Research Paper

Understanding the Factors Influencing Fruit and Vegetable Consumption Behavior of Office Workers: Intervention Strategies Using Social Marketing Techniques Based on Pender's Health Promotion Model

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ABSTRACT

Background: Due to the low consumption of fruits and vegetables in adults, most of them are employed in workplaces; this condition is a good opportunity to implement an intervention to influence the behavior of this group. This study aims to determine the effects of social marketing techniques in an intervention on fruit and vegetable (F&V) intake among office staff.

Methods: This descriptive study was a formative research. This study was conducted on 70 administrative staff in a government office in Ghaemshahr City, Mazandaran Province, Iran in two stages, formative research and developing intervention strategies according to social marketing techniques. Formative research consists of two distinct phases, qualitative and quantitative. The categories were extracted using the direct content analysis method by MAX QDA at the qualitative stage, and the questionnaire data were analyzed by SPSS software, version 22 using descriptive statistics and stepwise multiple linear regression.

Results: In the qualitative section, factors affecting F&V consumption were extracted into five main categories, including product, place, price, promotion, and organizational support. In the quantitative stage, the mean age of participants was 42.14±6.84 years, and the lowest percentage of mean scores related to the commitment to the action plan (29.16%) was related to the construct of Pender's health promotion model (HPM). Previous related behaviors, behavioral outcomes, preferences, and immediate demand predicted 43% of F&V consumption behavior. The mean intake of F&V per day was 1.57±1.32 and 0.45±0.75 units, respectively.

Conclusion: Although social marketing is a planning process, using theory can lead to the development of effective and accurate marketing strategies by covering all aspects of behavior to take more effective action to improve it.

Keywords: Formative research, Fruit and vegetable, Pender's health promotion model (HPM), Social marketing, Staff

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Introduction

Plentiful fruit and vegetable consumption (F&V) is a vital factor in a healthy diet recommended for various reasons, including fibers, low calories, and antioxidant properties, and to prevent cardiovascular diseases [1, 2]. Nearly 8 million premature deaths worldwide are caused by insufficient F&V consumption of less than 800 g per day [3]. The literature review by Abdi et al. also suggested that the F&V intake in Iran was 25% lower than the recommended limit [4]. Another study showed that 70% and 49% of the people living in Mazandaran Province consumed F&V, which is low [5].

In their study, Rekhy et al pointed to the World Health Organization's (WHO) 2013 estimate that about 1.7 million (2.8%) [6], and Hjartaker et al noted that about two million deaths occur each year. It is related to a reduction in the consumption of fruit and vegetables [7]. Since F&V protects against a variety of non-communicable diseases, including cardiovascular diseases, many countries encourage their populations to increase their consumption as a public health priority [7, 8] to reduce the incidence of non-communicable diseases through positively changing eating behaviors with healthy foods partly as a consequence of personal and social behavior patterns [9]. At the same time, social marketing is suggested as a potential way to promote healthy eating [10] and healthy eating behaviors, including F&V [11]. The center for disease control and prevention describes social marketing as the use of marketing principles to influence human behavior and promote social health or interests [12]. Since social marketing is an approach rather than a theory and directs intervention development, using theory or model is an essential part of this process [13]. It is essential to use theory or model to understand which factor describes a behavior since social marketing strategies can focus on variables with the highest impact on the intended outcome [14]. Pender's health promotion model (HPM) is a comprehensive and predictive healthy behavior promotion model with a theoretical framework for discovering the factors affecting health promotion behaviors [15]. Due to this model's approach toward changing ecological behavior, which takes intrapersonal, interpersonal, organizational, and social factors into account, it appears to help identify the factors influencing this behavior's emergence and maintenance [16]. This model considers the factors that affect behavior in the framework of modifiable factors, cognitive-perceptual factors, and variables influencing behavior probability; and since it does not emphasize personal threats, it is used in different stages of life [16]. Meanwhile, since the WHO prioritizes workplaces to present dietary behaviors, they are suitable to implement food interventions [17]. When healthy choices are supported by the environment and policies, the norms and social support for healthy choices are strong and people are encouraged and educated to make healthy choices, their behavior will likely change [18]. Diet is the vital modifiable risk factor for chronic disease [19, 20]. The consumption of fruits and vegetables in the diet is one of the main factors involved in reducing chronic diseases, including coronary artery disease [21-28]. Non-communicable diseases are partly the result of individual and social behaviors, therefore positive changes in healthy nutrition and dietary behaviors may reduce the risk of disease [29, 30]. Secondly, due to the involvement of office workers with risk factors, such as inactivity or long-term replacement during working hours and increased tolerance of stress caused by acceptance of work responsibilities [31], the necessity of a study examining the consumption behavior of fruits and vegetables in a more homogenous society in terms of occupational and social conditions was needed.

Methods

This descriptive study was formative research to determine the effect of organizational social marketing techniques based on Pender's HPM on F&V consumption in-office staff. Therefore, the main purpose of this study was to analyze the target group, channel, and market, also due to the organization of this study, the environment was analyzed in terms of opportunities and obstacles, (e.g. present organizational rules and policies, the participation of the key individual in the developing, implementation, and evaluation of suitable interventions in the organization) and how to engage other related organizations to cooperate and participate to improve F&V consumption behavior in the office staff, to develop strategies based on social marketing. This study was performed in two stages, formative research, and the developing of intervention strategies based on a social marketing mix, also formative research consisted of two steps, qualitative, and quantitative. This study was conducted on employees of a government office (Department of Education) in Ghaemshahr City, Mazandaran Province with a condition of entry (a minimum of 70 staff members) from December 11, 2019, to February 4, 2020.

