Effectiveness of training on preventative nutritional behaviors for type-2 diabetes among the female adolescents: Examination of theory of planned behavior

Farzaneh Maleki¹, Zahra Hosseini Nodeh², Zahra Rahnavard*³, Masoume Arab⁴

Received: 12 August 2014 Accepted: 1 August 2015 Published: 4 April 2016

Abstract

Background: Since type-2 diabetes is the most common chronic disease among Iranian female adolescents, we applied theory of planned behavior to examine the effect of training to intention to preventative nutritional behaviors for type-2 diabetes among female adolescents.

Methods: In this experimental study 200 (11-14 year old) girls from 8 schools of Tehran city (100 in each intervention and control group) were recruited based on cluster sampling method during two stages. For intervention group, an educational program was designed based on the theory of planned behavior and presented in 6 workshop sessions to prevent type-2 diabetes. The data were collected before and two months after the workshops using a valid and reliable (α=0.72 and r=0.80) author-made questionnaire based on Ajzens TPB questionnaire manual. The data were analyzed using t-test, chi-square test and analysis of covariance.

Results: Findings indicate that the two groups were homogeneous regarding the demographic characteristics before education, but the mean score of the theory components (attitudes, subjective norms, perceived behavioral control, and intention) was higher in the control group. Also, results showed all of the theory components significantly increased after the education in the intervention group (p=0.000).

Conclusion: Training based on the theory of planned behavior enhances the intention to adherence preventative nutritional behaviors for type-2 diabetes among the studied female adolescents.

Keywords: Health education, Theory of planned behavior, Diabetes Mellitus Type 2, adolescents.

Cite this article as: Maleki F, Hosseini Nodeh Z, Rahnavard Z, Arab M. Effectiveness of training on preventative nutritional behaviors for type-2 diabetes among the female adolescents: Examination of theory of planned behavior. Med J Islam Repub Iran 2016 (4 April). Vol. 30:349.

Introduction

The prevalence of type-2 diabetes is one of the main concerns of people in both the developed and developing countries (1). Although type-2 diabetes is not seriously considered as a common disease in the childhood and adolescence, however, an increase in the number of the teenagers with type-2 diabetes has been reported recently. In Iran, the prevalence of type-2 diabetes at the age group of 3-19 years is 45 in 100,000 people (2). Meanwhile, the studies indicate not only the prevalence of diagnosed type-2 diabetes among the Iranian women is more than men at all age groups, but also the number of Iranian females who are unaware of their diabetes is more than males (3). Further, the studies indicate that up to 2030 the number of patients with diabetes will increase up to 69% in developing countries (4). To this regard, people who will suffer from diabetes in the future are now in their childhood or adolescence; therefore, they need preventive care.

There is a positive and significant relationship between type-2 diabetes and obesi-
Effectiveness of training on preventative nutritional behaviors for …

The effectiveness of such a theory has been studied on problems such as malaria prevention behaviors among men (10), preventing HIV/AIDS among adolescents (13), preventing smoking among adolescents (9), hypertension prevention self-care behaviors (11) and increasing physical activity among children and adolescents in physical education classes (7).

Considering obesity as the main cause of increase of type-2 diabetes among the adolescents, and the effectiveness of the TPB on changing the intention for conducting behaviors associated with health, this study aims to determine the effect of the education based on the TPB on the intention of conducting preventive nutritional behaviors of type-2 diabetes among a population of Iranian female adolescents.

Methods

Study subject

In this experimental study, 200 (100 in each case and control group) girl adolescents participated from 8 schools in Tehran city; selected based on cluster sampling method during two stages. According to previous related studies of the impact of education on the nutritional performance (7,14,15), and also with regard to 5% alpha error and the study power 90%, the sample size equals 40 people for each group. However, by considering the loss and coefficient of cluster sampling, and also with the purpose of decreasing error, sample size was considered 100 people in each group. We had no blinding procedure.

