The Relation Between Decisional Balance and Self-Efficacy with Fruits and Vegetable Consumption Among a Sample of Women in Bandar Abbas, Iran

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Abstract

Background: Consumption of fruits and vegetables improve health and prevent chronic diseases.
Objectives: This study aimed to survey the relation between decisional balance and self-efficacy with fruits and vegetable consumption among a sample of women in Bandar Abbas, Iran.
Methods: In this study, 383 women who referred to seven health centers in Bandar Abbas were selected through a stratified sampling method. A valid and reliable questionnaire including the constructs of the transtheoretical model and fruits and vegetable consumption was used to collect data. SPSS version 19.0 was used to analyze the data running One-way ANOVA and linear trend analysis.
Results: Analysis of consuming two services or more fruits a day indicated that the majority of women (58%) were at the maintenance stage and the minority (4.2%) at the contemplation stage. Moreover, the majority of subjects (55.6%) were found to be at the maintenance stage of consuming 200 g or more vegetables a day, while the minority (3.7%) were at the contemplation stage. Significant relations were found between the stages of change to consume more fruits and vegetables and such constructs as decisional balance and self-efficacy P < 0.05).
Conclusions: According to the results, in designing interventions to increase the consumption of fruits and vegetables in housewives, it is necessary to emphasize increasing the decisional balance and self-efficacy.

Keywords: Fruit, Vegetables, Theoretical Model, Trend

1. Background

Consuming fruits and vegetables as part of a daily diet can help reduce the risk of coronary heart diseases (1), brain stroke (2), and cancer (3). Frequent consumption of fruits and vegetables lowers the probability of renal cell carcinoma and pre-eclampsia in women (4). Moreover, consuming fruits and vegetables is correlated with the prevention of cataract and hypertension (5). A diet enriched with fruits and vegetables probably lowers such diseases as depression, psychosis, and anxiety (6).

The World Health Organization (WHO) recommends a minimum of 400 g of fruits and vegetables a day (equal to 5 servings) to prevent chronic diseases (7). The average consumption of fruits and vegetables worldwide is much lower than the recommended amount by WHO. Only in the U.S., 6.8% of people have attained the daily recommended amount, and about 5.6% of Australians consume an adequate amount of fruits and vegetables a day (8). In an investigation conducted by Nemati et al., in Iran, the consumption trend and quality of fruits and vegetables were found to be low in women at the productive age (9).

Nutritional behaviors are among multifactorial health-related issues, which significantly affect health (10). Promotion of healthy dietary behaviors is only possible when the factors involved are adequately recognized through proper models of change in health behavior (11). One such model that applies to the promotion of health

is the transtheoretical model (12). This model consists of four constructs: stages of change, decisional balance, self-efficacy, and processes of change (13). The core of this model is the stages of change and is the only construct that has a temporal dimension. This construct is comprised of five consecutive stages: pre-contemplation in which one does not intend to change the behavior within the forthcoming six months, contemplation stage in which one considers changing the behavior within the next six months, preparation stage in which one plans to change the behavior in near future (usually in a month), action stage in which incorporates certain overt activities in his/her lifestyle to change the target behavior, and maintenance stage in which one attempts to maintain the altered behavior and take care not to return to the old habit (14). Decisional balance is one's cognitive evaluation of the positive and negative aspects of behavior (15). Self-efficacy is in fact confidence in one's own capability of following up a particular behavior. The transtheoretical model has been used in health-related behaviors such as doing physical exercises (16, 17), driving behavior (18), and smoking (19). However, few investigations have been conducted in Iran, especially on the consumption of fruits and vegetables based on this model (20, 21).

2. Objectives

To the best of our knowledge, a study in this area has not been conducted in Bandar Abbas. Therefore, this study aimed to survey the relation between decisional balance and self-efficacy with fruits and vegetable consumption among a sample of women in Bandar Abbas, in the south of Iran. This study provides a clear picture of the consumption of fruits and vegetables in housewives, who play an essential role in their families' health and can be used to design effective interventions.

