

The Effect of Education on Reducing Fast Food Consumption in Obese Iranian Female Adolescents: An Application of the Transtheoretical Model and the Theory of Planned Behaviour

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Abstract

Background: The number of reported food illnesses in Iran has increased over the past 10 years.

Objectives: The present study aimed at investigating the effect of education, based on the transtheoretical model (TTM) and the theory of planned behaviour (subjective norm and perceived behavioural control), on reducing fast food consumption in obese Iranian female adolescents.

Methods: In this quasi-experimental study, data were collected through a survey. This study included 420 obese Iranian female adolescents, aged 15 to 18 years, who were gathered from 12 schools in city of Sabzevar in Iran during 2014 and 2016. Using a questionnaire, the demographic and anthropometric characteristics, transtheoretical model (TTM) constructs, subjective norm, and perceived behavioural control were measured and analysed.

Results: The average rates of perceived behavioral control (11.949 ± 2.876), subjective norms (16.515 ± 4.877), stages of change (6.355 ± 1.342), processes of change (8.614 ± 3.406), and self-efficacy (22.447 ± 6.783) in the education group were meaningfully increased (P value < 0.05); however, these changes were not meaningful in the control group (P value > 0.05). Also, no statistically meaningful difference was obtained in decisional balance between the 2 groups after the intervention ($P = 0/924$).

Conclusions: The results of this study suggest that the use of TTM (except with decisional balance) focuses on the perceived behavioural control, and subjective norms can be used in educational interventions and have useful results.

Keywords: Obesity, Adolescents, Education, Consumption

1. Background

Fast food consumption was 20% in Iranian teenagers in 2016. Fast food represents one of the factors threatening the health of people and the amount of food consumed outside home (1-4). Several theories about the role of beliefs and ideas of young people about the side effects of fast food consumption have been proposed. Transtheoretical model (TTM) has been widely used in different populations for nutritional treatment (5). An advantage of TTM is that health care practitioners are able to treat individuals, while they are in different phases of readiness to make changes in their health behaviours (6). TTM has 4 constructs, which are as follow: stage of change, decisional balance (pros and cons), processes of change, and self-efficacy. Despite the success of TTM, use of the TTM has focused more on behavior change, and there are a number of cogni-

tive, social, and behavioral variables found to significantly differ across the stages of change (7). Conversely, research, using the TPB, has focused more on understanding the behavior (7). More specifically, the attitudes, norms, and perceived behavioral control are associated with certain intentions to perform a behavior, which are said to predict behavior in conjunction with efficacy. Efficacy and decisional balance of pros and cons in the TTM are said to mirror perceived behavioral control and attitudes in the TPB, but the TPB provides more insight to behavior with additional variables such as subjective norms (8). According to stage theories, these variables should differ by stage of change (9). Because of the complementary nature of these 2 models, research has begun to use TTM and perceived behavioral control and subjective norms to reach a richer understanding of behavior for reduction in consumption of fast food

(10, 11).

2. Objectives

The present study aimed at investigating the effect of education on reduction of fast food consumption among female adolescents suffering from obesity and overweight conditions in Sabzevar (Iran) in accordance with the TTM model, perceived behavioural control, and subjective norms.

3. Methods

3.1. Setting

In this study, the classroom-based intervention did not permit the random assignment of students to the intervention or control groups; therefore, this research was quasi-experimental. The students in the study were selected among the obese and overweight students in 12 schools located in Sabzevar, Iran.

3.2. Study Participants

A central city middle school serving medium-income and culturally similar students was the setting for the study during May 2014 and September 2016. Ethical approval for this study was gained from the research ethics committee at Tehran University of Medical Sciences (IR.TUMS.REC.1394.760) in 2014.

Before the enrolment, an informed consent was obtained from all the participants and their parents.

3.3. Inclusion Criteria

Inclusion criteria for this study were as follow: female adolescents aged 15 to 18 years; having a BMI values \geq 85th (CDC); following no special diet; willingness to participate in the study; having an Iranian nationality; and consuming fast food (sausage, sandwich, pizza, hamburgers, hot dogs, and French- fries) once a week.

