Research Article

Factors Affecting Healthy Oil Consumption Behaviors in Iranian Housewives: Application of the Theory of Planned Behavior

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Abstract

Background: Evaluation of oil and fat consumption plays a key role in predicting the nutritional health of community members.
Objectives: The current study aimed at predicting the adoption of healthy behaviors related to oil consumption among housewives based on the Theory of Planned Behavior (TPB).
Methods: This was a cross-sectional study with 160 housewives. We used the multi-stratified sampling method and Structural Equation Modeling (SEM) to examine the association between TPB constructs and housewives' behavioral intention to consume healthy oil.
Results: Liquid oil was the most frequently consumed oil (59.4%) while solid oil had the lowest frequency (6.9%). Also, 1.3% of the participants used red meat highly saturated in fat while 88.8% did it not at all. Path analysis was run to predict healthy behaviors concerning oil consumption in light of TPB. The TPB adopted in the current study enjoyed a desirable fitness, and explained 31% of behavior intention variance and 15% of behavior variance (B = 0.37). Also, the attitude was the strongest predictor of behavioral intention.
Conclusions: The TPB and its constructs were used to determine factors affecting healthy oil consumption behaviors among Women in Iran. This result indicates that promoting behavioral intention by focusing on attitude, perceived behavioral control, and subjective norms may promote healthy oil use.

Keywords: Theory of Planned Behavior, Oil Consumption, Housewives

1. Background

Diet is a major contributor to health, illness, and disability worldwide. Nutrition can largely affect metabolic risk factors such as blood pressure, cholesterol, and Body Mass Index (BMI). By 2020, approximately 75% of all mortalities and 60% of all life disabilities will be attributed to chronic noncommunicable diseases such as cardiovascular disease, type 2 diabetes, obesity, and cancer (1).

Fatty acids are essential nutritional compounds supplied by both animal and plant sources. The difference between these two sources is in their fatty acid components. Animal fats are saturated while plant fats are unsaturated. The latter can be classified into mono unsaturated fatty acids (MUFAs) and poly unsaturated fatty acids (PUFAs) (2).

Many studies have been conducted on the association between dietary fatty acids and the prevention/progression of chronic noncommunicable diseases such as type 2 diabetes and cardiovascular disease (3). According to the World Health Organization (WHO), ischemic heart disease and cardiovascular events were the main causes of mortality with 15 million deaths worldwide in 2015 (2).

Oils containing saturated fatty acids and trans-fatty acids have different side effects such as systemic inflammation, abdominal obesity, and insulin resistance. As they increase the concentration of total cholesterol in the blood, they can cause cardiovascular disease (4-6). The consumption of saturated fatty acids should be limited to 7% of total energy intake and trans fat should not exceed 1% of which. Moreover, cholesterol consumption should be kept below

300 mg a day ([7]). In general, hydrogenated oils are widely used in Iranian homes for cooking (average per-person intake of 14 g/1000 kcal). Trans fatty acids comprise 33% of fatty acids in these products, accounting for 4.2% of all calories consumed (12.3 g/day) ([8]).

Theories can easily help determine the characteristics and personal values of modifiable healthy behaviors ([9]). In a recent investigation, the Theory of Planned Behavior (TPB) was used as a theoretical framework ([10]). The predictive power of this theory has already been proved in many social and health-related studies of health behaviors ([11]). According to TPB, the foremost predictor of adopting a certain behavior is the intention to do that behavior. The intention is defined by three factors including the attitude toward behavior (desired or undesired), subjective norms (social pressure to behave or not behave in a certain way), and perceived control (perceived ease or difficulty) ([10]). The TPB is adopted as a proper framework to predict nutritional behaviors including fruit and vegetable intake ([12], [13]), eating breakfast ([14]), and fast-food consumption ([15]).

2. Objectives

Since women are the main decision-makers in the family diet, the current study aimed at predicting the adoption of healthy behaviors concerning oil consumption according to the TPB among housewives visiting the main healthcare centers of Bandar Abbas.

3. Methods

3.1. Study Population and Sampling Technique

This was a cross-sectional study. The target population included all women visiting the main healthcare centers in Bandar Abbas, Iran, in 2017. The sample size included 160 women selected using the multiple-stratified sampling method. Of 20 main healthcare centers in Bandar Abbas, two urban centers and two suburban centers (totally four centers) were randomly selected. In each center, housewife visitors were first selected using simple randomization upon attending the center and showing their household cards. The sample size was 40 women in each center. The inclusion criteria included reading and writing skills and the exclusion criteria were the absence in the briefing sessions and incomplete questionnaires.

