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Original Article

Nutritional Education of Anemia: Applying the Theory of Planned Behavior to Student Girls

Maryam Mohammadi[1,2], Hadi Tehrani[1,2], Habibollah Esmaily[1,3], Negar Palahang[2], Mohammad Vahedian-Shahroodi[1,2*]

[1]Social Determinants of Health Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
[2]Department of Health Education and Health Promotion, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
[3]Department of Biostatistics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran

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***Corresponding author:**
Mohammad Vahedian-Shahroodi,
Email: Vahedianm@mums.ac.ir

Abstract

Background: This study was conducted to determine how the theory of planned behavior (TPB) can be applied as a theoretical framework for managing iron deficiency anemia among student girls.

Methods: This quasi-experimental study was conducted in descriptive and interventional phases on student girls residing in Fariman, Iran. In the descriptive phase, 200 students were selected by multi-stage random sampling. In the intervention phase, 80 students were randomly divided into experimental and control groups. Data were collected using two questionnaires. One questionnaire included questions about demographic variables, and the other was a TPB construct questionnaire. The educational program was held based on the TPB model for the intervention group in four sessions. The intervention was evaluated immediately and three months after the training session. The data were analyzed by SPSS 20 using repeated measures, ANOVA, *t*-tests, and linear correlation.

Results: In this study, the research sample consisted of 200 student girls with a mean age of 13.11 ± 0.5. Before the intervention, there was no statistically significant difference in the average preventive nutrition behavior score between the two groups ($P>0.05$). However, after the education in the intervention group, the subjective norm score and perceived behavioral control increased from 8.19 ± 0.98 to 8.88 ± 1.2 and from 18.1 ± 3.6 to 19.8 ± 3.3, respectively. In addition, intention and preventive behavior increased from 14.6 ± 2 to 16.05 ± 1.9 and from 24.8 ± 4.5 to 26.9 ± 4.1, respectively. These differences were found to be statistically significant ($P>0.05$).

Conclusion: The results of this study demonstrated that educational interventions based on the TPB model can be effective in promoting preventive behaviors for anemia.

Keywords: Theory of planned behavior, Iron deficiency anemia, Girl, Student

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Introduction

Anemia is one of the most common public health problems worldwide, especially in developing countries (1,2). According to the studies conducted in Iran, the frequency of iron deficiency in different regions of the country is 2.4%-36.5% (3), and the results of the national survey of micronutrient status showed that 22.8% of Iranian teenage girls are suffering from severe iron deficiency and nutritional status during adolescence plays an important role in the human life cycle (4-5). Studies have shown that children whose socio-economic background, school and workplace are in rural areas and consume less meat, fruit and milk are more prone to iron deficiency(6-8). A study in Bangladesh revealed that iron absorption capacity and outcome expectations were positively associated with intentions to take iron supplements (9). A cross-sectional study in Indonesia also analyzed factors that correlated with anemia prevention behavior in women based on the theory of planned behavior (TPB) and reported that better attitudes, subjective norms, perceived behavioral control, and intentions of female adolescents improved the preventive behavior of anemia (10). Another study demonstrated that adolescence is not only a golden opportunity to prevent injuries caused by adopting wrong behaviors, but it will also be a time to choose a healthy lifestyle for future life (11). The search results highlight the importance of nutrition education in school-aged adolescents and its impact on anemia, and educational

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interventions in the field of anemia have been performed mostly in large cities. However, considering the differences between large and small cities, it seems necessary to investigate the impact of interventions in these cities. Therefore, this study was conducted to investigate the nutritional education of anemia-based TPB in Iranian adolescent girls.

The TPB posits an individual's likelihood of engaging in healthy behavior. It is one of the best theories for predicting behavior. The parts of this theory are (1) attitude toward behavior, (2) subjective norms, (3) perceived behavioral control, (4) behavioral intention, and (5) behavior (Figure 1). Attitudes indicate a person's general feelings about whether many things are desirable or not. Subjective norms refer to the person and his perception of the social pressure placed on the person to do or not do something. Perceived behavioral control is defined as an individual's assessment of the difficulty or ease of performing a behavior, and behavioral intention refers to the likelihood that a person will perform a certain behavior. Finally, behavior refers to the behavior that a person perceives (11-14).

