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Investigating the predictive power of constructs of extended Pender's health promotion model and some background factors in fruit and vegetable consumption behavior among government employees

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Abstract:

BACKGROUND: Daily consumption of fruit and vegetable (F and V) can effectively reduce the risk factors of cardiovascular diseases; therefore it is necessary to identify the factors affecting this behavior. This study aimed to determine the Predictive Power of Pender's Health promotion model (HPM) constructs in F and V consumption behavior and the effects of some background variables on this behavior.

MATERIALS AND METHODS: A descriptive-correlation study was conducted on 418 employees working in different offices of Qaemshahr, Mazandaran Province from April 8, 2019, to July 23, 2019. The participants filled out a questionnaire about perceived F and V Consumption behavior based on Pender's HPM Constructs. The data were statistically analyzed by descriptive statistics and parametric tests, including the Pearson correlation, Independent-Sample *t*-test, One-Way analysis of variance test, and multiple linear regression, in SPSS-22.

RESULTS: The mean age of participants was 40.25 ± 7.56 years. The results showed that F and V consumption behavior was positively correlated with some constructs of Pender's HPM including, behavioral outcome ($r = 0.51, P < 0.001$), previous related behavior ($r = 0.48, P < 0.001$), commitment to action ($r = 0.47, P < 0.001$), perceived self-efficacy and behavior-related emotions ($r = 0.39, P < 0.001$). Behavioral outcome alone explained 26% of the dependent variable changes (F and V consumption behavior). The results also indicated that there was a significant relationship between gender and F and V consumption behavior ($P = 0.01$).

CONCLUSION: The study findings demonstrated that some of Pender's HPM Constructs could predict F and V consumption behavior. Behavioral outcome alone was a strong predictor of this behavior. Therefore, in addition to background variables, these constructs should be taken into account in the development of training interventions and courses.

Keywords:

Background variable, construct, fruit and vegetable, Pender's health promotion model, predictive, staff

Introduction

There is an inverse relationship between daily consumption of fruits and

vegetables (F and V) and risk factors of cardiovascular disease as well as other chronic diseases such as cancer and type 2 diabetes.^[1-4] The results of a cohort study

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also proved the protective effects of F and V against cardiovascular diseases and stroke.^[5] According to a report published by the World Health Organization (WHO), 5.2 million deaths in 2012 were associated with the low consumption of F and V.^[6] In another study, Pengpid *et al.* also stated that the increasing consumption of F and V up to 600 g/per day can significantly reduce the burden of diseases around the world.^[7] Therefore, insufficient consumption of F and V can cause heavy direct and indirect economic costs. It is estimated that the low consumption of F and V in Canada leads to a financial burden of \$ 3.3 billion per year, 30% of which is related to direct health care costs, and 70% account for productivity loss.^[8] The WHO recommends the daily consumption of at least five units of F and V.^[9] In addition, according to the Noncommunicable Diseases Department of Iran's Ministry of Health and Medical Education, the recommended daily consumption of F and V by age is 3–5 and 2–4 units, equivalent to 100 g.^[10] However, the results of a review study conducted by Abdi *et al.* in 2015, showed that the consumption of F and V was 25% less than the recommended amount in Iran.^[11] In another study conducted by Vakili *et al.* on the general population of Mashhad in 2014, the results revealed that only about half of the participating men and women regularly consumed fruit, and the situation was even worse for consuming vegetables.^[12] Narimani *et al.* also reported that the majority of nursing and midwifery staff in Ardabil teaching and medical centers (77.3%) were in the inactive stages of changing the behavior of consuming F and V.^[13] As quoted from Tassitano *et al.* in their article, although there is evidence of environmental, economic, social, and demographic determinants in the documented scientific literature, understanding psychosocial factors can be the key to developing effective behavioral interventions to increase F and V consumption.^[14] In this regard, it is very important to develop programs with an emphasis on the need to consider the facilitators of consuming F and V. The findings of Kasten *et al.* in the Netherlands showed that high levels of intention and self-efficacy as well as strong habits of consuming F and V clearly help to develop action plans.^[15] In the meantime, models and theories can be used as a guide to discover health-related processes^[16] and identify the factors affecting the adoption of health-oriented behaviors (e.g., attitudes, norms, self-efficacy, environmental or social considerations, or a combination of them) to plan and develop appropriate interventions.^[17] Since theories and models increase productivity and effectiveness by eliminating inappropriate factors and focusing on the most important issues, theory-based interventions are more effective than those that are not developed based on scientific theories.^[18] Hence, Pender's health promotion model (HPM), which consists of both internal factors (e.g., self-efficacy) and external factors (e.g., situational factors), was employed