The study began in December 2010 and finished in January 2012. First, each of the 8 central regions of Tehran (district Southern 2 with 11 schools, Southern 5 with 9 schools, 6 with 30 schools, 7 with 32 schools, 9 with 14 schools, 10 with 16 schools, 11 with 21 schools, and 12 with 31 schools) was considered as a cluster, and then one school was selected from each cluster at random via table of random numbers. All students of these 174 schools were 30000 and 1473 students were selected in this stage. Randomly, 4 schools were allocated to intervention group and 4 allocated to control group. Finally, in each school, one class and in each class, 25 students
were selected randomly (100 girls in the intervention group and 100 girls in the control group). Since Southern and Northern regions of Tehran have considerable cultural, social, and economic differences, the comparison between the participants of these regions could show bias; therefore, the central regions of Tehran were selected. The schools were selected for convenient matters and the fact that health education in schools has a positive impact on the students’ health, knowledge, attitudes, and skills (16). Moreover, the selection of girls as the research population refers to the fact that the prevalence of diabetes among women is more than men (3,17).

Inclusion and exclusion criteria
11-14 year old girls who had not been educated in prevention of type-2 diabetes over the recent six months and also have not had a special disease were participated in the study. The exclusion criteria were: not participating in even one of the class sessions, receiving any other similar educations, and loosing tendency to take part in the study. According to the mentioned criteria, none of the samples were excluded from the study.

Measurements
The tool is a self-report researcher-made questionnaire with two parts:

a. The questionnaire of demographic characteristics investigating age, parents’ level of education, family past medical history of diabetes, the experience of participating in educational classes related to keeping a preventive diet of diabetes over the recent 6 months, and source of receiving health information.

b. The questionnaire consists of components of TPB, which was based on the TPB for preventing type-2 diabetes in four parts (18). This section is designed based on a review of studies by Fila and Smith (19), Rah et al. (20), Solhi et al. (7), and also by using the guideline of analyzing a questionnaire based on the TPB (21). The variable "preventive nutritional behavior of type-2 diabetes" has entered the standard questionnaire of Fishbin and Ajzen. The developed questionnaire includes aspects of TPB including attitude (10 items), subjective norms (4 items), perceived behavioral control (6 items), and intention to behavior (6 items) in the preventive nutrition of type-2 diabetes. According to the available standard instruction, the 5 point Likert-type scale is used to measure the questions (0=strongly disagree, 1=disagree, 2=having no idea, 3=agree, 4=strongly agree). The possible ranges for attitude, subjective norms, perceived behavioral, and intention to behavior were 0-40, 0-16, 0-24, and 0-24, respectively.

Reliability and validity
Reliability of the questionnaire was obtained by the internal consistency (attitude $\alpha=0.66$, subjective norms $\alpha=0.7$, perceived behavioral control $\alpha=0.66$, behavioral intention $\alpha=0.85$, and total questionnaire $\alpha=0.72$), and test-retest ($r=0.80$). The validity of tool was determined by face and content validity, which confirmed by 15 nursing and five nutrition sciences experts. The total content validity index in the parts associated with “relevance”, “simplicity”, and “clarity” was 92.56, 90.94, and 92.81, respectively.

Intervention
After an introductory session for deans of schools, parents and student, the pre-test was carried out. After a week, an educational workshop in six sessions of 120 minutes duration was hold and presented by five community health nurses over three weeks for the intervention group. The sessions were separately held in each school; however, the educators of the workshop were the same in all the schools. A two-hour lecture and question answer session was held for parents by two community health nurses, too. This session was held to give information to parents about the diabetes prevention program to reduce their concerns about this program.