Based on the TPB model, attitude, subjective norms, and perceived behavioral control can influence the intention of adolescent girls, and behavioral intention can be effective in nutritional behavior that prevents anemia.

Materials and Methods

Study Participants and Sampling

This quasi-experimental study was performed in two descriptive and interventional phases.

Sampling for the Descriptive Phase of the Study

This study was conducted in two stages in Fariman, Iran. In the descriptive phase, after approving the plan and obtaining the necessary permits from the Faculty of Health and the Department of Education, two schools were randomly selected from among seven secondary girls' schools. Then, 200 girl students were selected based on a previous study in this field (15) with a 95% confidence interval and 80% power. They were included in the study based on the entry criteria (showing a willingness to participate in the study, studying in high school, having a specific and accessible address, and having a phone number for follow-ups).

Sampling for the Intervention Phase of the Study

According to previous research (16), a sample size of 34 people was estimated for each group, considering a power of 90 and a confidence interval of 99%. The sample loss was 10%, resulting in a final sample size of 40 participants in each group.

Data Collection Methods

To achieve the objectives of the study, a questionnaire containing demographic variables and a questionnaire based on the theoretical constructs of planned behavior were completed by the participants before, immediately, and three months after the intervention (Figure 2).

Data Collection Tools

Demographic Information Questionnaire

This questionnaire included 5 questions about the father's education, the mother's education, the father's occupation, the mother's occupation, and income level.

Questionnaire Based on the Constructs of the Theory of Planned Behavior

The individual's attitudes and beliefs toward certain nutritional behaviors were evaluated through a series of 10 questions on the Likert-type scale, with scores ranging from "completely agree" (1) to "completely disagree" (5). The range of answered questions ranged from 10 to 50. Subjective norms in performing nutritional behaviors were measured with five questions with yes/no options (scored 1-2) and a response range of 5-10. Perceived behavioral control was measured with five questions on a Likert-type scale ranging from "completely agree" to "completely disagree" (1-5), with a response range of 5-25. Behavioral intention was determined with four questions on a Likert-type scale ranging from "completely agree" to "completely disagree" (scored 1-5), with a response range of 4-20. Behavior was measured with seven questions on a Likert-type scale ranging from "completely agree" to "completely disagree" (scored 1-5), with a response range of 7-35. To determine validity, the questionnaire was sent to 10 health education and promotion experts in the country, and their opinions were taken into account in determining the content and form validity, the clarity of linguistic appropriateness, and the range of responses to the items. The reliability of the tool was also estimated