in this study to determine the predictive performance of constructs of this model for and effects of some background variables on F and V consumption behavior among the government staff. The governmental staff and their family members account for a considerable fraction of the population, since this group of people works together for many hours, they may influence each other and other groups. It is hence necessary to conduct studies to investigate the F and V consumption behavior in a more homogeneous group in terms of occupational and social position.

Materials and Methods

Study design and setting

This descriptive-correlation study was conducted on 418 employees working in governmental offices in *Qaemshahr*, *Mazandaran* Province from April 8, 2019, to July 23, 2019. The sample size for determine the predictability of variables (Pender's HPM Constructs, should include 3–50 people per item according to Knapp and Brown.^[19] Since a total of 118 items existed in the original research tool, therefore 3 people were selected for each item that considering at least 20% attrition rate, 425 people were selected as the sample size.

Study participants and sampling

Participants were selected through the simple random sampling method from the 15 selected offices that these offices selected through the random cluster sampling method (*Offices included Environment, Telecommunications, Technical and Vocational, Governor's office, Electricity, Red Crescent, Foundation, Agricultural Jihad, Civil and Personal status Registration, Document Registration, Labour and Cooperation, Sports and Youth, Roads and Urban Development, Industry and Mining and Social Security.*) The inclusion criteria were being employed in one of the selected offices and providing a written consent form to participate in the study. Exclusion criteria were also incomplete completion of the questionnaire.

Ethical consideration

All participants were assured that their personal information will be kept confidential.

Data collection tool and technique

The required data were collected through a demographic form, a questionnaire about affliction with underlying diseases, and a researcher-made questionnaire on F and V consumption behavior based on Pender's HPM.^[20-28] The first section of tool consisted of 9 items about demographics and underlying diseases. The second section included 5 items about knowledge that were scored based on the mean and percentage of correct answers. The third section aimed to measure the consumption of F and V with the following two

items: “I consume at least two units of fruit every day” and “I consume at least three units of vegetables every day.” The items were scored based on a 5 point Likert scale (from “never” to “always”). The fourth section was related to constructs of Pender’s HPM as follows: (1) Previous relevant behavior with 8 items, scored based on a 4 point Likert scale (from “never” to “always”), (2) Perceived self-efficacy with 11 items, scored based on a 5point Likert scale (from “totally disagree” to “totally agree”), (3) behavior-related emotions with 7 items, scored based on a 5 point Likert scale (from “never” to “very much”), (4) Perceived benefits with 7 items, scored based on a 5 point Likert scale (from “totally disagree” to “totally agree”), (5) Perceived barriers with 15 items, scored based on a 5point Likert scale (from “never” to “very much”), (6) Interpersonal factors with 14 items in two parts, scored based on a 5point Likert scale (from “never” to “always”), (7) Situational factors with 14 items in three parts, scored based on a 5 point Likert scale (from “never” to “very much”), (8) Motivational factor (added as a new construct to the Pender’s HPM) with 9 items, scored based on a 5 point Likert scale (from “not important at all” to “very important”), (9) Commitment to action with 4 items, scored based on a 5 point Likert scale (from “at all” to “very much”), (10) Immediate preferences with 6 items, Yes/No and (11) Behavioral outcome with 4 items, scored based on a 5 point Likert scale (from “never” to “always) [Table 1].