3. Methods

The target population of the present study consisted of all women who referred to the healthcare centers of Bandar Abbas. The required sample size was determined with reference to Henry's study (22) and according to the purpose of the research. A sample of 383 subjects were selected through a multiple stratified sampling method. Initially, from among eleven health centers, seven were chosen randomly. Then, according to the existing population of each center, the sample size was established. In each center, from among all visitors, those who met the inclusion criteria entered the study. This procedure continued until the sample was completed. The inclusion criteria were: being married, literate and willing to take part in the research.

To collect the data, independent questionnaires were used each measuring a certain variable. These questionnaires consisted of demographic variables (age, education), stages of change of fruit and vegetable consumption, perceived benefits, perceived barriers, and self-efficacy. The decisional balance was estimated as the subtraction of perceived benefits and barriers. To design the questionnaires, a review of the related literature was used along with interviews with a number of research subjects. To determine the face and content validity of the items, a panel of experts was used, and the test-retest method was employed along with Cronbach's alpha to establish the reliability.

To determine the stages of change of consumption two services or more fruits a day, a questionnaire was used, which was comprised of four yes/no items. These items explored the state or intention of consuming two services or more fruit a day within the forthcoming one and six months. According to the responses one made, the result would belong to any of the pre-contemplation, contemplation, preparation, action, or maintenance stages. The test-retest method was used to check the reliability of this test. Accordingly, the questionnaire was submitted to 18 subjects two times in a 2-week interval. The correlation coefficient of these two administrations was 0.71.

The perceived benefits and perceived barriers questionnaires for consumption two services or more fruits a day each contained eight items in a Likert scale, with five choices ranging from totally agree (score five) to totally disagree (score one). The scores of all items were added up and then divided by eight. Therefore, the perceived benefit and perceived barrier scores of fruit consumption ranged between one and five. Cronbach's alpha for perceived benefits and perceived barriers questionnaires were estimated to be 0.75 and 0.85, which points to an acceptable internal consistency.

The self-efficacy questionnaire for consumption of two services or more fruits a day contained seven items arranged on a Likert scale. Each item consisted of five choices ranging from too easy (five) to too hard (one). The scores of all items were summed up and divided by seven. The self-efficacy score for fruit consumption would, therefore, vary between one and five. Cronbach's alpha was estimated to be 0.74, which indicates an acceptable internal consistency.

To determine the stages of change for consuming 200 g or more vegetables a day, a specific questionnaire was used. There were four yes/no items included, which explored one's intention of consuming 200 g or more of vegetables now, within a month, and within six months. According to the responses, one was found to be at any of these stages: pre-contemplation, contemplation, prepara-

tion, action, or maintenance. Test-retest method was used to establish the reliability of the questionnaire. The questionnaire was submitted to 18 subjects two times at the interval of two weeks, and the internal consistency was found to be 0.71.

The perceived benefits and perceived barriers questionnaires for consuming 200 g or more vegetables a day each contained nine items in a Likert scale, with five choices ranging from totally agree (score five) to totally disagree (score one). The scores of all items were added up and then divided by nine. Therefore, the perceived benefits and perceived barriers scores of vegetable consumption ranged between one and five. Cronbach's alpha for perceived benefits and perceived barriers questionnaires were estimated to be 0.64 and 0.70, which points to an acceptable internal consistency.

The self-efficacy questionnaire for consuming 200 g or more vegetables a day contained seven items arranged in a Likert scale; each item consisted of five choices ranging from too easy (five) to too hard (one). The scores of all items were summed up and divided by seven. The self-efficacy score would, therefore, vary between one and five. Cronbach's alpha was estimated to be 0.80, which indicates an acceptable internal consistency.