The educational content focused on the
Effectiveness of training on preventative nutritional behaviors for diabetes and its importance, complications, types, and risk factors (attitude) (sessions one and two), significance of improving and protecting the adolescents’ health, and expectations of society, family and friends from the adolescents to protect their health (subjective norm) (sessions three and four), importance of changing lifestyle to prevent diabetes (the perceived behavioral control) and healthy nutrition to prevent diabetes (sessions five and six) (21,22). According to the program schedule, after determining the purposes of each educational session, an educational content was presented via a short lecture, and then the scenarios based on the problem-solving design were presented to the adolescents. Later, the adolescents were divided into groups with five members to solve the problem, discuss it, exchange ideas, and finally present the results of their work. The session was over by one of the managers’ conclusion. At the end of each session, a pamphlet including the content of that session was given to the students. Moreover, the educational session was held for one or both of the adolescents’ parents. The session concentrated on the importance of preventive nutrition for diabetes in the adolescence. The control group has had no educational program. In line with Solhi’s study, the post-test was performed in both groups two months after the last workshop session (7). Because of students were repeatedly recommended to complete all items of the questionnaire, the study had no missed data.

Data analysis
To the study homogeneity of two groups from the perspective of demographic characteristics, the inferential statistics including chi-square and t-test was applied. Kolmogorov - Smirnov test was used to test the normal data distribution and independent t-test and analysis of covariance were used to compare the mean of scores between two groups of control and intervention. Level of significance was 0.05. Data were analyzed via SPSS version 14.

Ethical considerations
The study is confirmed by the Committee of Ethics, Tehran University of Medical Sciences. The research objectives were explained for all of the adolescents participating in the study, deans of schools, and adolescents’ parents, and then their written consents were obtained. Moreover, a similar workshop for the control group and their parents was presented after collecting post-test data.

Results
Descriptive results
The mean (SD) age of the participants was 13.2±0.78 (case=12.9 (0.62), control=13.2 (0.78)), their parents educated up to the middle school on average (43.5% of mothers and 55% of fathers), most of them did not have a family history of diabetes (82.15%), and the majority of them had not had participated in the educational classes of keeping a diet over the recent 6 months (92.1%). Moreover, TV and radio were the health information resources of most of them (43.5%). The findings indicated that, the control and the intervention groups were homogeneous regarding the demographic characteristics (Table 1).

Analytical results
Results indicate that before the intervention, attitude, subjective norms, and perceived behavioral control of the control group are higher than the intervention group. Therefore, to analyze the data, analysis of covariance was applied. However, comparing the mean and standard deviation of the adolescents’ behavioral intention between two groups before the intervention reveals no significant statistical difference. Therefore, the score of behavioral intention after the education was studied in both of the groups via independent t-test (Table 2).

The results indicate that after the educational program, the mean of the components of the TPB in the intervention group has increased (Table 2). Also, the inter-group study between the control and the intervention groups indi-
Table 1. Comparison of participants’ demographic characteristics between the intervention and the control groups