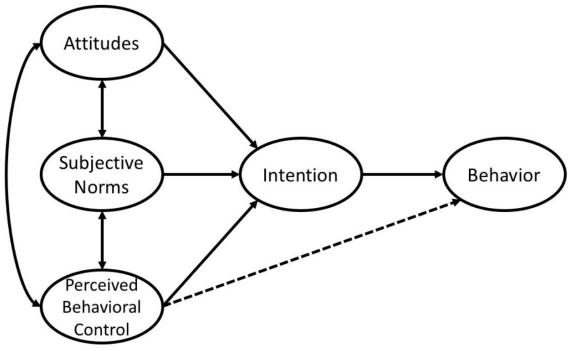

Figure 1. Theory of Planned Behavior Model

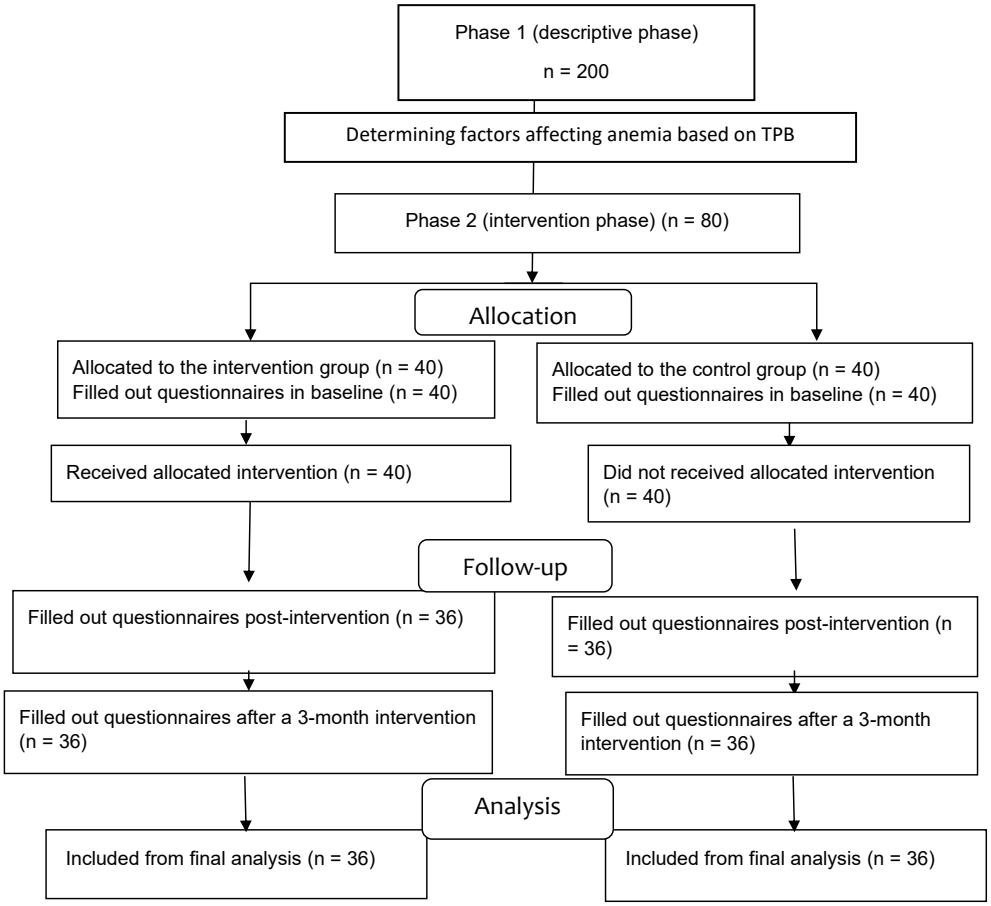

Figure 2. Study Design and Sampling

by completing 30 questionnaires by the research subjects with an interval of 14 days at the beginning of the study.

Intervention Method

Educational Content

The educational content was compiled based on predictive constructs in the descriptive study and the educational objectives of the lesson plan of the training course, and an educational package was presented in four theoretical and practical sessions for the intervention group. These training sessions were held in the school environment for 45-60 minutes, and the educational package included educational CDs, posters, pamphlets, tracts, and homework (Table 1).

Data Analysis

Completed questionnaires were entered into the SPSS 20 program for information investigation. First, the typicality of quantitative factors was decided by utilizing the Kolmogorov-Smirnov test. Then, repeated measures, ANOVA, *t* test, and linear correlation were utilized to analyze the information, and the significance level was 0.05.

Ethical Considerations

The degree of compliance with ethical standards in research was considered in this review. All participants in the research were given sufficient information about the objectives and process of the study before taking the basic test, and then they declared their informed consent to participate in the study. The information about the participants' study was kept confidential, and they were completely assured of the way of coordinating and holding educational intervention sessions, and their human dignity and satisfaction were respected as much as possible. After completing the educational interventions and conducting the final exams, especially due to the request of the participants in the control group and based on materials, the commitment given to them before the start of the training of the common part of the program was presented along with their related educational.

Results

The results of the data analysis of this study are presented in two parts. The first part describes the sample, which includes the demographic information of the study sample, and the second part and conclusions focus on the main objectives of the study.

Descriptive Results of the Study

In this study, the research sample consisted of 200 student girls with a mean age of 13.11 ± 0.5 from Fariman, Iran, which showed that the highest level of education in mothers (27.8%) and fathers (37.8%) participating in

