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Factors Related to Fruit and Vegetable Consumption: A Cross-Sectional Study Based on Theory of Planned Behavior

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Abstract: Psychological factors such as some habits, beliefs and lack of knowledge regarding the way of using fruits and vegetables in a diet has been considered as an obstacle to fruit and vegetable consumption. The aim of this study was to determine the factors related to factors related to fruit and vegetable consumption based on the Theory of Planned Behavior (TPB). In this cross-sectional study, conducted in Kermanshah county, the West of Iran, a total of 410 women's was randomly selected to participate voluntarily in the study. Participants filled out a self-administered questionnaire including the expanded theory of planned behavior components. Data were analyzed by SPSS Version 21 using t-test, bivariate correlation and linear regression statistical tests at 95% significant level. The findings indicated mean of fruit and vegetable consumption during the day was 2.1 times. There was a significant correlation between job, educational level and family economic status with fruit and vegetable consumption. Linear regression analysis showed the determinant variable accounted for 42% of the variation in fruit and vegetable consumption. Based on our results, it seem TPB variables are suitable variables for fruit and vegetable consumption.

Key words: Fruit and vegetable consumption, theory of planned behavior, women, habits, Iran

INTRODUCTION

A diet rich in fruit and vegetables results in the reduction of death risk factors and it has a significant role in weight management (He *et al*., 2007). Reduction of affliction with cardiovascular diseases and cancer is one of the health benefits of fruit and vegetable consumption due to the existence of antioxidants in these materials and it has been pointed out in different studies (Duttaroy and Jørgensen, 2004). Diversity and quality of the fruits and vegetables consumed are effective and significant in individual's health in a way that the different elements in fruits and vegetables such as vitamins, minerals and fiber play a significant role in prevention of diseases (Kris-Etherton *et al*., 2002; Phillips *et al*., 2008). It is suggested that, the consumption of fruits, green vegetables and vegetables rich in vitamin C can effectively result in weight reduction and prevent atherosclerosis (Lin and Morrison, 2002). One of the objectives of society's health in 2010 was mentioned to be a daily consumption of 2-4 units of fruits and 3-5 units of vegetables (Moeini *et al*., 2014).

The study of the psychological factors such as some habits, beliefs and lack of knowledge regarding the way of using fruits and vegetables in a diet has been considered as an obstacle to fruit and vegetable consumption. Also, some social environmental factors such as the impact of family members in fruit and vegetable consumption, childhood habits, accessibility of fruits and vegetables and buying them in their own seasons and high costs of purchasing fruits and vegetables in times other their production seasons have been pointed out to be among the factors for lack of enough fruit and vegetable consumption (Amini *et al*., 2009). For exploring the existing conditions of health issues, health promotion planners recommend the use of theories adopted from social psychology for knowing the health-related behaviors and consider selecting a good theory as the first step in planning for health promotion programs (Kok, 2014). We agree with the view of Kurt Lewin, the father of modern social psychology, that nothing is useful as using a good theory (Eldredge *et al*., 2016). On the other hand, it has been shown that studies based on the

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theories of psychology and social psychology have an important role in effective health promotion programs (Morowatishaifabad *et al*., 2015; Moghadam *et al*., 2012; Alavijeh *et al*., 2015; Jalilian *et al*., 2015). Meanwhile, theory of planned behavior has been used in different studies for prediction of behavior (Ataee *et al*., 2014; Jalilian and Emdadi, 2011). Different studies have verified the adequacy of this theory in predicting different behaviors (Armitage and Conner, 2001) especially, heath related behaviors (Godin and Kok, 1996). Therefore, theory of planned behavior was used in the present study for understanding the consumer's behavior. This theory is consisted of five constructs: attitude, subjective norms, perceived behavior control, behavioral intention and behavior. The individual's attitude regarding a subject is the result of the performance of his/her beliefs regarding that subject and response evaluations regarding these beliefs. Subjective norms adjust standards for action that can be accepted or rejected by individuals.