3.2. Data Collection

The required data were collected by a questionnaire comprising three sections including demographic information, oil consumption habits, and TPB constructs. The

first section of the questionnaire included females' demographic information such as age, educational status, and average family income. The second section was to assess the oil consumption habits with nine items on the type, amount, and the way of oil consumption. The oil consumption scores ranged from 0 to 22. The third section of the questionnaire inquired about the constructs of TPB including attitudes (behavioral beliefs and outcome evaluation) and consisted of 20 items. The attitude was estimated through behavioral beliefs (10 items) and outcome evaluation (10 items). The items were scored based on a five-point Likert scale ranging from totally agree (score 5) to totally disagree (score 1). Certain items were scored reversely. attitude score was ranging from 10 to 250.

Subjective norms were measured through normative beliefs (four items) and motivation to comply (four items). These items were also scored based on a five-point Likert scale ranging from totally agree (score 5) to totally disagree (score 1). The score of subjective norms was calculated as the sum of all normative beliefs multiplied by the motivation to comply. The overall score ranged from 4 to 100.

Perceived behavioral control consisted of control beliefs (three items) and perceived power (three items) and was scored based on a five-point Likert scale ranging from totally agree (score 5) to totally disagree (score 1). The perceived behavioral control score was calculated as the sum of the all control belief sub-scale multiplied in by the perceived power. The overall score ranged from 3 to 75. Behavioral intention included three items scored based on a five-point Likert scale ranging from 5 (totally possible) to 1 (totally impossible). The overall score ranged from 3 to 15.

3.3. Reliability and Validity

To evaluate the validity of the questionnaire, 10 health education specialists and nutrition specialists were required to comment on it. The questionnaire was revised based on the comments. To estimate the internal consistency of the questionnaire, Cronbach's alpha was used for each construct, which was 0.58 for behavioral beliefs, 0.63 for outcome evaluation, 0.76 for normative beliefs, 0.76 for motivation to comply, 0.65 for control beliefs, 0.63 for perceived power, and 0.79 for intention. These values attest to the acceptable reliability of the questionnaire.

3.4. Ethical Considerations

As soon as the required permissions were obtained from the authorities, the selected centers were visited and sampling was performed among female visitors. The study objectives were explained to women meeting the inclusion criteria. The subjects were assured about the confidentiality of their information and they gave their informed consent.

3.5. Statistical Analyses

The collected data were analyzed statistically with SPSS version 22 and the path analysis model using EQS 6.1. The model was evaluated using fit criteria including Root Mean Square Error of Approximation (RMSEA), Goodness of Fit Index (GFI), and Normalized Fit Index (NFI).

4. Results

The relative frequency and absolute frequency of women in different age groups are listed in Table 1. In terms of education, nine (5.6%) women had an elementary school education, 37 (23.1%) had a junior high school education, 74 (46.3%) had a diploma, and 40 (25%) had a university degree. The study results regarding the type of oil consumed by housewives showed that liquid oil was the most common type of consumed oil (59.4%) while the lowest frequency belonged to solid oil (6.9%).

Table 1. Social and Demographic Characteristics of the Participants

Demographic Characteristics	No. (%)
Age	
15 - 25	46 (28.7)
26 - 35	85 (53.2)
36 - 45	24 (15)
46 - 55	5 (3.1)
Elementary	9 (5.6)
Education	
Under diploma	37 (23.1)
Diploma	74 (46.1)
Academic	40 (25)
Income, Rials	
< 10,000,000	63 (39.4)
Between 10,000,000 and 20,000,000	74 (47.5)
> 20,000,000	21 (13.1)

Table 2 indicates oil consumption-related behaviors. Based on the results, 20% of the participants stated that they did not remove extra oil from the stew surface and 12% said that they did not eliminate extra fat from red meat.

Figure 1 represents the path analysis results including the standardized weights (β scores) as the path coefficients. The path analysis was run to predict healthy behaviors concerning oil consumption in light of TPB (Figure 1). In the path analysis, different indices are used to check the fitness of tested models. In the present study, we used the comparative fit index (CFI) estimated at 0.98, along with the goodness of fit index (GFI) estimated at 0.90

and the normalized fit index estimated at 0.98. The P value was lower than 0.001. Since the CFI and GFI were $\geq$ 0.9 and RMSEA was estimated at 0.085, the fitness of TPB was confirmed for oil consumption-related health behaviors. The target indices proved the convergence of TPB to the target research population.