In advance to the data collection, the purpose of the study, confidentiality of the data, and how to complete the questionnaire were explained to the subjects. The questionnaires were then submitted to women who were willing to participate in the research. They began to evaluate themselves based on the target questionnaire. In case there was any ambiguity, further explanation was provided. This research was approved by the Ethics Committee of Hormozgan University of Medical Sciences (code: HUMS.REC.1394.172).

SPSS version 19.0 was utilized for the required statistical analyses. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to analyze the data and due to the normality of data distribution, one-way ANOVA was used to test how the processes involved in changing the fruit and vegetable consumption behavior and how it relates to such factors as decisional balance and self-efficacy. In order to look into the trend of change in decisional balance and self-efficacy for fruit and vegetable consumption, linear trend analysis was used. The significance level was set at below 0.05.

4. Results

The mean age of the subjects was 29.5 years (SD = 7.3), ranging from 16 to 58. The education level of 5.7% was elementary school, 15.9% secondary school, 48.3% high school, and 30% had a university degree. Analysis of consuming two services or more fruit a day in the light of the transtheoretical model indicated that the majority of women (58%) were at the maintenance stage and the minority (4.2%) at the contemplation stage (Table 1).

Table 1. Stages of Change of Consuming Two Services or More Fruits a Day

Stages of Change	No. (%)
Precontemplation	31 (8.1)
Contemplation	16 (4.2)
Preparation	67 (17.5)
Action	47 (12.3)
Maintenance	222 (58)
Total	383 (100)

There was a statistically significant relation between the stages of change of consuming two services or more fruits a day and decisional balance (P < 0.05). Moreover, along with the development from pre-contemplation to maintenance stage, decisional balance showed to have a linear increasing trend (P < 0.05).

There was a significant relation between the stages of change of consuming fruits and self-efficacy (P < 0.05) (Table 2). Accordingly, self-efficacy was found to have a statistically significant linear trend (P < 0.05). Self-efficacy had an increasing linear trend along the stages of change. In other words, meanwhile, the subjects were moving from pre-contemplation towards maintenance, their self-efficacy was also increased in a linear fashion (Figure 1).
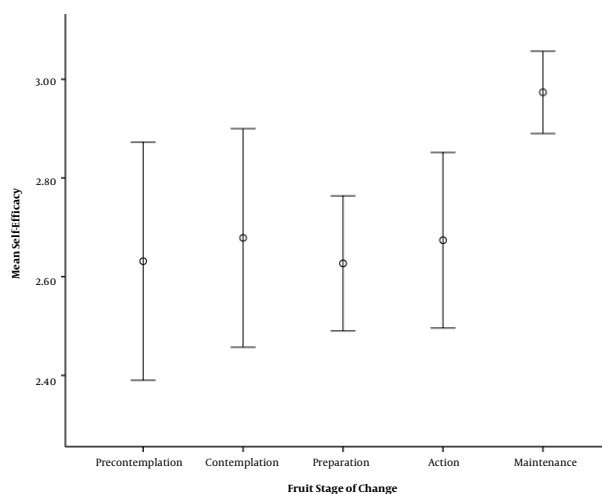

Figure 1. The trend of change in self-efficacy regarding fruit consumption based on the stages of change

The majority of subjects (55.6%) were found to be at the

Table 2. Mean (SD) of the Model Constructs and Stages of Change of Consuming Two Services or More Fruit a Day (ANOVA)

Stages of Change TTM Constructs	Precontemplation	Contemplation	Preparation	Action	Maintenance	F	P
Decisional balance	1.58 (0.75)	1.39 (0.77)	1.67 (0.65)	1.57 (0.74)	1.86 (0.72)	3.57	< 0.007
Self-efficacy	2.63 (0.65)	2.67 (0.41)	2.62 (0.56)	2.67 (0.59)	2.97 (0.63)	6.73	< 0.001

maintenance stage of consuming 200 g or more vegetables a day, while the minority (3.7%) were at the contemplation stage (Table 3).