The mean score of all constructs was first calculated and then the percentage of obtained scores (percentage of the mean score of each construct divided by the maximum score obtainable on each construct) to compare the constructs of Pender’s HPM. The validity of the questionnaire was assessed by content validity ratio and content validity index. These two were obtained 0.92 and 0.97, respectively. Cronbach’s alpha coefficient for the reliability of the questionnaire was 0.84.

Data analysis

The obtained data were statistically analyzed by descriptive statistics and parametric tests, including the Pearson correlation, Independent– Sample *t*-test, One-Way analysis of variance test, and stepwise multiple linear regression, in IBM SPSS, Version 22.0, NY, USA.

Results

The mean age of participants was 40.25±7.56 [Tables 2 and 3]. The mean score of F and V consumption behavior was equal to 4.57 ± 1.64, which accounted for 57.12% of the total score. The highest and lowest percentage of scores were related to “Motivational factors” (83.05%) and “commitment to action” (37.00%), respectively [Table 4]. The results showed that the mean score of F and V consumption behavior was positively correlated with

Table 1: Sample question of Pender’s health promotion model constructs

Constructs of Pender’s HPM	Example of questions
Previous relevant behavior	I eat F and V, such as cucumbers, tomatoes, and carrots, instead of sweets and biscuits as a snack in my workplace
Perceived self-efficacy	I can consume vegetables, such as cucumbers, tomatoes, and carrots, as a snack in my workplace
behavior-related emotions	I enjoy eating fruits because it diversifies my diet
Perceived benefits	Daily consumption of F and V can prevent chronic diseases such as cardiovascular diseases, cancers, and diabetes
Perceived barriers	Lack of easy access to marketplaces where vegetables are sold is a barrier to the consumption of vegetables
Interpersonal effects	Do your colleagues expect or encourage you to consume F&V to maintain and improve your health? And B: how much do you matter the opinions of your colleagues in relation to further consumption of F and V?
Situational factors	How much does studying on the benefits of eating F and V affect your desire to eat F and V? B: How much does each of the following social places or events affect your desire to eat F and V?
Motivational factor	How much the appearance and packaging can motivate you to eat more F and V?
Commitment to action	Do you have a schedule for eating the recommended amount of fruits throughout the day?
Immediate preferences	If any of the following items are available to you at the same time and you are free to choose one of them, which one would you prefer to consume? A: Vegetables, such as cucumbers, tomatoes, etc. or B: Junk foods, such as crisps, cheese puffs, etc.
Behavioral outcome	I consume vegetables during working hours in my workplace

HPM=Health promotion model

the mean scores of previous related behavior ($r = 0.48, P < 0.001$), perceived self-efficacy ($r = 0.39, P < 0.001$), behavior-related emotions ($r = 0.39, P < 0.001$), commitment to action ($r = 0.47, P < 0.001$), and behavioral outcome ($r = 0.51, P < 0.001$). The results also indicated that there was a stronger correlation between the mean score of behavior-related emotions and that of perceived benefits, compared to other constructs ($r = 0.61$) [Table 5]. Based on the results of stepwise multiple regression analysis, “behavioral outcome” explained 26% of the total variance of the consumption behavior [Table 6]. There was a significant

Table 2: Demographic characteristics

Variable	n (%)
Age (mean)	40.25±7.56
Gender	
Male	238 (56.90)
Female	180 (43.10)
Place of residence	
Urban areas	368 (88.00)
Rural areas	50 (12.00)
Marital status	
Single (never married)	58 (13.90)
Married	353 (84.40)
Others (e.g., divorced, widowed, separated)	7 (1.70)
Educational attainment	
Nonacademic	55 (12.70)
Academic	363 (86.80)
Family size*	
1-2	87 (20.80)
3-4	285 (68.20)
5-6	38 (9.10)
>6	8 (1.90)
Monthly income**	
10,000,000-20,000,000	143 (34.30)
>20,000,000-40,000,000	247 (59.10)
>40,000,000	28 (6.70)
The most important source of acquiring health information	
Medical and health staff	89 (21.30)
TV	187 (44.70)
Radio	5 (1.20)
Books	36 (8.60)
Press	8 (1.90)
Friends and colleagues	32 (7.70)
Others (e.g., internet, cyberspace, etc.)	61 (14.60)