As can be observed in Figure 1, the attitude, subjective norms, and perceived behavioral control constructs had standardized β-values of 0.37, 0.22, and 0.23, respectively, respecting the behavioral intention construct (P < 0.05). This can prove the direct effect of these constructs on behavioral intention. Indeed, the attitude construct had a stronger effect than others on behavioral intention. The behavioral intention construct had a 0.09 prediction power while perceived behavioral control had a 0.12 prediction power. The TPB in the current study not only showed an acceptable fitness, but also explained 31% of the behavioral intention variance and 15% of behavior variance.

5. Discussion

The current study aimed at predicting the adoption of healthy behaviors in consuming oil based on the TPB among housewives. As the results showed, most of the housewives claimed that they only consumed liquid plant oil (simple or frying-only). Jafari et al. [16] investigated the ways of oil consumption among subjects residing in the east of Tehran. They found that the most frequent type of consumed oil was liquid oil, followed by solid oil. For fried foods, the most frequently used type of oil was liquid oil, followed by frying-only oil. In that study, liquid oil was consumed to a lower extent than in the current study and this discrepancy can be explained by different contexts and lifestyles, people's higher access to liquid oil, and established dietary habits among the residents of these regions. The data collection methods and the increased awareness of people over time can be among the other reasons for these diverse findings.

The current study results also revealed that attitude, subjective norms, and perceived behavioral control were the predictors of adopting healthy behaviors in oil consumption. In other words, an increase in any of these constructs is accompanied by improved behavioral intention and finally, the probability of doing that behavior.

The attitude construct with a path coefficient of 0.37 played a key role in predicting intention and behavior. Similarly, in a body of related studies including the one that predicted the intention of adopting a healthy diet by Pawlak et al. [17] or the study by White et al. investigating the consumption of low-fat food in patients with diabetes or cardiovascular diseases, the attitude was the

Table 2. Oil Consumption-related Behaviors in the Target Population

Statement	Behavior, No. (%)			
	Always	**Often**	**Sometimes**	**Never**
Use of frying-only liquid oil	57 (35.6)	43 (26.9)	46 (28.8)	14 (8.8)
Use of cooking-only liquid oil	68 (42.5)	50 (31.3)	26 (16.3)	16 (10)
Removing extra oil from the stew surface	58 (36.3)	29 (18.1)	41 (25.6)	32 (20)
Heating oil up at a high temperature	-	110 (68.8)	-	50 (31.3)
Reusing oil for frying	-	46 (28.8)	-	114 (71.3)
Removing extra fat from red meat	64 (40)	35 (21.9)	41 (25.6)	20 (12.5)
Reusing extra fat of red meat	5 (3.1)	2 (1.3)	11 (6.9)	142 (88.8)
Preferring high-fat food to low-fat food	64 (40)	33 (20.6)	44 (27.5)	19 (11.9)
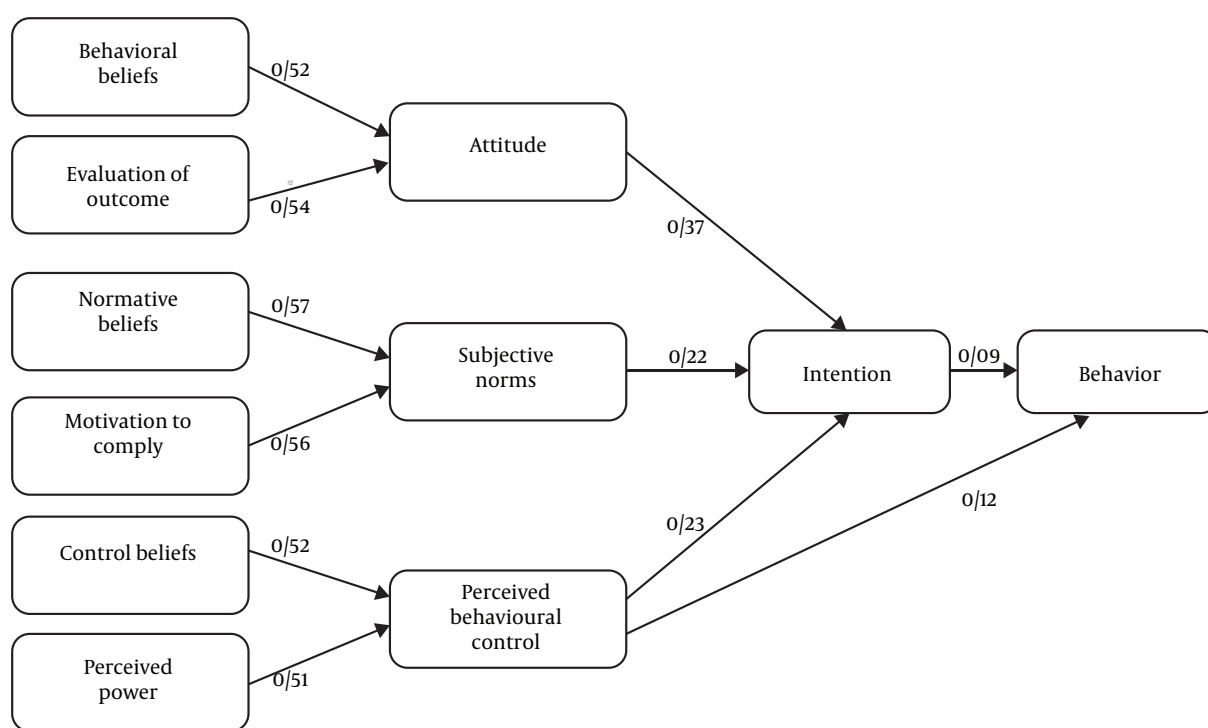
Figure 1. Path analysis of theory of planned behavior to predict oil consumption-related healthy behaviors