Table 1. Educational Intervention for Training Sessions

Session	Title	Content	Equipment	Intervention Method	Time
1	Knowledge Attitude	• Describing the symptoms of anemia • Listing the names of the groups at risk of iron deficiency anemia (IDA) and explaining the cause of each one • Describing factors that cause IDA • Listing the ways to prevent IDA • Explaining the role and importance of proper nutrition in preventing IDA • Explaining the socio-economic consequences that can be caused by IDA	Computer, data projector Whiteboard and marker Booklets	Lecture, review memories, brainstorming, discussion, and question and answer	45-60 minutes
2	Subjective norms Perceived behavior control	• Discussing the role and importance of family, friends, and acquaintances regarding nutritional behaviors • Improving awareness and performance regarding nutritional risk factors and teaching useful and non-useful foods • Examining people's experiences regarding healthy eating behavior • Expressing people's thoughts and feelings regarding healthy or unhealthy eating behavior • Explaining how to control eating behavior	Computer, data projector Whiteboard and marker	Lecture, review memories, brainstorming, discussion, question and answer, and role-playing	45-60 minutes
3	Behavior intention	• Changing and correcting nutritional behaviors regarding the principles of proper nutrition during adolescence and its role in preventing anemia	Computer, data projector Whiteboard and marker	Lecture, pamphlet, barrier identification, role-playing, movie show, and question and answer	45-60 minutes
4	Conclusion	• Summarizing what was mentioned in the previous session • Answering the questions	Computer, data projector Whiteboard and marker	Lecture, discussion, and question and answer	45-60 minutes

the study was a diploma degree. In terms of the income index, the majority of mothers (67.7%) earned less than 10 million Tomans per month. Furthermore, the comparison table of the demographic information of the two groups revealed that there was no significant difference between the studied variables before the start of the intervention ($P > 0.05$, Table 2).

The results of this study on the predictive power of the TPB model constructs demonstrated that the standardized regression coefficient (beta) of control, norm, and attitude had the highest regression effect on intention, respectively (Table 3).

Interventional Results of the Study

According to the mean attitude structure before and after the intervention and the follow-up stage, the difference between the mean before the intervention and immediately after it was statistically significant. However, the difference between the mean before the intervention and the follow-up stage was not significant ($P = 0.01$). Based on the findings (Table 4) to compare the two groups during the educational intervention, the mean of the attitude structure in the two groups was checked using the independent t-test, and the results showed that there was no significant difference between the two groups in the mean attitude score at the beginning of the intervention ($P = 0.27$), after the intervention ($P = 0.23$), and in the follow-up phase ($P = 053$).

According to the results, the mean of the perceived behavioral control structure before and after the intervention and the follow-up phase was statistically significant ($P = 0.006$). Moreover, the mean structure of behavioral intentions during the study period was statistically significant ($P = 0.02$). Based on the findings, no significant difference was observed in the mean values in any course in the control group, and there were no significant changes. The results confirmed that there were no significant differences in the mean behavioral intention ratings between the two groups at the beginning of the intervention and during the follow-up phase. However, a significant difference was found in the mean behavioral intention ratings in the post-intervention period ($P = 0.01$).

The results showed no significant difference between the two groups in the average behavior score at the beginning of the intervention ($P = 0.69$). Furthermore, the results revealed that there was no significant difference between the intervention and control groups at the beginning of the intervention. After the intervention and the follow-up phase, however, the difference in the structure of the subjective norm between the two groups was significant (Table 4).

Discussion

The findings of this study demonstrated that there is no significant relationship between demographic variables (parents' education, parent's occupation, and household income) and nutritional behaviors related to anemia, which is in line with the results of studies by Jalambadani et al (17), Hosseinizadeh et al (18), and Mirkarimi et al (19).

The results of this study indicated that the mean score of the attitude structure before and after the intervention and the follow-up stage was statistically significant, which corroborates the findings of Zeng and Jadha. Conversely, our results contradict those of Peyman et al (20) and Mirkarimi et al (19), demonstrating that the attitude was not significant during the study. The reason for this difference can be that these studies were conducted on male students, and this gender difference can be an important factor in changing attitudes.

Table 2. Frequency and Distribution of Demographic Variables in the Research Units

Variable		Intervention Group		Control Group		*P* Value
		Number	Percent	Number	Percent	
Father's education	Primary school	7	20.6	12	31.4	>0.05
	Diploma	11	32.35	8	22.2	
	Higher than diploma	16	47.05	16	44.4	
	Total	34	100	36	100	
Mother's education	Primary school	17	51.51	3	8.3	>0.05
	Diploma	10	30.30	9	25.0	
	Higher than diploma	9	27.27	24	66.7	
	Total	33	100	36	100	
Father's job	Employee	6	17.6	9	25.1	>0.05
	Manual worker	5	14.7	22	61.1	
	Unemployment	23	67.7	5	13.9	
	Total	34	100	36	100	
Mother's job	Housewife	33	94.3	33	91.7	>0.05
	Employee	2	5.7	3	8.3	
	Total	35	100	36	100	
Monthly income	Less than 5 million	9	29	12	33	>0.05
	5-10 million	12	38.7	21	58.3	
	More than 10 million	10	32.3	3	8.3	
	Total	31	100	36	100	