*People, **Rials

relationship between the mean score of F and V consumption behavior and gender ($P = 0.01$) [Table 7]. The results demonstrated that there was a significant relationship between gender and the mean score of previous relevant behavior, perceived self-efficacy, behavior-related emotions, perceived barriers, and behavioral outcome ($P < 0.05$). Moreover, the mean score of knowledge was significantly related to “place of residence” ($P = 0.04$), educational attainment ($P = 0.001$), and monthly income ($P = 0.04$). The results of the *post hoc* test revealed that this relationship was more significant in Income level 2 (More than 20,000,000–40,000,000 Rials) and Income level 1 (10,000,000–20,000,000 Rials). There was a significant relationship between the mean score of “motivational factors” and the history of affliction with diseases and health-related problems ($P = 0.04$). The results showed that there was a significant relationship between age groups and the mean scores of “immediate preferences and demands” and “behavioral outcome” ($P < 0.001$) ($P = 0.02$). Based on the results of the *post hoc* test, this relationship was more significant in age Group 2 (36–45 years) and age group 3 (over 46 years),

Table 3: Frequency of underlying diseases in the target group

Variable	Type of underlying diseases	n (%)
History of diseases and health-related problems based on medical records	Cardiovascular diseases	
	Yes	381 (91.10)
	No	37 (8.90)
	Cancers	
	Yes	416 (99.50)
	No	2 (0.50)
	Hypertension	
	Yes	379 (90.70)
	No	39 (9.30)
	Diabetes	
	Yes	394 (94.30)
	No	24 (5.70)
Mental disorders (stress, anxiety, etc.)	Yes	359 (85.90)
	No	59 (14.10)
Obesity	Yes	350 (83.70)
	No	68 (16.30)
Hyperlipidemia	Yes	369 (88.30)
	No	49 (11.70)

compared to age Group 1 (26–35 years). There was a significant relationship between marital status and the mean scores of “knowledge” and “immediate preferences and demands” ($P = 0.01$, $P = 0.001$). The *post hoc* test showed that this relationship was more significant in single participants and then married ones (compared to the divorced, widowed, or separated ones) and married participants and then single ones in terms of “knowledge” and “immediate preferences and demands,” respectively. There was a significant relationship between the most important source of health information and the mean scores of “immediate preferences and demands,” “behavior-related emotions,” and “perceived benefits” ($P = 0.04$, $P = 0.02$, $P = 0.04$). The *post hoc* test indicated that, in terms of “immediate preferences and demands,” this relationship was more significant in participants who mostly acquired health information from the medical and health staff and TV, rather than via the Internet or cyberspace, as well as those who mostly acquired health information from books, rather than through the internet or cyberspace, friends, and colleagues. In terms of “behavior-related emotions,” this relationship was more significant in participants who mostly acquired health information from the medical and health staff, rather than via the Internet or cyberspace, friends, and colleagues, the participants who mostly acquired health information from books, rather than via the Internet or cyberspace, friends, colleagues, and TV, and those who mostly acquired health information from TV, rather than from friends and colleagues. Finally, in terms of “perceived benefits,” this relationship was more significant in participants who mostly acquired

Table 4: Mean and percentage of scores obtained on knowledge and each of the constructs of Pender's health promotion model in relation to the fruit and vegetable consumption behavior