Perceived behavior control refers the level of individual's willful control in doing or not doing a behavior. If individuals believe that have no resource or opportunity for doing a behavior, the possibility of doing the behavior is decreased (Ajzen, 1991). Regarding the application of this theory in behavior analysis, Toft *et al*. (2012) concluded that habits had the greatest relationship with fruit and vegetable consumption and they are the most impactful variable on fruit and vegetable consumption in boys. In a similar study, Brug *et al*. (2006) showed that habits and intentions are strong predictors of fruit consumption and are pointed out as the most effective variables on fruit and vegetable consumption behavior. The study by Blanchard *et al*. (2009) on 511 students with a mean age of 19.8 years regarding consumption of fruits and vegetables 5 times a day with the application of planned behavior showed that the theory constructs together predict 50% of the intention. In that study, perceive behavior control was the strongest predictor and attitude and subjective norms were the next predictors of behavioral intention. Considering the importance of the issue, the present study was conducted with the aim of deterring the factors predicting fruit and vegetable consumption in urban Kermanshah families based on theory of planned behavior.

MATERIALS AND METHODS

This cross-sectional study was conducted on 410 women referred to health centers in Kermanshah county, the West of Iran, during 2016. The sample size was calculated at 95% significant level according to the results of a previous study (Moeini *et al*., 2014) and a sample of 410 was estimated. To enroll the participants and collect data the following stages were done. First, different areas of the city were classified based on the division of the geographical region, next for each social class one health centers were randomly selected (a total of eight health centers were selected). Then, subjects referred to the health centers for taking health care, were enrolled into this study voluntarily. Finally, the volunteers were given the self-questionnaire. This research has been approved by the institutional review board at the Kermanshah University of Medical Sciences (KUMS.REC.1395.287). 351 (85.6%) participants out of 410 subjects signed the consent form and voluntarily agreed to participate in the study.

Prior to conducting the main project, a pilot study was carried out. Initially the relevant questionnaires were administered to 30 women who were similar to study population in order to estimate the duration of the study conduction and to evaluate the reliability of the questionnaire. Estimated reliability using alpha Cronbach coefficient for each TPB constructs questionnaire were as follows: attitude ($\alpha = 0.84$); subjective norms ($\alpha = 0.81$); perceived behavior control ($\alpha = 0.80$) and behavioral intention ($\alpha = 0.85$).

The variables assessed in this study included: age, education level (primary school/secondary school/high school/academic), job (housewife/working), number of family, economic status (very weak, weak, average, good very good) and number of fruit and vegetable consumption during the day. TPB scale was designed based on a standard questionnaires (Moeini *et al*., 2014; Amini *et al*., 2009) and included items under four constructs including attitude; subjective norms; perceived behavioral control; behavioral intention. Three items were designed to measure attitude toward fruit and vegetable consumption. Five items were designed to measure subjective norms toward fruit and vegetable consumption. Two items were designed to perceived behavioral control toward fruit and vegetable consumption. Two items were designed to evaluate intention toward fruit and vegetable consumption. In order to facilitate participants' responses to the items, all items were standardized to a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Data were analyzed by SPSS Version 21 using appropriate statistical tests including t-test, bivariate correlation and linear regression at 95% significant level.

RESULTS AND DISCUSSION

The mean age of respondents was 37.29 years [95% CI: 36.51, 38.08], ranged from 30-60 years. We found that

significant correlation between educational level, job and economic status with fruit and vegetable consumption. However, there was no significant difference between age with fruit and vegetable consumption (Table 1).

Table 2 shows mean, standard deviation, scores range and bivariate correlations between the TPB constructs, which were statistically significant at either 0.01 and 0.05 level. Linear regression analysis was performed to explain the variation of fruit and vegetable consumption. As shown in Table 3, collectively, TPB variables accounted for 42% of the variation seen in fruit and vegetable consumption.

The findings of the present study showed that mean of fruit and vegetable consumption during the day was 2.1 times and this was lower than the standard of 5 times a day. In line with this, the results of the study by Dehdari *et al.* (2013) showed that 55.5% of the explored students consume one fruit or less and 44.5% consumed 2 fruits and more. In another study on students in the city of Zanjan in Iran, the mean of the times of fruit consumption was 1.5 times a day and only 8.7% of the students consumed fruits at least 3 times a day (Amini *et al.*, 2009). Moeini *et al.* (2014) reported the consumption of fruits and vegetables in high school student of the city of Hamadan to be 3.4 times a day. In addition, the studies by De Bruijn (2010), Brug *et al.* (2006) and Kothe *et al.* (2012) outside Iran indicated the consumption of <5 units a day and the result of these studies were consistent with those of the present study. These findings indicate that the consumption of fruits and vegetables in the Iranian society is lower compared with the global standard and show the necessity of implementing interventions for promotion of fruit and vegetable consumption.