Table 3. Linear Regression Results on the Impact of Planned Behavior Theory Constructs on Intention

Variables	Regression Coefficient (B)	Standard Error	Standardized Regression Coefficient (Beta)	T	*P* Value
Attitude	0.071	0.034	0.117	1.87	0.63
Subjective norms	0.316	0.028	0.185	2.96	0.003
Perceived control behavior	0.325	0.036	0.420	6.7	0.001
Dependent variable: Intention					

The influence of subjective norms on behavior, including the attitudes of family members, peers, and health workers, has an impact on how to adopt behavior, and the continuation of behavior, including support from family, friends, and neighbors and their attitude toward performing nutritional behaviors related to anemia, has a strong impact on the individual. The results of the studies by Mirkarimi et al (19) and Payman et al (16) are consistent with those of the present study. However, Jafarpour et al (20) reported that the subjective norms were not significant during the study. One reason for this difference could be the different teaching methods used in these studies compared to the present study.

The results of this study revealed that in the intervention group, there was a significant difference in the mean perceived behavioral control during the study. The mean increase in perceived behavioral control immediately after the intervention compared to baseline and follow-up was statistically significant, indicating that the educational intervention was effective in strengthening and improving perceived behavioral control for participants in the intervention group. The results of this study are in conformity with the findings of Zendehtalab regarding the effect of intervention based on the TPB on improving the nutritional behaviors of students (21).

Limitations of Study

One limitation of this study was the self-reporting of the questionnaire, which can reduce the accuracy of the study. To solve this problem, the objectives of the study and the anonymity of the students can be adequately explained, and the stage before and after the intervention can be specified with numbers without mentioning the person's name. Another limitation was the small sample size. It should be noted that there were no more samples available since this study was conducted in a small city.

Conclusion

Overall, the TPB is a valuable framework for understanding and promoting healthy eating behaviors. It can be applied to various populations and provides insights into the factors that influence nutritional behaviors. Future research should continue to explore and expand upon the application of behavior change models and theories to improve nutritional behaviors.

In general, the results confirmed that the design

Table 4. Evaluation of TPB Components Before Intervention, Immediately After Intervention, and Follow-up in Control and Intervention Groups

Variables	Group	Before	After	Follow-up	Mean Difference Immediately	Mean Difference Follow-up	*P* Value
		M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	
Attitude	Intervention	37.1 ± 4.2	38.9 ± 3.9	39.4 ± 4.1	1.8 ± 4.6	2.3 ± 5.5	0.001
	Control	36.1 ± 3.8	37.6 ± 4.5	36.3 ± 4.3	1.4 ± 4.9	0.35 ± 5.9	0.26
	P value	0.27	0.23	0.53	0.38	0.22	
	t	1.1	1.2	1.9	0.14	0.67	
Subjective norms	Intervention	8.19 ± 0.98	8.88 ± 1.2	8.91 ± 1.1	0.69 ± 1.02	0.72 ± 0.82	0.05
	Control	8.28 ± 1.4	8.05 ± 1.24	8.36 ± 1.1	0.23 ± 0.05	0.08 ± 1.3	0.51
	P value	0.69	0.003	0.28	0.02	0.86	
	t	0.77	2.7	1.43	5.4	0.05	
Perceived behavioral control	Intervention	18.1 ± 3.6	19.8 ± 3.03	19.8 ± 3.8	1.7 ± 3.6	1.3 ± 3.08	0.006
	Control	17.4 ± 3.6	17.3 ± 3.3	17.4 ± 3.3	(-0.32) ± 5.3	(-0.22) ± 4.8	0.91
	P value	0.6	0.001	0.007	0.002	0.007	
	t	0.51	3.3	2.7	1.9	1.6	
Behavior intention	Intervention	14.6 ± 2.5	16.05 ± 1.9	15.5 ± 2.33	1.4 ± 2.7	3.4 ± 0.88	0.02
	Control	14.6 ± 2.4	14.5 ± 3.1	14.7 ± 2.7	(-0.02) ± 4.2	0.11 ± 3.7	0.97
	P value	0.96	0.01	0.18	0.02	0.96	
	t	0.04	2.4	1.33	1.7	0.99	
Behavior	Intervention	24.8 ± 4.5	26.9 ± 4.2	26.9 ± 4.10	2.1 ± 5.01	2.1 ± 5.2	0.01
	Control	24.3 ± 4.9	23 ± 5.3	23.5 ± 4.7	(-1.3) ± 7.5	(-0.08) ± 6.8	0.51
	P value	0.69	0.01	0.002	0.03	0.08	
	t	0.39	3.3	3.1	2.3	2.03	