| Group                              | Case% (n) | Control% (n) | Total% (n) | p |
|------------------------------------|-----------|--------------|------------|---|
| Father’s education                 |           |              |            |   |
| Diploma-higher than diploma        | 36% (n=36)| 40% (n=40)   | 38% (n=76) |   |
| BA. or higher degrees              | 4% (n=4)  | 4% (n=4)     | 4% (n=8)  |   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| Mother’s education                 |           |              |            |   |
| Diploma-higher than diploma        | 44% (n=44)| 35.3% (n=35) | 39.6% (n=79)|   |
| BA. or higher degrees              | 8% (n=8)  | 11.8% (n=12) | 9.9% (n=20) |   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| Father’s job                       |           |              |            |   |
| Retired                            | 10% (n=10) | 11.8% (n=12) | 10.9% (n=22)| 0.93f |
| Worker                             | 20% (n=20) | 15.7% (n=16) | 17.8% (n=36)|   |
| Employee                           | 20% (n=20) | 19.6% (n=20) | 19.8% (n=40)|   |
| Self-employed                      | 42% (n=42)| 43.1% (n=42) | 42.6% (n=84)|   |
| Unemployed                         | 4% (n=4)  | 2% (n=2)     | 3% (n=6)  |   |
| Others                             | 4% (n=4)  | 7.8% (n=8)   | 5.9% (n=12)|   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| Mother’s job                       |           |              |            |   |
| Housekeeper                        | 2% (n=2)  | 7.8% (n=8)   | 5% (n=10) | 0.18f |
| Employed                           | 98% (n=98)| 92.2% (n=92) | 95% (n=190)|   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| History of disease                 |           |              |            |   |
| Yes                                | 2% (n=2)  | 2% (n=2)     | 2% (n=4)  | 0.75f |
| No                                 | 98% (n=98)| 98% (n=98)   | 98% (n=196)|   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| History of medicine use            |           |              |            |   |
| Yes                                | 0% (n=0)  | 3.9% (n=4)   | 2% (n=4)  | 0.49f |
| No                                 | 100% (n=100)| 96.1% (n=96)  | 98% (n=196)|   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| History family of diabetes         |           |              |            |   |
| Yes                                | 20% (n=20)| 15.7% (n=16) | 17.8% (n=36)|   |
| No                                 | 80% (n=80)| 84.3% (n=84) | 82.2% (n=164)| 0.57f |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| History of participation in         |           |              |            |   |
| educational classes                |           |              |            |   |
| Yes- more than 6 months            | 6% (n=6)  | 9.8% (n=10)  | 7.9% (n=16) | 0.71f |
| No                                 | 94% (n=94)| 90.2% (n=90) | 92.1% (n=184)|   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |
| Information resources              |           |              |            |   |
| TV and radio                       | 44% (n=44)| 49% (n=49)   | 46.5% (n=93)| 0.81f |
| Friends                            | 8% (n=8)  | 5.9% (n=6)   | 6.9% (n=14) |   |
| Family members                     | 30% (n=30)| 33.3% (n=33) | 31.7% (n=63)|   |
| Teachers                           | 8% (n=8)  | 2% (n=2)     | 5% (n=10)  |   |
| Members of health group            | 4% (n=4)  | 3.9% (n=4)   | 4% (n=8)  |   |
| Internet                           | 6% (n=6)  | 5.9% (n=6)   | 5.9% (n=12) |   |
| Total                              | 100% (n=100)| 100% (n=100)  | 100% (n=200) |   |

¥: Independent T test, £: Chi- square

The results indicate that a behavioral theory, such as the TPB, could be a good framework to achieve the educational objectives in changing feeding behaviors. Since type-2 diabetes is more prevalent among Iranian women – whether female adolescents or adults- than men (23), then this study entered female adolescents, who

Discussion
Effectiveness of training on preventative nutritional behaviors for …

Table 2. Comparison of the meanscore (SD) of the components of the TPB between the intervention and the control groups before and after education

| Components of the TPB | Before intervention | After education | p    |
|----------------------|---------------------|----------------|------|
|                      | Case Mean±SD | Control Mean±SD | (95% CI for mean difference) | Case Mean±SD | Control Mean±SD | (95% CI for mean difference) |
| Attitude             | 79.68±13.17 | 84.54±7.98 | p=0.02*** (−19.19,−0.55) | 92.99±7.76 | 79.76±10.42 | p=0.001*** (9.56,16.83) |
| Subjective norms     | 63.12±14.5 | 70.1±14.2 | p=0.01*** (−12.42,−12.58) | 81.2±10.2 | 67.52±16.81 | p=0.001*** (8.17,19.17) |
| Perceived behavioral control | 64.88±16.34 | 70.66±11.01 | p=0.04** (−11.31,−0.26) | 78.88±15.95 | 67.68±14.61 | p=0.001*** (5.15,17.23) |
| Behavioral intention | 80.26±14.73 | 82.81±13.22 | p=0.36† (−8.07,2.98) | 93.80±8.10 | 77.64±12.89 | p=0.001*** (11.9,20.41) |

*: analysis of covariance, ¥: Independent t-test, **: Significant at level 0.001, ***: Significant at level 0.01, *: Significant at level 0.05