3.4. Exclusion Criteria

The exclusion criteria for this study were as follow: having a disease; not completing the questionnaire; and having physical activity.

Students completed the measures in a classroom setting.

3.5. Sample Size

The sample size was calculated using the formula for quasi-experimental survey (12), with a margin of error = 0.05 and =10%, and an expected power of 90%, and a Z value of 1.28.

The mean \pm SD in the education group was 39.92 ± 4.22 (mean \pm SD) and it was 36.26 ± 4.77 (mean \pm SD) in the control group. Moreover, it was calculated that a sample of 210 students in each group was required; thus, 420 obese Iranian female adolescents were selected to participate in the study.

$$n = \frac{(Z_1 - Z_{1-\beta})^2 (\sigma_1^2 - \sigma_2^2)}{(\mu_1 - \mu_2)^2} \quad (1)$$

3.6. Instruments

3.6.1. Demographic Variables

Demographic variables included age, grade, mother and father's education level, mother and father's occupation, number of children in the family, family residence status, height, weight, and BMI (Weight (kg)/ height (m)²).

Questionnaires were provided at Tehran University of Medical Sciences based on TTM and TPB (13). All questionnaires CVI (Content Validity Index) and CVR (Content Validity Ratio) values were higher than 0.75 and 0.62. Face validity was considered to be suitable, as decided by 18 expert panel members (14). (Table 1).

Table 1. Psychometric Properties of the Transtheoretical Model Constructs, Subjective Norm, Perceived Behavioral Control

Measures	Content Validity Index (CVI)	Content Validity Ratio (CVR)	Cronbach's Alpha (α)
Stage of change Ques	0.92	0.90	0.90
Self-efficacy Ques	0.98	0.97	0.82
decisional balance Ques	0.83	0.86	0.79
Process of change Ques	0.88	0.90	0.80
Subjective norm Ques	0.90	0.94	0.88
Perceived behavioral control Ques	0.94	0.96	0.95

3.6.2. Questionnaire

The 5 stages of change are reflected in the following questions.

1- I have not reduced fast food consumption and have not thought about it (yes - no).

2- I have not reduced fast food consumption, but I have thought about it (yes - no).

3- I have not reduced fast food consumption, but I am planning to do so within 1 month (yes - no).

4- Currently, it has been less than 6 months since I have reduced my consumption of fast food (yes - no).

5- Currently, it has been more than 6 months since I have reduced my consumption of fast food (yes - no).

The answer "yes" reveals that the participant is in that stage and the answer no reveals that she is in other stages.

In this research, to ensure self-efficacy, 8 questions were designed. Decisional balance was assessed using a questionnaire with 8 questions. The PCS questionnaire contains 34 items and measures experiential and behavioral processes of change. Subjective norm had 4 items and perceived behavioral control had 2.

The answers to the questions were designed in the form of 5 optional Likert scale from 'strongly disagree' to 'strongly agree' (+1 to +5).

3.6.3. Educational Interventions

Participants were assigned into the education and the control group. The educational needs of the groups were determined. Each group met for 60 minutes twice a week for 12 weeks. Six months were set aside for completion of the survey (preintervention and postintervention). The curriculum focused on identifying the changing behaviours of subjective norms, perceived behavioural control, stage of change, decisional balance (pros and cons), processes of change, and self-efficacy. The first lesson focused on basic nutrition concepts to include the food guide pyramid and the importance of reduction in the consumption of fast food for overall health and well-being. The later lessons focused on identifying barriers and overcoming barriers, goal-setting, and identifying methods to stay motivated. Each training session was followed by a 30-minute discussion with students on difficulty and ease in consumption reduction of fast food; also, common beliefs and conceptions about the hazards of fast food consumption in the short- and the long- terms were discussed. The cognitive process of change is as follows: (a) consciousness-raising (increasing knowledge of fast food consumption and fast food consumption effects on health and complete fast food consumption-related diseases); and (b) social liberation (identifying the impact of fast food consumption on social functioning in the short- and long terms), environmental re-evaluation (identifying one friend 'who does not consume fast food'; identifying signals that prevent from consuming healthful foods). Behavioural processes of change are as follow: (a) self-liberation (Telling oneself that it is possible to reduce consumption of fast food, compare current and previous di-