Table 3. Stages of Change of Consuming 200 g or More Vegetables a Day

Stages of Change	No. (%)
Precontemplation	39 (10.2)
Contemplation	14 (3.7)
Preparation	94 (24.5)
Action	23 (6)
Maintenance	213 (55.6)
Total	383 (100)

There was a significant relation between the stages of change of consuming 200 g or more vegetables a day and decisional balance (Table 4, P < 0.05). Along the developmental stages, decisional balance showed to follow an increasing linear trend (P < 0.003). In other words, along with development from pre-contemplation to maintenance stage, one's decisional balance would be linearly increased (Figure 2).
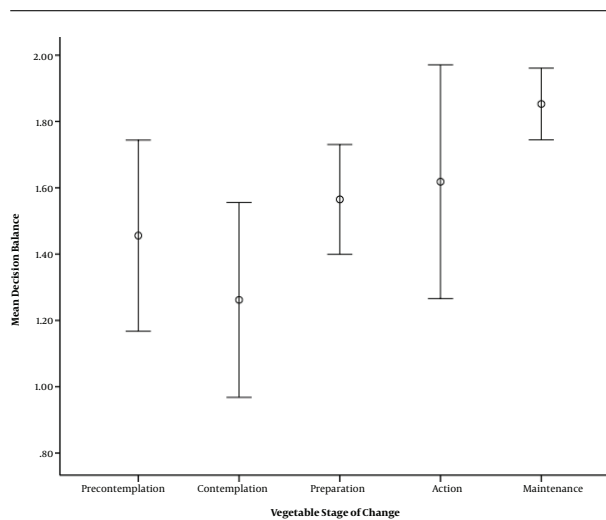

Figure 2. The trend of change in decisional balance regarding vegetable consumption based on the stages of change

As for self-efficacy, there was a statistically significant relation between subjects' self-efficacy and the stages of

change of consuming vegetables (Table 4, P < 0.05). Linear trend analysis was also conducted; however, no statistically significant trend was found (P > 0.07).

5. Discussion

In the present research, the majority of subjects were found to be at the active stages (action and maintenance) in terms of consuming two or more services of fruits. Only 29.8% were at the inactive stage (pre-contemplation, contemplation, and preparation). In terms of consuming 200 g or more vegetables, the majority of subjects were found to be at the active stages and only 38.4% were at the inactive stages. In Green et al.'s (23) research, more than half of the subjects were at the active stages. Similarly, in Van Duyn et al.'s investigation (24), 61.9% of the subjects were at the active stages. In another research conducted by Henry et al. (22) more than half of the participants were found to be at the active stages, which is a great extent consistent to the findings of the present research. Other researchers such as Khezeli et al. (21), or Hildebrand and Betts (25), found that the majority of subjects were at the inactive stages of behavioral change towards consuming fruits and vegetables. This finding is different from that of the present research, which can be due to the different research populations and their distinct socioeconomic and demographic features.

In regards to the correlation of the stages of behavior change towards consuming more fruits and vegetables and decisional balance, the result showed when one developed along the stages, the decisional balance was increased in a linear fashion. Decisional balance deals with the relative significance of the pros and cons of changing a behavior (12). A higher decisional balance in a particular domain implies that one is more willing to change that behavior to better. The more pros one associates with changing a specific behavior as compared to the cons, the more probable the behavior change (26). These findings were consistent with another research conducted on young adults (27) as well as another research by Horwath et al. (28), on adults. These findings abide by the underlying principles of the transtheoretical model since increased benefits and decreased barriers as well as the costs of consuming fruits and vegetables have moved one to the maintenance stage and led to the permanence of the behavior.