Note. TPB: Theory of planned behavior; M: Mean; SD: Standard deviation.

and implementation of the educational program can significantly increase the amount of behavioral intention and increase preventive behaviors while significantly reducing the habits and behaviors predisposing to anemia.

Although this study was conducted on a small sample of student girls aged 15–17 years studying in the second year of high school, despite the importance of preventing this disease in girls and women, their performance status was not at a good level before the educational intervention, which multiplies the need to implement educational interventions in the field of anemia prevention. Based on the results of the present study, the TPB has been successful in predicting the nutritional behaviors of students and can be the basis for future interventions.

Suggestions for Future Studies

The TPB can be utilized to improve nutritional behaviors. The TPB suggests that intention is directly influenced by three major constructs, namely, attitude, subjective norm, and perceived behavioral control. By understanding these factors, interventions can be designed to promote healthy eating behaviors. It is suggested that future studies include longer follow-ups to investigate the continuation of behavior change after the implementation of educational programs. Additionally, studies should be conducted to improve nutritional behavior in other groups with socio-cultural characteristics specific to the country. It is also recommended that other theories and models, or combined multiple models, be examined to evaluate factors affecting the nutritional behavior of adolescents and compare them with the results of existing studies.

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Authors' Contribution

Conceptualization: Mohammad Vahedian-Shahroodi.
Data curation: Negar Palahang.
Formal analysis: Habibollah Esmaily.
Funding acquisition: Mohammad Vahedian-Shahroodi, Hadi Tehrani.
Investigation: Maryam Mohammadi, Negar Palahang, Hadi Tehrani.
Methodology: Hadi Tehrani, Negar Palahang.
Project administration: Mohammad Vahedian-Shahroodi.
Resources: Hadi Tehrani.
Software: Negar Palahang, Habibollah Esmaily.
Supervision: Mohammad Vahedian-Shahroodi.
Validation: Hadi Tehrani, Mohammad Vahedian-Shahroodi.
Visualization: Negar Palahang, Maryam Mohammadi.
Writing – original draft: Maryam Mohammadi.
Writing – review & editing: Maryam Mohammadi.

Competing Interests

The authors declare that they have no conflict of interests.

Ethical Approval

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences with the ethics codes IR.MUMS.REC.1397.031 and IRCT20160917029843N9.

The Moral Benchmarks of the Regulation and National Inquire about Committees as set out within the 1964 Helsinki Affirmation, or its consequent revisions or erasures, have been regarded by all methods that were performed amid this ponder. The assent of all subjects has been given in writing.

