, the intention to breakfast raised to 100%. These changes were statistically significant according to Wilcoxon test (P=0.000).

In the control group, 61.4% intended to breakfast, 36.4% were unsure of breakfasting, and 2.3% not intended to breakfast, According to Mann-Whitney test, a significant difference existed between the two groups after the intervention in terms of intention to breakfast (P=0.000) (Table 4).

Table 5 depicts the amount of breakfast consumption by students before and after the intervention. According to this table, the amount of breakfast consumption after the training program was increased in the intervention group both in comparison with before the intervention and with the control group based on paired t-test and t-test, and this difference was statistically significant (P<0.01).

**Conclusion:**

Eating habits are forming from childhood and continue with age (19). According to a study by Gail, breakfast increases students' cognitive functions which per se can improve lifestyle (20). The results of the present study show that the use of the theory of planned behavior (TPB) is effective in increasing breakfast consumption by school students. In this research, the students' knowledge of the importance of breakfast and beneficial nutrients in breakfast was low in both groups of intervention and control at baseline. This can be due

to inadequacy of nutrition education by teachers and parents as well as the media, and since the students' scores in the intervention group increased after training, it can be stated that the developed training program was more effective in promotion of knowledge than education through textbooks and other educational and communication materials.

In terms of increased levels of knowledge among students after training, the present research is consistent with the study of Chris (21) on Austrian students, which showed that nutrition education using a computer curriculum during 2 weeks can increase students' knowledge; with the study of Angurani (22) who showed that the mean knowledge score of students about breakfast consumption has increased after training; and with the study by Turnin who investigated the impact of nutrition education on knowledge and nutritional performance of French students and showed that knowledge was significantly increased after training (23).

Developing desired attitude in order to encourage goal behavior is a strategy which has been emphasized in studies related to nutrition education. This study was successful in improving attitude by using the theory of planned behavior and intervention through group discussion, question and answer and show clip.

Low attitude towards breakfast in students before training can arise from lack of a positive perception of the value and benefits of breakfast consumption, but an attitude was created in them towards the value of breakfast after the intervention. Numerous studies have been performed to increase attitude towards behavior using TPB such as the study by Kothe (24). In this study, attitude was significantly increased after four weeks of training program compared to before study.

Since objective norms of the individual's life provide conditions for breakfast consumption, one goal of the training program was to increase these norms.

In terms of the effect of objective norms as predictors of behavioral intention to breakfast, parents are very impressive, because if the parents consider breakfast as an important meal and sit around the breakfast table every day, as an objective norm, they can encourage children to have breakfast.

Our results showed the effectiveness of the educational intervention in increased encouraging norms for eating breakfast in the intervention group after the training program. These results are consistent with the findings of similar studies (25).

The results regarding the effect of educational intervention on perceived behavioral control showed that the mean perceived behavioral control in the intervention group increased after training, and this is consistent with the findings of Niknami (25) and Aghamolai (26).

Perceived behavioral control reflects the individual's belief regarding the existence or lack of resources for performing a behavior, so that the presence of resources is considered as facilitator and the lack of them as preventive of behavior (27).

Mothers occupation and lack of breakfast (28,30), repeated breakfast, and students concern of delayed school are obstacles against breakfast consumption, and identification of obstacles is essential to overcome them (29,30).

Unlike previous studies in which attitude had the highest predictive value for intention (31-33), perceived behavioral control in this research was a stronger predictor of intention to breakfast.

The results also showed that students' intention to breakfast in the intervention group was increased after the training program and comparison of the results between the intervention and control groups, before and after training showed a statistically significant difference; this is consistent with other studies in the field of application of TPB for increasing participants' intention to perform health behaviors such as the study of Niknami (36) and Juon (34).

Regarding breakfast consumption (behavior), the amount of breakfast consumption before training in the intervention group was averagely 74.3 and increased to 98.3 two months after education, indicating the positive impact of training program; this is consistent with the results of Sadrzadeh (35) about the effect of education on increase in breakfast consumption by students. The results of this study are also consistent with other studies regarding the application of TPB in promoting healthy behaviors in people in intervention groups, such as the studies of Fowler (36) and Fernandez (37).

Since the intervention and control groups had no significant difference in terms of main variables of TPB before intervention, increased intention and behavior of breakfast consumption in the intervention group can be attributed to the positive impact of TPB-based training program

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## تأثیر برنامه آموزشی بر اساس تئوری رفتار برنامه‌ریزی شده بر ارتقاء رفتار مصرف صبحانه در دانش‌آموزان

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مجله پزشکی هرمزگان سال نوزدهم شماره اول فروردین و اردیبهشت ۹۴ صفحات ۴۳-۳۵

### چکیده

**مقدمه:** فراوانی مصرف صبحانه در نیم قرن اخیر کاهش داشته است و این وعده غذایی توسط کودکان و نوجوانان نادیده گرفته می‌شود. هدف این مطالعه، تعیین تأثیر برنامه آموزشی مبتنی بر تئوری رفتار برنامه‌ریزی شده بر ارتقاء مصرف صبحانه در دانش‌آموزان بود.

**روش کار:** این مطالعه یک پژوهش مداخله‌ای از نوع نیمه تجربی بود که بر روی ۸۸ دانش‌آموزان مقطع راهنمایی شهر بندرعباس در سال ۱۳۹۰ انجام شد. روش نمونه‌گیری خوشه‌ای چند مرحله‌ای بود. ابزار گردآوری اطلاعات پرسشنامه‌ای مبتنی بر سازه‌های تئوری رفتار برنامه‌ریزی شده بود که روایی و پایایی آن در مطالعه پایلوت تعیین گردید. داده‌های جمع‌آوری شده توسط نرم‌افزار SPSS 18 و به روش کمی با استفاده از آزمون‌های آماری رگرسیون خطی،  $t$   $t$ -test زوجی، ویل کاکسون و مان ویتنی تجزیه تحلیل شدند.

**نتایج:** پس از اتمام برنامه آموزشی کنترل رفتاری درک شده و قصد مصرف صبحانه در گروه مداخله افزایش یافت که این تغییر نسبت به قبل از آموزش بر اساس آزمون آماری ویل کاکسون معنی‌دار بود ( $P=0/000$ ).

**نتیجه‌گیری:** با توجه به نتایج این بررسی، توصیه می‌شود جهت افزایش قصد و مصرف صبحانه در دانش‌آموزان بر استراتژی‌های آموزشی مبتنی بر تئوری رفتار برنامه‌ریزی شده تأکید گردد. در نظر داشتن هنجارهای انتزاعی مشوق دانش‌آموزان به مصرف صبحانه به ویژه گروه همسالان و والدین می‌تواند در طراحی برنامه‌های آموزشی کمک کننده باشد.

**کلیدواژه‌ها:** تئوری رفتار برنامه‌ریزی شده - نوجوانان - مدارس - صبحانه

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