Table 4. Mean (SD) of the Model Constructs and Consuming 200 g or More Vegetables a Day (ANOVA)

Stages of Change TTM Constructs	Precontemplation	Contemplation	Preparation	Action	Maintenance	F	P
Decisional balance	1.45 (0.88)	1.26 (0.50)	1.56 (0.80)	1.61 (0.81)	1.85 (0.80)	4.57	< 0.001
Self-efficacy	2.31 (0.84)	2.75 (0.81)	2.46 (0.65)	2.49 (0.59)	2.74 (0.65)	5.25	< 0.001

In regards to the correlation of the stages of change towards consuming more fruits and self-efficacy, the results showed that along with development from precontemplation to maintenance, one's self-efficacy in consuming fruits increased. The same result was obtained for the consumption of vegetables, which is consistent with the target model. Self-efficacy entails belief in one's capabilities of developing a certain behavior and is the strongest predictor of health behaviors, which plays a crucial role in behavior change (29, 30). In the previous literature, self-efficacy was explored as a key factor involved in accessing and successfully maintaining the change in the diet towards consuming fruits and vegetables (22, 23, 27, 31). In other similar investigations such as Hildebrand and Betts (25) or Van Duyn et al. (32), subjects' self-efficacy was found to be increased in higher developmental stages, which is similar to the finding of the present research. According to the findings reported by Shaikh et al. (33), self-efficacy was a predictor of consuming fruits and vegetables by adults. One probable reason for this consistency can be that the self-efficacy of those at higher stages of development was increased to overcome the barriers to consuming fruits and vegetables and maintaining this behavior. Similarly, their perceived benefits must have been increased. These two factors could have caused them to consume fruits and vegetables and stick to this behavior. Several strategies can help increase one's self-efficacy in following a certain behavior such as breaking down the complicated behavior to smaller manageable units, use of role-play and tangible roles, use of motivators, and lowering stress related to the new behavior (29). These strategies can be used to increase women's self-efficacy and move them from the initial stages of behavior change to the higher stages.

One limitation of the present research is the inclusion of literate women only. Therefore, the results cannot be generalized to all women who referred to the health centers. In addition, in this study the relation between socioeconomic status and demographic variables with fruit and vegetable consumption was not investigated.

5.1. Conclusions

The significant relations between decisional balance and self-efficacy with stages of change for fruit and vegetable consumption indicate the significance and effect of these constructs on changing one's consumption of fruits and vegetables. Therefore, in designing interventions to increase the consumption of fruits and vegetables in housewives, it is necessary to emphasize on increasing the decisional balance and self-efficacy.

Supplementary Material

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

Footnotes

Conflict of Interests: The authors have indicated that they had no conflict of interest regarding the content of this article.

Ethical Considerations: This research was approved by the Ethics Committee of Hormozgan University of Medical Sciences (Code: HUMS.REC.1394.172).

References

1. He FJ, Nowson CA, Lucas M, MacGregor GA. Increased consumption of fruit and vegetables is related to a reduced risk of coronary heart disease: Meta-analysis of cohort studies. *J Hum Hypertens*. 2007;**21**(9):717–28. doi: 10.1038/sj.jhh.1002212. [PubMed: 17443205].

2. He FJ, Nowson CA, MacGregor GA. Fruit and vegetable consumption and stroke: Meta-analysis of cohort studies. *Lancet*. 2006;**367**(9507):320–6. doi: 10.1016/S0140-6736(06)68069-0. [PubMed: 16443039].

3. Boeing H, Bechthold A, Bub A, Ellinger S, Haller D, Kroke A, et al. Critical review: Vegetables and fruit in the prevention of chronic diseases. *Eur J Nutr*. 2012;**51**(6):637–63. doi: 10.1007/s00394-012-0380-y. [PubMed: 22684631]. [PubMed Central: PMC3419346].

4. Rouzbahani N, Attarha M, Akbari Torkestani N. [Correlation between consumption of fruit and vegetable with occurrence of preeclampsia]. *Arak Med Univ J*. 2008;**11**(2):42–9. Persian.