Table 3. Inter-group comparison of the mean scores (SD) of components of the TPB in the control and the intervention groups before and after the education

| Group | Components of the TPB | Before education Mean ±SD | After education Mean ±SD | p    | Before education Mean ±SD | After education Mean ±SD | p    |
|-------|----------------------|---------------------------|--------------------------|------|---------------------------|--------------------------|------|
|        |                      | Case Mean±SD | Control Mean±SD | (95% CI for mean difference) | Case Mean±SD | Control Mean±SD | (95% CI for mean difference) |
| Attitude             | 79.68±13.17 | 92.99±7.76 | p=0.001*** (−17.38,−9.18) | 84.54±7.98 | 79.76±10.42 | p=0.001*** (1.97,7.6) |
| Subjective norms     | 63.12±14.05 | 81.2±10.2 | p=0.001*** (−21.57,−14.59) | 70.11±14.20 | 67.52±16.81 | p=0.24* (-17.76,9.64) |
| Perceived behavioral control | 64.88±16.34 | 78.88±15.95 | p=0.001*** (−19.97,−8.03) | 70.66±11.01 | 67.68±14.61 | p=1.29* (-3.33,7.29) |
| Behavioral intention | 80.26±14.73 | 93.80±8.10 | p=0.001*** (−16.87,−10.20) | 82.81±13.22 | 77.64±12.89 | p=0.007*** (1.46,8.86) |

*: analysis of covariance, ¥: Independent t-test, **: Significant at level 0.001, ***: Significant at level 0.01, *: Significant at level 0.05

might suffer from type-2 diabetes in the adolescence or adulthood, as a result of ignoring the risk factors of the type-2 diabetes. Moreover, using educational workshop at school could increase the power of intervention and reliability of the results (24,25).

In comparison with the control group and before the education, the significant positive increase of adolescents’ attitude in the intervention group indicates the effectiveness of the educational program to improve the attitude toward the preventive nutritional behaviors of type-2 diabetes. The achieved results are in agreement with the results of the similar studies. In their research, Hardman et al applied TPB to study the intention to conduct health behaviors with the final purpose of increasing the physical activity among the adults (26). Kothe et al applied TPB to increase regular eating of breakfast among the young students (27), and Baker et al. applied it to increase the intention to have a healthy diet and physical activities among adolescents (28). Our participants’ attitude significantly changed after the educational intervention. However, no change occurred in the study of Parrot et al., study on the attitude toward having physical activities among the adults (29). The different results are because of the different health objectives of the studies. In fact, achieving a special attitude depends on two factors of enjoying a behavior, and having access to the advantages of that behavior (21). According to the results, in comparison with before educational program and with the control group, subjective norms of the intervention group have increased. It seems that applying the workshop method and the peers’ interactions about the diabetes, its complications, and preventive nutrition lead to the increase of the score of the component. Parrot et al. reported no increase in physical activity as a result of educational program delivered via E-mail (29). Also, Hardeman et al study reported no modification in subjective norms in the field of physical activity via the face to face and telephone-based theoretical educational methods (26). It seems that the merely theoretical education and

http://mjiri.iums.ac.ir  Med J Islam Repub Iran 2016 (4 April). Vol. 30:349.
not involvement of friends and families were the causes of their failure, however, Baker’s study of the adolescents with the purpose of predicting nutrition and behavior patterns based on the TPB also failed modify the adolescents’ subjective norms (28). The importance of the educational method is revealed after been compared with the results of study of Kothe et al who applied a combined method of study (27). It seems that more practical definitions and more studies are needed in relation to the effective factors associated with the structure of subjective norms. Just like other components of the planned behavior theory, the perceived behavioral control increased in the intervention group after performing the educational program. Results indicated the impact of education based on the workshop method on changing lifestyle in preventing diabetes. The same results were achieved in the previous studies (11,26-29).

Moreover, in a study that aimed to determine the effect of behavioral control and intention on the increase of consuming fruits and vegetables, an intervention via booklet was presented to students. In this study, self-efficiency and perceived behavioral control were considered as variables. The results indicated that the score of the individuals’ intention increased; however, the intervention failed to improve their self-efficiency and perceived behavioral control (30). In contrast, a study on the use of an educational method to modify a special behavior, increased the behavioral control (31). It seems that paying attention to barriers that individuals have to confront is effective in explaining the contradictions.