The results of the present study indicated that there was a significant relationship between economic condition and consumption of fruits and vegetables in a way that the consumption was higher with better economic condition and this finding was consistent with those of the other studies on this subject (Dehdari *et al.*, 2013; Amini *et al.*, 2009). Another finding of the present study was more consumption of fruits and vegetables among individuals with higher levels of education and this finding too is consistent with the findings of other similar studies (Dehdari *et al.*, 2013). Probably higher level of education is related to more knowledge of the benefits of fruits and vegetables and paves the way for more fruit and vegetable consumption.

The study of background findings indicated that age and marital status did not have a significant relationship with the level of fruit and vegetable consumption. Considering the low level of fruit and vegetable consumption in urban Kermanshah families, it seems that educating them on healthy nutrition could have a significant role in the increase of fruit and vegetable consumption in them. Also, it seems that considering the results of the present study, environmental planning for reduction of fruit and vegetable price can impact the increase of fruit and vegetable consumption in the society.

Table 1: Association between background variable and fruit and vegetable consumption

Variables	Mean	SD	p-values
Education al level			
Primary school	1.05	0.33	0.001
Secondary school	1.36	0.68	
Diploma	2.01	0.99	
Academic	3.00	0.60	
Economic status			
Bad	1.25	0.44	0.001
Middle	1.94	1.08	
Good	2.67	0.47	
Very good	3.50	0.51	
Marital status			
Single	1.95	1.02	0.490
Married	2.11	1.05	
Job			
Housewife	2.01	1.04	0.001
Working	2.76	0.75	

Table 2: Correlation between TPB variable and fruit and vegetable consumption

Variables	Mean (SD)	Scores range	X^1	X^2	X^3	X^4
X^1; Attitude	10.77 (2.19)	3-15	1			
X^2; Subjective norms	17.60 (3.71)	5-25	0.468**	1		
X^3; Perceived behavioral control	4.99 (1.19)	2-10	0.127*	0.336**	1	
X^4; Behavioural intention	6.39 (1.74)	2-10	0.529**	0.332**	0.004	1
X^5; Fruit and vegetable consumption	2.10 (1.04)	0-5	0.496**	0.468**	0.202**	0.558**

*, **Correlation is significant at the 0.05 and 0.01 level (2-tailed)

Table 3: TPB variable which were predictor of fruit and vegetable consumption

	Unstandardized coefficients				
Variables	B	SE (B)	Standardized coefficients (β)	t-values	Sig.
Attitude	0.082	0.025	0.171	3.317	0.001
Subjective norms	0.063	0.014	0.222	4.535	0.001
Perceived behavioral control	0.091	0.038	0.104	2.395	0.017
Behavioural intention	0.236	0.029	0.394	8.115	0.001

$R^2 = 0.42$; $F = 65.044$; $p<0.001$

According to the results of the present study planned behavior theory constructs predicted 42% of the variance of fruit and vegetable consumption behavior. The study by Lien *et al.* (2002) on teenagers indicated that planned behavior theory constructs predicted 7% of the changes of fruit and vegetable consumption frequency. In addition, among the constructs of planned behavior theory, behavioral intention, subjective norms, attitude and perceived behavior control were the strongest predictors of fruit and vegetable consumption, respectively. In the study by Moeini *et al.* (2014) intention as the strongest predictor of fruit and vegetable consumption predicted 35% of the behavior. After that, subjective norms, perceived behavior control and attitude predicted 31% of the behavior intention. In the study by Dehdari *et al.* (2013), the construct behavioral intention was reported to be the strongest predictor. The findings of another study on Dutch women indicated that attitude, subjective norms and perceived behavior control explained 44.5% of the intention for consumption of at least 2 fruits or at least 200 g of vegetables (Bogers *et al.*, 2004). The finding of the present study is consistent with those of the similar studies to a great extent.

CONCLUSION

Fruit and vegetable consumption among urban Kermanshah families was not at the favorable recommended level. Considering the results of the present study, it seems that if subjective norms promoting fruit and vegetable consumption, attitude to fruit and vegetable consumption and the improvement of perceived behavior control in fruit and vegetable consumption are emphasized in designing interventions, more useful findings in the promotion of fruit and vegetable consumption can be seen.

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