strongest predictor of intention to consume low-fat food (18). However, in another study, which predicted the factors involved in nutritional behaviors concerning cardiovascular disease (19), the attitude was a poor predictor of behavioral intention, unlike the current study findings, which can be explained by different study groups, types of target behaviors, and study settings.

The path coefficient of subjective norms was estimated at 0.22, which showed that this construct was directly and significantly related to the intention construct. A study by

Parrott et al. confirmed this finding (20). In another study investigating the application of TPB in seven health-related behaviors (i.e., addiction, driving, nutrition, sports, AIDS, and oral/dental health), subjective norms played no significant role (21). Furthermore, in the study by Bogers et al., subjective norms were not significantly correlated with the intention of fruit and vegetable intake (22), which was not in agreement with the current study findings. Different personal, social, and cultural features of participants might be the reasons for such divergence.

As for the perceived behavioral control construct, the path coefficient was 0.23, which showed that this construct was directly and significantly correlated with behavioral intention. These results are consistent with those obtained by Parrott et al. ([20]) and White et al. ([23]). An investigation conducted by Godin and Kok revealed that perceived behavioral control, in line with the intention construct, can directly affect behavior ([19]). According to the path analysis, perceived behavioral control with a β-value of 0.12 can directly and significantly affect behavior. In the study by Blanchard et al., similarly, perceived behavioral control could significantly predict the intention and behavior of fruit and vegetable consumption among university students ([12]). White et al. found that perceived behavioral control and intention were the strong predictors of consuming food with saturated fat ([18]). As the results reported by Murnaghan revealed, perceived behavioral control had a significant effect on consuming fruits and vegetables, physical activity, and quitting smoking among teenagers ([24]). In our study, perceived behavioral control had a direct significant correlation with intention and behavior. However, it could not predict these two constructs. These divergent findings can be explained by different personal, social, and cultural differences of the study populations.

The explained variance in the path analysis showed that the overall percentage of the dependent variable was explained by the independent variables of the study. The TPB showed an acceptable fitness and explained 31% of the behavioral intention variance and 15% of behavior variance. In comparison with other studies, the coverage of these variances, or in other words, the prediction of intention and behavior constructs within the theory, was acceptable. In the body of related studies on TPB until 1997, the mean intention variance was reported as 39% and the mean behavior variance was 27% ([25]).

In a review of 56 studies that looked into 87 types of behaviors based on TPB, 41% of behavioral intention variance and 34% of future behavior were explained by this theory ([21]). The coverage of intention and behavior variances by TPB in the above-mentioned studies and tens of others has been obtained in different study populations, types of behaviors, and study settings.