5. 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].

6. McMartin SE, Jacka FN, Colman I. The association between fruit and vegetable consumption and mental health disorders: Evidence from five waves of a national survey of Canadians. *Prev Med*. 2013;**56**(3-4):225–30. doi: 10.1016/j.ypmed.2012.12.016. [PubMed: 23295173].

7. World Health Organization. *Promoting fruit and vegetable consumption around the world*. 2014. Available from: http://www.who.int.

8. Rekhy R, McConchie R. Promoting consumption of fruit and vegetables for better health. Have campaigns delivered on the goals? *Appetite*. 2014;**79**:113–23. doi: 10.1016/j.appet.2014.04.012. [PubMed: 24751917].

9. Nemati A, Abasgholizadeh N, Farokhi S, Memari M, Tazakori Z, Sohbat Zadeh Z. Study of nutritional status of childbearing age in Ardebil. *Ninth International Congress of Nutrition in Iran*. 2006. p. 4–7.

10. Matlabi M, Sharifirad G, Mostavafi F, Mohebi S, Azadbakht L. [Factors affecting fish consumption based on structures of health education]. *J Health Sys Res*. 2012;**8**(4):523–36. Persian.

11. Salehi L, Eftekhar H, Mohammad K, Tavafian SS, Jazayery A, Montazeri A. Consumption of fruit and vegetables among elderly people: A cross sectional study from Iran. *Nutr J*. 2010;**9**:2. doi: 10.1186/1475-2891-9-2. [PubMed: 20070890]. [PubMed Central: PMC2818615].

12. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot*. 1997;**12**(1):38–48. doi: 10.4278/0890-1171-12.1.38. [PubMed: 10170434].

13. Velicer WF, Prochaska JO, Fava JL, Norman GJ, Redding CA. Smoking cessation and stress management: Applications of the transtheoretical model. *Homeostasis*. 1998;**38**:216–33.

14. Prochaska JO. The transtheoretical model and stages of change. In: Glanz K, editor. *Health behavior and health education: Theory, research, and practice*. 4th ed. San Francisco, CA: Jossy-Bass; 2008.

15. Charkazi A, Nazari N, Samimi A, Koochaki GM, Badeleh MT, Shahnazi H, et al. [The relationship between regular physical activity and the stages of change and decisional balance among Golestan University of Medical Sciences' students]. *J Res Dev Nurs Midwifery*. 2013;**9**(2):74–81. Persian.

16. Berry T, Naylor PJ, Wharf-Higgins J. Stages of change in adolescents: An examination of self-efficacy, decisional balance, and reasons for relapse. *J Adolesc Health*. 2005;**37**(6):452–9. doi: 10.1016/j.jadohealth.2004.09.019. [PubMed: 16310122].

17. Callaghan P, Khalil E, Morres I. A prospective evaluation of the transtheoretical model of change applied to exercise in young people. *Int J Nurs Stud*. 2010;**47**(1):3–12. doi: 10.1016/j.ijnurstu.2009.06.013. [PubMed: 19646693].

18. Kowalski K, Jeznach A, Tuokko HA. Stages of driving behavior change within the transtheoretical model (TM). *J Safety Res*. 2014;**50**:17–25. doi: 10.1016/j.jsr.2014.01.002. [PubMed: 25142357].

19. Ham OK, Yoo JB. Mediating effects of self-efficacy in the transtheoretical model among adolescent male smokers in Korea. *Asian Nurs Res (Korean Soc Nurs Sci)*. 2009;**3**(1):15–23. doi: 10.1016/S1976-1317(09)60012-8. [PubMed: 25030228].

20. Salehi L, Solki S, Montazeri A. [Effectiveness of an educational program based on transtheoretical model on fruit and vegetable con-sumption]. *J Payesh*. 2014;**13**(1):51–60. Persian.