Variable	Mean±SD	Percentage of score obtained	Score range	Maximum score	Minimum score
Knowledge	1.26±4.03	80.60	0-5	5	0
Previous relevant behavior	4.44±11.44	47.66	0-24	24	0
Perceived self-efficacy	8.21±29.97	68.11	0-44	44	0
Behavior-related emotions	5.01±21.54	76.92	0-28	28	0
Perceived benefits	4.36±22.71	81.10	0-28	28	4
Perceived barriers	11.49±39.69	66.15	0-60	60	10
Interpersonal factors	9.02±40.41	72.16	0-56	56	6
Situational factors	9.53±32.77	58.51	0-56	56	4
Motivational factors	5.07±29.90	83.05	0-36	36	9
Commitment to action	2.40±2.22	37.00	0-6	6	0
Immediate preferences and demands	1.48±4.93	82.16	0-6	6	0
Behavioral outcome	3.43±7.66	47.78	0-16	16	0
Fruit and vegetable consumption behavior	1.64±4.57	57.12	0-8	8	0

SD=Standard deviation

health information from the medical and health staff, TV, books, and cyberspace, rather than from friends and colleagues [Table 8]. The results also demonstrated that there was no significant difference between family size and the mean scores of all constructs of Pender's HPM.

Discussion

This study aimed to determine the Predictive Power of Pender's HPM constructs in F and V consumption behavior and the effects of some background variables on this behavior. The study findings showed that although there was a correlation between some constructs of Pender's HPM and the F and V consumption behavior such as behavioral outcome previous related behavior, commitment to action, behavior-related emotions perceived, and self-efficacy, in studies conducted by Solhi *et al.*, strengthening self-efficacy has been mentioned as an important factor in developing interventions to adopt a healthy behavioral style.^[29] There was no or a poor correlation between consumption behavior and other constructs such as perceived benefits, perceived barriers, interpersonal factors, and situational factors. By contrast, in studies conducted by O'Neal *et al.* on African-American adults and Solhi *et al.* on female students living in dormitories, it was shown that social support and perceived benefits play a major role in the consumption of F and V,^[23,30] These results are not consistent with the findings of the present study. Some of the constructs of Pender's HPM, such as "behavioral outcome," exhibited a stronger correlation to the F and V consumption behaviour. Considering the definition of structural behavioral consequences in this model, that is to say, outcomes of decision-making and preparation for action,^[31] obtaining a higher mean score on other constructs of Pender's HPM can ultimately affect behavioral outcomes. "Previous behaviors and habits," after "behavioral outcome," exhibited the highest correlation with this behavior. In studies

conducted by Toft *et al.* on people aged 30-60 years in Copenhagen, Denmark, and Gholami *et al.* in Ilam, previous habits exhibited the strongest relationship with the consumption of F and V.^[20,32] Although no significant relationship was found between some constructs of Pender's HPM in this study, some constructs, such as behavior-related emotions and interpersonal factors, showed a positive correlation to other constructs. The interaction between some constructs reveals the role and importance of some constructs in the model. Therefore, by developing effective interventions to affect these constructs, it would be possible to indirectly provide the conditions to improve results in other constructs, ultimately achieve the desired goal, and save time and cost. The results of multiple linear regression analysis also showed that behavioral outcome, previous relevant behavior, commitment to action, perceived barriers, and behavior-related emotions had a good practice in predicting the F and V consumption behavior, but behavioral outcome alone was a stronger predictor of this behavior. Therefore, it is necessary to take these constructs into account in the development of training programs and interventions. The study results demonstrated that female participants, on average, consumed more F and V every day. This is consistent with the findings of Zamanian *et al.* in 2013 in Arak.^[33] Considering the role of women in choosing the food basket of households, future studies can use women as the main intervention group to influence other groups in relation to adopting proper nutritional behaviors. There was no significant relationship between background variables, including age, marital status, monthly income level, and so on, and the F and V consumption behavior. By contrast, Zamanian *et al.*, Rostami *et al.*, and Colón-Ramos *et al.* reported a significant relationship between some background variables and the F and V consumption behavior.^[33-35] The results showed that single and married participants had more knowledge than divorced, widowed, or separated participants