In light of the current study findings, to modify oil consumption habits, mass media should be used to raise people's awareness. It is proposed to educate housewives visiting the main healthcare centers on the proper ways of oil consumption. Further studies on other populations also seem essential.

The high number of questionnaire items and the time taken to complete them were the limitations of the study. Also, we only enrolled housewives in the study and the results are not generalizable to the whole population.

5.1. Conclusions

The current study aimed at predicting the adoption of healthy behaviors concerning oil consumption among housewives in light of TPB. The findings revealed that adopting healthy behaviors of oil consumption was mainly predicted by attitude, followed by perceived behavioral control, and subjective norms. Intention and behavioral control directly affected the adoption of healthy behaviors concerning oil consumption. All factors should be taken together while developing the required interventions to modify oil consumption habits. Thus, it is necessary to discuss how to correct the existing wrong beliefs and reinforce correct attitudes toward the outcomes of improper oil consumption. Housewives have different beliefs about oil consumption ranging from positive to negative. Researchers aiming to promote oil consumption-related behaviors should address these beliefs and cut down on negative beliefs or remove them all and instead, highlight positive ones. To facilitate the outcome evaluation construct, the positive outcomes of quitting unhealthy habits and behaviors concerning oil consumption need to be discussed. To facilitate control beliefs and adjust the perceived power, a discussion needs to target such facilitators as the capability of resisting such tantalizing effects of better food taste with solid oil and inhibitors such as the higher cost of liquid oil. To facilitate subjective norms, a program is required to involve more of the surrounding people to further motivate housewives. Moreover, to improve public performance regarding oil consumption, there is a need to involve mass media and healthcare centers and provide access to healthy oil at a low cost.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Conflict of Interests: The authors declare that they have no competing interests.

References

1. Micha R, Khatibzadeh S, Shi P, Fahimi S, Lim S, Andrews KG, et al. Global, regional, and national consumption levels of dietary fats and oils in 1990 and 2010: A systematic analysis including 266 country-specific nutrition surveys. *BMJ*. 2014;**348**:g2272. doi: 10.1136/bmj.g2272. [PubMed: 24736206]. [PubMed Central: PMC3987052].

2. Acosta-Montano P, Garcia-Gonzalez V. Effects of dietary fatty acids in pancreatic beta cell metabolism, implications in homeostasis. *Nutrients*. 2018;**10**(4). doi: 10.3390/nu10040393. [PubMed: 29565831]. [PubMed Central: PMC5946178].

3. Anderson BM, Ma DW. Are all n-3 polyunsaturated fatty acids created equal? *Lipids Health Dis*. 2009;**8**:33. doi: 10.1186/1476-511X-8-33. [PubMed: 19664246]. [PubMed Central: PMC3224740].

4. Micha R, Mozaffarian D. Trans fatty acids: Effects on cardiometabolic health and implications for policy. *Prostaglandins Leukot Essent Fatty Acids*. 2008;**79**(3-5):147–52. doi: 10.1016/j.plefa.2008.09.008. [PubMed: 18996687]. [PubMed Central: PMC2639783].

5. Mozaffarian D. Effects of dietary fats versus carbohydrates on coronary heart disease: A review of the evidence. *Curr Atheroscler Rep*. 2005;**7**(6):435–45. doi: 10.1007/s11883-005-0060-y. [PubMed: 16256001].

6. Mozaffarian D, Stein PK, Prineas RJ, Siscovick DS. Dietary fish and omega-3 fatty acid consumption and heart rate variability in US adults. *Circulation*. 2008;**117**(9):1130–7. doi: 10.1161/CIRCULATIONAHA.107.732826. [PubMed: 18285566].

7. Hunter JE. Dietary levels of trans-fatty acids: Basis for health concerns and industry efforts to limit use. *Nutrition Research*. 2005;**25**(5):499–513. doi: 10.1016/j.nutres.2005.04.002.

8. Mozaffarian D, Abdollahi M, Campos H, Houshiarrad A, Willett WC. Consumption of trans fats and estimated effects on coronary heart disease in Iran. *Eur J Clin Nutr*. 2007;**61**(8):1004–10. doi: 10.1038/sj.ejcn.1602608. [PubMed: 17268422].

9. Fishbein M, Ajzen I. *Understanding attitudes and predicting social behavior*. Amazon; 1980.

10. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decision Proc*. 1991;**50**(2):179–211. doi: 10.1016/0749-5978(91)90020-t.