Finally, it should be mentioned that the performed interventions of the present paper influenced conducting preventive nutritional behaviors of type-2 diabetes. The results were in agreement with results of Kothe et al., indicating that the increase of the three structures of the theory led to the increase of behavioral intention (27). Also, in the studies of Hardeman et al and Baker et al the behavioral intention increased, however, subjective norms did not change (26,28). In the study of Parrot et al only the perceived behavioral control indicated a positive change, no other change was observed in the behavioral intention in comparison with before intervention (29). The results of the present study and previous studies indicates that the increase of the behavioral intention does not depend on the increase of the three components of the theory, however, the significant and positive change of attitude and perceived behavioral control is effective and necessary in increasing it.

Limitations

One of the confounding variables was the researchers’ inability to completely control the participants not to receive educational information from other educational resources during the study. Anyhow, the researchers have recommended the adolescents and their families to avoid same educational programs. The research was carried out only in Tehran city (with 8.5 million populations) and its results cannot be generalized to all of the Iranian female adolescents. Nonetheless, Tehran is the capital of Iran that makes 11.12 % of the total population of Iran (24) and 99.6 percent of its population refers to the five main ethnic groups of Iran (25).

Conclusion

The results of the study confirm the effectiveness of educational program based on the workshop method and the TPB on the intention to conduct preventive nutritional behaviors of type-2 diabetes among the female adolescents. In other words, after the educational intervention, adolescents are more likely to conduct preventive nutritional behaviors of diabetes. They also expected their beloved ones to have a preventive diet in relation with diabetes. They are more able to act based on a preventive diet of diabetes after the intervention. In a nutshell, their intention to conduct a preventive nutritional behavior of diabetes has increased among them.
Effectiveness of training on preventative nutritional behaviors for …

Acknowledgment

We would like to appreciate Vice-chancellery for research of Tehran University of Medical Sciences, which provided financial support. We appreciate all managers of schools and the students who helped us during this study.