Table 5: Matrix of pearson correlation between knowledge and each of the constructs of Pender’s health promotion model in relation to the fruit and vegetable consumption behavior

Variable	Knowledge	Previous relevant behavior	Perceived self-efficacy	Behavior related emotion	Perceived benefits	Perceived barriers
Knowledge	1					
Previous relevant behavior	$r=0.03$ Significant=0.4	1				
Perceived self-efficacy	$r=0.15$ Significant=0.02	$r=0.42$ $P<0.001$	1			
Behavior related emotion	$r=0.12$ Significant=0.01	$r=0.39$ $P<0.001$	$r=0.55$ $P<0.001$	1		
Perceived benefits	$r=0.15$ Significant=0.01	$r=0.23$ $P<0.001$	$r=0.51$ $P<0.001$	$r=0.61$ $P<0.001$	1	
Perceived barriers	$r=0.11$ Significant=0.01	$r=0.05$ Significant=0.20	$r=0.13$ Significant=0.07	$r=0.13$ Significant=0.005	$r=0.12$ Significant=0.01	1
Interpersonal factor	$r=0.05$ Significant=0.20	$r=0.15$ Significant=0.001	$r=0.30$ $P<0.001$	$r=0.32$ $P<0.001$	$r=0.36$ $P<0.001$	$r=0.13$ Significant=0.007
Situational factor	$r=0.11$ Significant=0.02	$r=0.17$ $P<0.001$	$r=0.36$ $P<0.001$	$r=0.38$ $P<0.001$	$r=0.39$ $P<0.001$	$r=0.005$ Significant=90
Motivational factors	$r=0.08$ Significant=0.07	$r=0.14$ significant=0.003	$r=0.23$ $P<0.001$	$r=0.35$ $P<0.001$	$r=0.40$ $P<0.001$	$r=0.005$ Significant=0.90
Commitment to action	$r=0.04$ Significant=0.30	$r=0.41$ $P<0.001$	$r=0.28$ $P<0.001$	$r=0.31$ $P<0.001$	$r=0.18$ $P<0.001$	$r=0.03$ Significant=0.40
Immediate preferences and demand	$r=0.06$ Significant=0.10	$r=0.18$ $P<0.001$	$r=0.08$ Significant=0.08	$r=0.21$ $P<0.001$	$r=0.08$ Significant=0.09	$r=0.08$ Significant=0.10
Behavioral outcome	$r=0.01$ Significant=0.07	$r=0.46$ $P<0.001$	$r=0.37$ $P<0.001$	$r=0.32$ $P<0.001$	$r=0.20$ $P<0.001$	$r=0.08$ significant=0.07
Fruit and vegetable consumption behavior	$r=0.08$ Significant=0.09	$r=0.48$ $P<0.001$	$r=0.39$ $P<0.001$	$r=0.39$ $P<0.001$	$r=0.22$ $P<0.001$	$r=0.17$ $P<0.001$
Variable	Interpersonal factor	Situational factor	Motivational factors	Commitment to action	Immediate preferences and demand	Behavioral outcome
Knowledge						
Previous relevant behavior						
Perceived self-efficacy						
Behavior related emotion						
Perceived benefits						
Perceived barriers						
Interpersonal factor	1					
Situational factor	$r=0.32$ $P<0.001$	1				
Motivational factors	$r=0.40$ $P<0.001$	$r=0.36$ $P<0.001$	1			
Commitment to action	$r=0.22$ $P<0.001$	$r=0.19$ $P<0.001$	$r=0.20$ $P<0.001$	1		
Immediate preferences and demand	$r=0.11$ Significant=1	$r=0.10$ Significant=0.03	$r=0.09$ Significant=0.05	$r=0.22$ $P<0.001$	1	
Behavioral outcome	$r=0.27$ $P<0.001$	$r=0.27$ $P<0.001$	$r=0.12$ $P<0.001$	$r=0.45$ $P<0.001$	$r=0.27$ $P<0.001$	1
Fruit and vegetable consumption behavior	$r=0.26$ $P<0.001$	$r=0.26$ $P<0.001$	$r=0.12$ $P<0.001$	$r=0.47$ $P<0.001$	$r=0.24$ $P<0.001$	$r=0.51$ $P<0.001$

on the consumption of F and V, and the mean score of “immediate preferences and demands” was higher in married participants compared to single, divorced, widowed, or separated ones. Considering the roles and responsibilities of married people, they care about consuming healthier food than the other two groups do. The study results also showed that the participants aged