ets, plan to deal with situations where fast food is likely to be eaten.); (b) counter- conditioning (finding a substitute behaviour for consumption of fast food, reading all food labels before eating food, eating 'healthful foods' in a fast-food restaurant, planning a healthful diet in accordance with the food guide pyramid); and (d) reinforcement (receiving a reward for avoidance of fast food consumption and engaging in new behaviours).

Pros and Cons were expressed. Teaching methods were provided by group discussions, educational videos, and posters. The no-education control group completed measures at baseline (6 months). Homework was determined for each education session. Then, the 2 groups completed the questionnaires again 6 months after the educational intervention.

3.7. Statistical Analysis

All the statistical analyses were performed using the SPSS statistical software Version 22.

The Kolmogorov-Smirnov test was also used to describe the normality of the variables and followed by parametric tests. Independent t test was used to compare and determine the parametric data between the 2 groups and repeated measurement test was utilized to compare the parametric data in 2 time points. P value < 0.05 was considered as statistically significant.

4. Results

The mean age of the students in the education and control groups was 16.360 ± 0.703 and 16.530 ± 0.701 years, respectively. Before the intervention, the results of the independent- samples t test did not show any statistically meaningful difference between the 2 groups in age ($P = 0.802$), weight ($P = 0.928$), height ($P = 0.833$), BMI ($P = 0.855$), and number of children ($P = 0.663$) (Table 2).

Table 3 demonstrates the average rates of perceived behavioral control ($P < 0.001$, $t = 5.05$, $df = 420$), subjective norms ($P = 0.002$, $t = 2.96$, $df = 420$), stages of change ($P = 0.002$, $t = 3.10$, $df = 420$), processes of change ($P = 0.030$, $t = 2.17$, $df = 420$), and self-efficacy ($P = 0.010$, $t = 2.03$, $df = 420$) increased meaningfully after intervention in the education group (P value < 0.05); these changes were not meaningful in the control group (P value > 0.05). There was also no statistically meaningful difference in decisional balance ($P = 0.924$, $t = 0.06$, $df = 420$) between the 2 groups after the intervention (P value > 0.05). The average rates of BMI ($P < 0/002$) in the education group was increased meaningfully (P value < 0.05). These changes were not meaningful in the control group ($P = 0.121$). The education group lost significantly more weight at the final

Table 2. Mean of Age, Weight, Height, Body Mass Index, the Number of Children in Two Groups Education and Control before education^a

Variables	Education	Control	(Independent-Samples T Test)
Age, y	16.360 ± 0.703	16.530 ± 0.701	t = 0.252, P = 0.802, df = 420
Weight	66.469 ± 4.345	66.79 ± 4.145	t = 0.09, P = 0.928, df = 420
height	158.690 ± 3.042	157.290 ± 3.632	t = 0.211, P = 0.833, df = 420
body mass index (BMI)	1.242 ± 0.429	1.181 ± 0.385	t = 0.145, P = 0.855, df = 420
Number of children	2.595 ± 0.758	2.695 ± 0.645	t = 0.436, P = 0.663, df = 420

^aValues are expressed as mean ± SD.

follow-up than the control group (P = 0.002, t = 3.064, df = 420).

5. Discussion

The changes in perceived behavioural control average scores revealed an increasing trend from the elementary to advanced stages (15, 16). According to this, if adolescents feel that environmental factors (facilities and barriers) are under their control, they reduce their consumption of fast food (17). Environmental factors and associations with social or support groups, which promote reduction in the consumption of fast food, may also provide positive effects. Thus, education had meaningful statistical differences in the score of subjective norms of the education group. Friends and classmates played an important role in subjective norms. The results of some similar studies (Kothe EJ and Prelip M studies) indicated that friends played an important role in subjective norms (15, 16).