References

1. Ganz M, Wiley J. Prevention of type 2 diabetes: Wiley Online Library; 2005.pp. 105.
2. Sanjari M, Hedayati S, Azizi F. Prevalence of type 2 diabetes mellitus in 3-19 age group in east of Tehran in 2001. Iranian J Endocrinol Metab 2004; 6(2):119-126
3. Hadaegh F, Bozorgmanesh MR, Ghasemi A, Harati H, Saadat N, Azizi F. High prevalence of undiagnosed diabetes and abnormal glucose tolerance in the Iranian urban population: Tehran Lipid and Glucose Study. BMC public health 2008;8(1):176.
4. Shaw J, Sierce R, Zinmet P. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 2010;87(1):4-14.
5. Metzger BE. American medical association guide to living with diabetes: preventing and treating type 2 diabetes-essential information you and your family need to know: John Wiley & Sons; 2006.
6. Briggs M. Position of the American dietetic association, school nutrition association, and society for nutrition education: comprehensive school nutrition services. J Am Diet Assoc 2010; 110(11):1738-49.
7. Solhi Mahnaz ZF, Karimzade SK, Taghdisi MH, Jalalian F. Designign and implementing educational progran to promote physical activity among students: an application of the theory of planned behavior. Ofogh-E-Danesh 2012;18(1):45-52.
8. Bensley RJ, Brookins-Fisher J. Community health education methods: A practical guide: Jones & Bartlett Learning; 2003.pp. 180.
9. Karimi-Shahjanarini A, Omidvar N, Bazargan M, Rashidian A, Majdzadeh R, Shojaeizadeh D. Iranian female adolescent’s views on unhealthy snacks consumption: a qualitative study. Iranian J of public health 2010;39(3):92-101.
10. Jadgal KM, Zareban I, Rakhshani F, Shaharakipour M, Sepehrvand B, Alizadeh Sivaki H. The effect of health education according to the theory of planned behavior on malaria preventive behavior in rural men of Chabahar. J Res & Health 2012;2(2):237-46.
11. Pooreh S, Hosseini Nadeh Z. Impact of education based on theory of planned behavior: an investigation into hypertension-preventive self-care behaviors in Iranian girl adolescent. Iranian J of Public Health 2015;44(6):839–847.
12. Kerr J, Weitkunat R, Moretti M. ABC of Behavior Change: A guide to successful disease prevention and health promotion: Elsevier Churchill Livingstone; 2005. pp. 312.
13. Zeidi M. The impact of health education based on theory of planned behavior on the prevention of AIDS among adolescents. Iran J Nurs 2012;25(78):1-13.
14. Rasouli A, Tavafian Sedighe S, Amin SF. Effects of integrated health education program on knowledge, attitude and practical approaches of female students in Bojnurd secondary schools towards dietary regimen. J North Khorasan Uni of Med Sci 2010;2(2-3):73-77.
15. Khalaj M, Mohammadi Zeidi I. Health education effects on nutritional behavior modification in primary school students. J Shahrekord Uni of Med Sci 2006;8(1):41-9.
16. Breckon DJ. Managing health promotion programs: Leadership skills for the 21st century: Jones & Bartlett Learning; 2004.pp. 14.
17. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes estimates for the year 2000 and projections for 2030. Diabetes care 2004;27(5):1047-53.
18. Kovač VB, Rise J, Moan IS. From intentions to quit to the actual quitting process: The case of smoking behavior in light of the TPB. J Appl Biobehav Res 2009;14(4):181-97.
19. Fila SA, Smith C. Applying the theory of planned behavior to healthy eating behaviors in urban Native American youth. Int J Behav Nutr Phys Act 2006;3(1):11.
20. Rah JH, Hasler CM, Painter JE, Chapman-Novakofski KM. Applying the theory of planned behavior to women's behavioral attitudes on and consumption of soy products. J Nutr Educ Behav 2004;36(5):238-44.
21. Ajzen I. From intentions to actions: A theory of planned behavior. In: Action Control from Cognition to Behavior, Kuhl J and Beckmann J, Berlin Heidelberg. Springer; 1985. pp 20-22.
22. Fishbein M, Ajzen I. Theory-based behavior change interventions: comments on Hobbs and Sutton. J Health Psychol 2005;10(1):27-31.
23. Esteghamati A, Gouya MM, Abbasi M, Delavari A, Alikhani S, Aalaedini F, et al. Prevalence of diabetes and impaired fasting glucose in the adult population of Iran national survey of risk factors for non-communicable diseases of Iran. Diabetes care 2008;31(1):96-8.
24. ZakeriSohi M. Iran Network and Transit Modeling and Forecasting Using EMME/2. 21st International EMME Users Conference; 10-12 October, Toronto, CA. Toronto, CA: Jiri Dufek Transport Research Centre; 2007.
25. Iran Ncfs. Detailed results of census of population and housing. In: Iran Ncfs, editor. Iran:
National center for statistics of Iran; 2011.
26. Hardeman W, Kinmonth A, Michie S, Sutton S. Impact of a physical activity intervention program on cognitive predictors of behaviour among adults at risk of Type 2 diabetes (ProActive randomised controlled trial). Int J Behav Nutr Phys Act. 2009;6.
27. Kothe EJ, Mullan BA, Amaratunga R. Randomised controlled trial of a brief theory-based intervention promoting breakfast consumption. Appetite 2011;56(1):148-55.
28. Baker CW, Little TD, Brownell KD. Predicting adolescent eating and activity behaviors: the role of social norms and personal agency. Health Psychology 2003;22(2):189.
29. Parrott MW, Tennant LK, Olejnik S, Poudhevigne M. Theory of planned behavior: Implications for an email-based physical activity intervention. Psychology of sport and exercise 2008;9(4):511-26.
30. Kellar I, Abraham C. Randomized controlled trial of a brief research-based intervention promoting fruit and vegetable consumption. Br J Health Psychol 2005;10(4):543-58.
31. Stock J, Cervone D. Proximal goal-setting and self-regulatory processes. Cognit Ther Res 1990;14(5):483-98.