36-45 years or over 46 years obtained a higher mean score on “immediate preferences and demands” compared to those aged 26–35 years. It can be hence stated that age can be determinant of food choice. Accordingly, as people age older, they are more likely to consume less junk foods, which have low nutritional value, and healthier foods, such as F and V.^[36] The results also showed that

Table 6: Results of stepwise multiple linear regression analysis on the relationship between the F and V consumption behavior and constructs of Pender’s Health Promotion model

Criterion variable	Steps	Predictive variable	R	R ²	Adjusted R ²	F	P	B	β	T	P
F and V consumption behavior	1	Behavioral outcome	0.51	0.26	0.26	150.19	<0.001	0.24	0.51	12.25	<0.001
	2	Behavioral outcome	0.58	0.33	0.33	106.23	<0.001	0.17	0.37	8.24	<0.001
		Previous related behavior						0.11	0.30	6.78	<0.001
	3	Behavioral outcome	0.61	0.37	0.37	84.33	<0.001	0.14	0.29	6.34	<0.001
		Previous related behavior						0.09	0.24	5.39	<0.001
	4	Commitment to action						0.16	0.23	5.21	<0.001
		Behavioral outcome	0.63	0.40	0.39	69.00	<0.001	0.13	0.27	6.04	<0.001
		Previous related behavior						0.08	0.23	5.32	<0.001
	5	Commitment to action						0.17	0.25	5.63	<0.001
		Perceived barriers						0.20	0.14	3.83	<0.001
		Behavioral outcome	0.64	0.41	0.40	58.54	<0.001	0.12	0.26	5.73	<0.001
		Previous related behavior						0.07	0.20	4.37	<0.001
		Commitment to action						0.15	0.23	5.18	<0.001
			Perceived barriers					0.01	0.13	3.41	<0.001
			Behavior-related emotions					0.04	0.13	3.22	<0.001

Table 7: The mean and standard deviation of scores the F and V consumption behavior and Pender’s health promotion model constructs in relation to background variables

Variables	Background variables	Frequency	Mean±SD	Significant*	T	F
Fruit and vegetable consumption behavior	Gender					
	Male	238	1.54±4.40	0.04	-2.45	1.48
Female	180	1.75±4.80				
Motivational factors	History of diseases and health-related problems					
	Yes	175	29.30±5.29	0.04	2.05	1.63
No	243	30.33±4.87				
Knowledge	Educational attainment					
	Academic	363	4.11±1.22	0.001	-3.38	4.11
Nonacademic	55	3.45±1.37				
Knowledge	Place of residence					
	Urban areas	368	4.07±1.24	0.04	1.97	2.76
Rural areas	50	3.70±1.35				
Previous relevant behavior	Gender					
	Male	238	10.55±4.02	0.001	-4.80	7.75
Female	180	12.61±4.72				
Perceived self-efficacy	Gender					
	Male	238	28.79±8.05	0.001	-3.42	0.004
Female	180	31.53±8.18				
Behavior-related emotions	Gender					
	Male	238	21.11±5.25	0.04	-2.04	1.92
Female	180	22.12±4.62				
Perceived barrier	Gender					
	Male	238	38.12±11.27	0.001	-1.30	0.20
Female	180	41.77±11.49				
Behavioral outcome	Gender					
	Male	238	7.02±3.29	P<0.001	-4.46	0.20
Female	180	8.50±3.44				

*Independent sample t-test. SD=Standard deviation

sources of acquiring health information, such as the medical and health staff, books, and TV, can significantly affect some constructs of Pender’s HPM. Therefore, the role of media and sources of information is of special importance here, considering the extent to which the target groups trust them. In other words, these media not only can be important and reliable sources of health

information for target groups but also can be included in training interventions. Based on the results of previous studies, it can be stated.