21. Khezeli M, Ramezankhani A, Soori H, Mirmiran P, Keshavarz-Mohamadi N, Ghazanfari Z. [Stages of change and cognitive and behavioral processes related to fruit and vegetable consumptiona-mong women: Application of the transtheoretical model]. *J Clin Care*. 2015;**2**(3):1–11. Persian.

22. Henry H, Reimer K, Smith C, Reicks M. Associations of decisional balance, processes of change, and self-efficacy with stages of change for increased fruit and vegetable intake among low-income, African-American mothers. *J Am Diet Assoc*. 2006;**106**(6):841–9. doi: 10.1016/j.jada.2006.03.012. [PubMed: 16720125].

23. Greene GW, Fey-Yensan N, Padula C, Rossi S, Rossi JS, Clark PG. Differences in psychosocial variables by stage of change for fruits and vegetables in older adults. *J Am Diet Assoc*. 2004;**104**(8):1236–43. doi: 10.1016/j.jada.2004.05.205. [PubMed: 15281040].

24. Van Duyn MAS, Heimendinger J, Russek-Cohen E, DlClemente CC, Sims LS, Subar AF, et al. Use of the transtheoretical model of change to successfully predict fruit and vegetable consumption. *J Nutrition Educ*. 1998;**30**(6):371–80. doi: 10.1016/s0022-3182(98)70359-0.

25. Hildebrand DA, Betts NM. Assessment of stage of change, decisional balance, self-efficacy, and use of processes of change of low-income parents for increasing servings of fruits and vegetables to preschool-aged children. *J Nutr Educ Behav*. 2009;**41**(2):110–9. doi: 10.1016/j.jneb.2008.09.007. [PubMed: 19304256].

26. Pirasteh A, Davati A, Jouhari Z, Mohamadi L. [Predicting physical activity behavior among Iranian medical college students using the transtheoretical model]. *Daneshvar Med*. 2012;**19**(100):1–10. Persian.

27. Ma J, Betts NM, Horacek T, Georgiou C, White A, Nitzke S. The importance of decisional balance and self-efficacy in relation to stages of change for fruit and vegetable intakes by young adults. *Am J Health Promot*. 2002;**16**(3):157–66. doi: 10.4278/0890-1171-16.3.157. [PubMed: 11802261].

28. Horwath CC, Nigg CR, Motl RW, Wong KT, Dishman RK. Investigating fruit and vegetable consumption using the transtheoretical model. *Am J Health Promot*. 2010;**24**(5):324–33. doi: 10.4278/ajhp.071218138. [PubMed: 20465146].

29. Saffari M, Shojaeizadeh D, Ghofranipour F, Heydarnia A, Pakpour A. *[Health education and promotion theores, models and methods]*. 2nd ed ed. Tehran: Asar Sobhan; 2012. p. 106–7. Persian.

30. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev*. 1977;**84**(2):191–215. [PubMed: 847061].

31. Horacek TM, White A, Betts NM, Hoerr S, Georgiou C, Nitzke S, et al. Self-efficacy, perceived benefits, and weight satisfaction discriminate among stages of change for fruit and vegetable intakes for young men and women. *J Am Diet Assoc*. 2002;**102**(10):1466–70. [PubMed: 12396169].

32. Van Duyn MA, Kristal AR, Dodd K, Campbell MK, Subar AF, Stables G, et al. Association of awareness, intrapersonal and interpersonal factors, and stage of dietary change with fruit and vegetable consumption: A national survey. *Am J Health Promot*. 2001;**16**(2):69–78. doi: 10.4278/0890-1171-16.2.69. [PubMed: 11727591].

33. Shaikh AR, Yaroch AL, Nebeling L, Yeh MC, Resnicow K. Psychosocial predictors of fruit and vegetable consumption in adults a review of the literature. *Am J Prev Med*. 2008;**34**(6):535–43. doi: 10.1016/j.amepre.2007.12.028. [PubMed: 18471592].