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References

1. Sadighi J, Sheikholeslam R, Mohammad K, Pouraram H, Abdollahi Z, Samadpour K, et al. Flour fortification with iron: a mid-term evaluation. Public Health. 2008;122(3):313-21. doi: 10.1016/j.puhe.2007.05.002.
2. Seyed Nematollah Roshan F, Navipor H, Alhani F. Effect of family-centered empowerment model (FCEM) on quality of life of mothers having teenagers with iron deficiency anemia. J Nurs Educ. 2014;3(2):27-40. [Persian].
3. Mehrabian F, Valipour R, Kasmaei P, Atrkar Roshan Z, Mahdavi Roshan M. Survey status and nutritional behavior to prevention of iron deficiency anemia among high school girls in Babol city. Nurs Midwifery J. 2014;11(12):1015-23. [Persian].
4. Paknahad Z, Sharifirad GR, Yazdani M, Hoseini SM. Effect of nutrition education on nutritional knowledge and attitude among adolescent girls. J Health Syst Res. 2011;6(1):73-8. [Persian].
5. Vahedian Shahroodi M, Tehrani H, Esmaily H, Olyani S. Effect of education intervention on nutrition behaviors of high school female students along with promoting health literacy. Health Educ Health Promot. 2019;7(4):169-76.
6. Uijterschout L, Vloemans J, Vos R, Teunisse PP, Hudig C, Bubbers S, et al. Prevalence and risk factors of iron deficiency in healthy young children in the southwestern Netherlands. J Pediatr Gastroenterol Nutr. 2014;58(2):193-8. doi: 10.1097/mpg.0000000000000216.
7. Mantadakis E, Chatzimichael E, Zikidou P. Iron deficiency anemia in children residing in high and low-income countries: risk factors, prevention, diagnosis and therapy. Mediterr J Hematol Infect Dis. 2020;12(1):e2020041. doi: 10.4084/mjhid.2020.041.
8. Sarintohe E, Larsen JK, Vink JM, Maciejewski DF. Expanding the theory of planned behavior to explain energy dense food intentions among early adolescents in Indonesia. Cogent Psychol. 2023;10(1):2183675. doi: 10.1080/23311908.2023.2183675.
9. Pita-Rodríguez GM, Chávez-Chong C, Lambert-Lamazares B, Montero-Díaz M, Selgas-Lizano R, Basabe-Tuero B, et al. Influence of inflammation on assessing iron-deficiency anemia in Cuban preschool children. MEDICC Rev. 2021;23(3-4):37-45. doi: 10.37757/mr2021.v23.n3.7.
10. Karimi B, Hajizadeh Zaker R, Ghorbani R. Intake of iron supplement and its related factors in jounior and high school girl students of the Iraninan population. Koomesh. 1393;15(3):316-24. [Persian].
11. Peters RM, Templin TN. Theory of planned behavior, self-care motivation, and blood pressure self-care. Res Theory Nurs Pract. 2010;24(3):172-86. doi: 10.1891/1541-6577.24.3.172.
12. Alhamad H, Donyai P. The validity of the theory of planned behaviour for understanding people's beliefs and intentions toward reusing medicines. Pharmacy (Basel). 2021;9(1):58. doi: 10.3390/pharmacy9010058.
13. Mehri A, Mazloomi Mahmoud Abad SS, Morovati Sharif Abad MA. The effect of an educational program based on the theory of planned behavior on helmet use among employed motorcyclists. Payesh. 2012;11(1):13-20. [Persian].
14. Ajzen I. Constructing a Theory of Planned Behavior Questionnaire. 2019. p. 1-7. Available from: http://www.people.umass.edu/aizen/pdf/tpb.measurement.pdf.
15. Shahnazi H, Tabar Isfahani M, Azarbin S, Hassanzadeh A, Charkazi A, Moodi M. Impact of education based on precede model on knowledge, attitude and behavior of grade two guidance school girls regarding iron deficiency anemia (IDA) in Isfahan, Iran. J Health Syst Res. 2012;8(5):773-81. [Persian].
16. Peyman N, Charoghchian Khorasani E, Moghzi M. The impact of education on the basis of the theory of planned behavior on junk food consumption in high school in Chenaran. Razi J Med Sci. 2016;23(8):62-72. [Persian].
17. Jalambadani Z, Shojaeezadeh D, Yaseri M. The effect of education for folic acid consumption based on the theory of planned behavior in pregnant women in Mashhad. J Jiroft Univ Med Sci. 2016;3(1):105-13. [Persian].
18. Hosseinizadeh m, Khajavi A, Moshki M. Effect of mother's education based on "theory of planned behavior" (TPB) in preventing iron deficiency anemia in 4-24 month children in Ferdows city in 2015. J Birjand Univ Med Sci. 2017;24(3):207-17. [Persian].
19. Mirkarimi K, Bagheri D, Honarvar M, Kabir M, Berdi Ozouni-Davaji R, Eri M. Effective factors on Fast food consumption among high-school students based on planned behavior theory. J Gorgan Univ Med Sci. 2016;18(4):88-93. [Persian].
20. Jafarpour K, Arastoo AA, Gholamnia Shirvani Z, Saki O, Araban M. The effect of health education intervention based on the theory of planned behavior to promote physical activity in women's health volunteers of Shushtar health centers. Iran J Obstet Gynecol Infertil. 2016;19(37):62-74. doi: 10.22038/ijogi.2016.8189. [Persian].
21. Zendehtalab HR. The effect of intervention based on the theory of planned behavior on improving nutritional behaviors of students. Journal of Research and Health. 2014;4(4):903-10. [Persian].