Perceived social support,^[37] Previous relevant behavior,^[38] knowledge,^[39,40] and Perceived barriers^[41] are among the factors affecting F and V consumption behavior.

Table 8: The mean and standard deviation of scores the F and V consumption behavior and Pender’s health promotion model constructs in relation to background variables

Construct	Background variable	Mean±SD	F	Significant*	Post hoc					
Immediate preferences and demands	Age groups (years)	26-35	8.06	<0.001	46 years and over and 36-45 years versus 26-35 years					
		36-45								
		Over 46								
Behavioral outcome	Over 46	5.27±1.17 6.88±3.27	3.66	0.02	26-35 years and 36-45 years versus 46 years and over					
Knowledge	Marital status	Single	4.30	0.01	Single and married versus others					
		Married								
		Others (e.g., divorced, widowed, separated)								
Immediate preferences and demands	Others (e.g., divorced, widowed, separated)	2.71±1.91 4.00±1.72	6.64	0.001	Married versus single					
Knowledge	Monthly income level	<10,000,000-20,000,000	3.05	0.04	20,000,000-40,000,000 versus <10,000,000-20,000,000					
		20,000,000-40,000,000								
		>40,000,000								
Immediate preferences and demands	The most important sources of acquiring health information	Medical and health staff	2.18	0.04	Medical and health staff and TVVs others (internet, cyberspace, etc.)					
		TV								
		Radio								
		Books								
		Press								
		Friends and colleagues								
Perceived benefits	Others (Internet, cyberspace, etc.)	Books	2.48	0.02	Books versus TV, friends and colleagues and others (e.g., internet, cyberspace, etc.)					
		Press								
		Friends and colleagues								
		Behavior-related emotions				Others (Internet, cyberspace, etc.)	4.44±1.80 22.57±4.75 20.50±5.20	2.13	0.04	Medical and health staff, TV and books versus friends and colleagues

*One-way ANOVA. SD=Standard deviation, ANOVA=Analysis of variance

By contrast, in this study, there was no significant relationship between these factors and the F and V consumption behavior. Nevertheless, they were significantly related to some background variables. Therefore, given that preventive care is very important, evidence-based data should be used in the preparation of effective educational protocols because the inefficiency of studies is a limiting factor in their application.^[42] One of the innovations of this study is the use of motivational factor construct in Pender’s HPM, that with the addition of this construct to the model, Pender’s HPM was used as an extended model. A strength of this study was that the

participants were selected from different governmental offices so that they were of different monthly income levels, positions, etc. A weakness of this study was the large number of items of the research questionnaire. Considering the occupations of participants in their workplaces, it could reduce the accuracy of answers.

Limitation and recommendation

One of the most important limitations in this study was the conditions of the study environment because due to the high workload in some offices and also the high number of clients, the participation of the target group in

the study was reduced. Therefore, in such circumstances, it is recommended to give Opportunity a few days to complete the questionnaire completely and correctly to gain target group's participation and trust.

Conclusion

In addition to constructs of Pender's HPM that directly affect the F and V consumption behavior, other constructs of Pender's HPM that may indirectly affect this behavior but are correlated with the main construct should be taken into account in developing interventions based on Pender's HPM. On the other hand, considering the significant relationship between most constructs of this model and some background variables, special attention should be paid to these variables to achieve the desired goal, which is to increase the consumption of F and V. In other words, background variables should be also considered in the development of interventions based on Pender's HPM. Future similar studies are hence recommended to investigate more background variables, including all physical, psychological, and social factors and other possible effective factors concerning the conditions and characteristics of the target group, along with constructs of Pender's HPM to achieve better results.

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Conflicts of interest

There are no conflicts of interest.

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