In the current study, the changes in self-efficacy average scores showed an increasing trend from the elementary to advanced stages. The increase in self-efficacy among the 5 stages has been confirmed by Jiang G and Palmira's studies (15, 18, 19). In Palmeira AL study, self-efficacy accounted for a large share of the predictive power. Self-efficacy values have shown mixed evidence as prospective predictors of weight loss (19). Processes of change in the present study were significant. Reduction in the consumption of fast food plays an important role in the prevention of digestive diseases. Processes of change in Fallon and Lowther M studies were not significant (20, 21). In Fallon study, one possible explanation was that those who are able to reach the later stages of change for exercise may have fewer social, familial, and professional demands, and

thus leaving more time for exercise in their daily schedules and reducing the need for behavioral strategies.

Education had no meaningful statistical difference in the score of decisional balance in the education group. The results of the study are consistent with the studies of Frenn M and Greene JD (22-24). Therefore, it may be necessary to spend more time justifying and training to increase the score of decisional balance (25-27). The mass media can help increase the pros of reduction in the consumption of fast food in adolescents. The pros may be more inclined to change than the cons because the pros are more sensible and immediate, whereas a reduction in the cons requires longer-term maintenance. The average rates of BMI in the education group increased meaningfully, and this change was not meaningful in the control group. The results are consistent with the study of Sara S who found significant differences in body weight, which is a change associated with clinical improvement in health indicators (28).

5.1. Strengths

Understanding the strength of the influence that each antecedent had on behavior can help the researchers to determine how successful their design was, compared to similar researches using the same antecedents.

5.2. Weaknesses

Lack of control on the sale of fast food in the buffet schools has caused some students to think everything sold in schools is healthy. This shows the important and significant role of schools in forming healthy behaviors in adolescents.

5.3. Study Limitations

The data were collected from those participants who participated in the study voluntarily, which increases the probability that the participants have been in the stage of preparation for behavior change.

5.4. Conclusion

Models tested in this study need to be examined with greater control for similarity of the intervention across classrooms as well as in a larger number of schools, using the internet. Similar studies should be conducted in other sex and age groups with different cultural, population, social, and economic contexts.

Table 3. The Comparison Among the Average of Studied Variables in Group of Education and Control, Before and After Intervention

Groups	Education			Control			(Independent-Samples T Test)
	Before	After	P value (tpair)	Before	After	P value	
Stages of change	2.175 ± 1.272	6.355 ± 1.342	< 0.001	2.100 ± 1.172	3.325 ± 1.142	0.109	P = 0.002, t = 3.10, df = 420
Processes of change	4.214 ± 3.206	8.614 ± 3.406	< 0.001	4.017 ± 3.106	3.914 ± 3.206	0.620	P = 0.030, t = 2.17, df = 420
Decisional balance	2.775 ± 1.272	1.175 ± 1.908	0.170	2.795 ± 1.472	1.175 ± 1.908	0.930	P = 0.924, t = 0.06, df = 420
Self-efficacy	18.317 ± 5.763	22.447 ± 6.783	< 0.001	18.317 ± .763	19.447 ± 5.983	0.960	P = 0.010, t = 2.03, df = 420
Perceived behavioral control	6.857 ± 2.713	11.949 ± 2.876	< 0.001	6.957 ± 2.813	7.049 ± 2.876	0.904	P < 0.001, t = 5.05, df = 420
Subjective norms	11.515 ± 4.597	16.515 ± 4.877	< 0.001	11.415 ± 4.997	12.010 ± 4.977	0.511	P = 0.002, t = 2.96, df = 420
BMI	1.242 ± 0.429	1.081 ± 0.273	0.002	1.181 ± 0.385	1.181 ± 0.385	0.121	P = 0.002, t = 3.064, df = 420

^aValues are expressed as mean ± SD.

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Footnotes

Authors' Contribution: All the authors approved the content of the manuscript, contributed significantly to the research, and were involved in the writing of the manuscript. All of the authors were responsible for the study conception and design, data collection and analysis, preparing the draft of the manuscript, and making revisions to the paper for important intellectual content and English editing.

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