11. Kassem NO, Lee JW, Modeste NN, Johnston PK. Understanding soft drink consumption among female adolescents using the Theory of Planned Behavior. *Health Educ Res*. 2003;**18**(3):278–91. doi: 10.1093/her/cyf017. [PubMed: 12828230].

12. Blanchard CM, Fisher J, Sparling PB, Shanks TH, Nehl E, Rhodes RE, et al. Understanding adherence to 5 servings of fruits and vegetables per day: A theory of planned behavior perspective. *J Nutr Educ Behav*. 2009;**41**(1):3–10. doi: 10.1016/j.jneb.2007.12.006. [PubMed: 19161914].

13. Emanuel AS, McCully SN, Gallagher KM, Updegraff JA. Theory of Planned Behavior explains gender difference in fruit and vegetable consumption. *Appetite*. 2012;**59**(3):693–7. doi: 10.1016/j.appet.2012.08.007. [PubMed: 22898607]. [PubMed Central: PMC3490048].

14. Mullan B, Wong C, Kothe E. Predicting adolescent breakfast consumption in the UK and Australia using an extended theory of planned behaviour. *Appetite*. 2013;**62**:127–32. doi: 10.1016/j.appet.2012.11.021. [PubMed: 23219456].

15. Seo HS, Lee SK, Nam S. Factors influencing fast food consumption behaviors of middle-school students in Seoul: An application of theory of planned behaviors. *Nutr Res Pract*. 2011;**5**(2):169. doi: 10.4162/nrp.2011.5.2.169. [PubMed: 21556232]. [PubMed Central: PMC3085807].

16. Jafari F, Kholdi N, Davati A, Nezamdust Z. The study of oils consumption pattern and its related factors in east Tehran. *J Fasa Univ Med Sci*. 2013;**3**(3):202–7.

17. Pawlak R, Malinauskas B, Rivera D. Predicting intentions to eat a healthful diet by college baseball players: Applying the theory of planned behavior. *J Nutr Educ Behav*. 2009;**41**(5):334–9. doi: 10.1016/j.jneb.2008.09.008. [PubMed: 19717116].

18. White KM, Terry DJ, Troup C, Rempel LA, Norman P. Predicting the consumption of foods low in saturated fats among people diagnosed with Type 2 diabetes and cardiovascular disease. The role of planning in the theory of planned behaviour. *Appetite*. 2010;**55**(2):348–54. doi: 10.1016/j.appet.2010.07.011. [PubMed: 20674639].

19. Rezabeigi Davarani E, Mahmoodi MR, Khanjani N, Fadakar Davarani MM. Application of planned behavior theory in predicting factors influencing nutritional behaviors related to cardiovascular diseases among health volunteers in Kerman. *J Health*. 2018;**8**(5):518–29.

20. Parrott MW, Tennant LK, Olejnik S, Poudevigne MS. Theory of Planned Behavior: Implications for an email-based physical activity intervention. *Psychol Sport Exerc*. 2008;**9**(4):511–26. doi: 10.1016/j.psychsport.2007.07.002.

21. Godin G, Kok G. The Theory of Planned Behavior: A review of its applications to health-related behaviors. *Am J Health Promot*. 2016;**11**(2):87–98. doi: 10.4278/0890-1171-11.2.87. [PubMed: 10163601].

22. Bogers RP, Brug J, van Assema P, Dagnelie PC. Explaining fruit and vegetable consumption: The theory of planned behaviour and misconception of personal intake levels. *Appetite*. 2004;**42**(2):157–66. doi: 10.1016/j.appet.2003.08.015. [PubMed: 15010180].

23. White KM, Terry DJ, Troup C, Rempel LA, Norman P, Mummery K, et al. An extended Theory of Planned Behavior intervention for older adults with type 2 diabetes and cardiovascular disease. *J Aging Phys Act*. 2012;**20**(3):281–99. doi: 10.1123/japa.20.3.281. [PubMed: 22190336].

24. Murnaghan DA, Blanchard CM, Rodgers WM, LaRosa JN, MacQuarrie CR, MacLellan DL, et al. Predictors of physical activity, healthy eating and being smoke-free in teens: A Theory of Planned Behaviour approach. *Psychol Health*. 2010;**25**(8):925–41. doi: 10.1080/08870440902866894.

25. Armitage CJ, Conner M. Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *Br J Soc Psychol*. 2001;**40**(4):471–99. doi: 10.1348/014466601164939.