Sample size

Considering that the present study was the preliminary stage of an interventional study, based on the sample size

formula in the intervention study, the sample size was estimated at 70 people, therefore in the quantitative stage, 70 people were included in the study.

According to the main research variable, i.e. F&V intake, and considering (Equation 1),

$$n_1 = n_2 = \frac{2\times(z_{\frac{\alpha}{2}} + z_{\beta})^2\sigma^2}{(\mu_1 - \mu_2)^2} = 68, \sigma = 0.69, \mu_1 = 2.87, \mu_2 = 2.54, \alpha = 0.05, \beta = 0.2 \quad (1)$$

The size of each intervention and control group was estimated at 70.

Study participants and sampling

This study was conducted to collect information from employees and officials of the city's Department of Education on the perception of F&V consumption behavior, barriers to consumption at home and office, and recommend solutions. The Department of Education's administrative automation was used to call and register individuals to participate in the study and was selected by the convenience sampling method. Since the participants in this stage also had to take part in part two involving an intervention, this stage had to consider the condition for entry into stage two. Therefore, volunteers needed to be employed at the office in question and fill out the consent form. They were also assessed for lack of contradiction to participate in the intervention. Finally, 70 people participated in this study, of which all 70 people participated in the quantitative phase of the study and 36 people participated in the qualitative phase of the study.

Data collection for qualitative analysis

To identify the benefits, barriers, preferences, and facilitators of F&V consumption and preferential communication channels, individual interviews and focus group discussions were conducted with the target group using structured questions, and the necessary observations to obtain the necessary information regarding available opportunities inside and outside the organization.

Individuals were to register and participate in the study first through the call (with the aim of the study and the condition of entering the study) which was sent to all employees using office automation and also face-to-face notification by colleagues in both departments from 11/12/2019 to 29/12/2020 by referring to the administrative affairs department of the municipality and the research unit of the Education Department.

Some of the group discussion questions and interviews were on the following subjects:

1. How do you perceive a person who recommends the use of more F&V? 2. What specific things do you do to encourage coworkers to consume more F&V? 3) What were some of the memorable or interesting programs or activities in the office to motivate you to do certain activities? 4. In your opinion, what factors can affect the reception of F&V consumption? 5. What is the best educational program to provide you an effective training? 6. Which is the best program to cause you to consume more F&V?

Data collection for quantitative analysis

Since developing scientific knowledge of social marketing requires compatible theory application and accurate measurements, and given the target group and the organizational environment of study, Pender's HPM was used alongside the social marketing approach as it considers personal as well as interpersonal and environmental factors. Therefore, the quantitative section consisted of two separate questionnaires. Researcher-made questionnaire of perception of F&V consumption behavior based on Pender's HPM, that the results of content validity ratio, the content validity index, and Cronbach's α of the questionnaire were 0.92,0.97 and 0.96, respectively, and in construct validation by using exploratory factor analysis test comprised 61.14% of the model's cumulative variance and consisted of 104 items in 12 constructs that included previous related behavior, perceived self-efficacy, behavioral feelings, perceived benefits and barriers, interpersonal effects, situational influencers, motivational factors added to Pender's HPM, commitment to the action plan, preferences, and immediate demand, and behavioral outcomes in a 5-point Likert scale (zero=none, 4=always) with knowledge questions by selecting the correct answer [32]. The second questionnaire was F&V frequency questionnaire, which consisted of 33 items and was extracted from the validated 86-item food frequency questionnaire, which was used in the study of Veisi et al [33]. The validity of the questionnaire was assessed with the help of nutritionists and the reliability of the questionnaire was 0.71 using the retest. The questionnaire collected data related to the mean consumption of F&V food groups per day according to the amount of each unit mentioned in the questionnaire.

Qualitative data analysis

The researcher recorded all interviews and focus group discussions, followed by word-for-word transcription of interviews for proper coding. In this study, purposive sampling was unlikely and to obtain information, reaching saturation level was considered as the end of sampling. Finally, the initial codes and categories were extracted using the direct content analysis method by MAX QDA software. Then, the codes and categories were re-evaluated with an expert's help, and the results were written.

Quantitative data analysis

Questionnaire data was analyzed by SPSS software, version 22 using descriptive statistics, and stepwise multiple regression.

Strategy design stage

In the second stage, intervention strategies based on social marketing techniques were designed and organized using the results extracted from the formative research stage with a downstream and midstream approach while considering benchmarks (by integrating Anderson's six benchmarks and the National Social Marketing Center's 8 benchmarks) [34, 35], and Pender's HPM constructs.

Behavior: The goal is to identify clear behaviors for change, not simply to change knowledge, beliefs, and attitudes [13].

Theory: Behavioral theories with identification of factors affecting behaviors, their formation, and their changes in designing interventions [13].

Segmentation of the audience: Identification and meaningful prioritization of the target population regarding the intervention's objectives according to clear criteria [13].

Exchange: Offering something valuable to the audience to change behavior [34]. Individuals need meaningful motivations to change their attitudes [36].

Customer-orientation: Developing interventions based on the opinions, demands, needs, and preferences of employees [34].

Competition: Knowledge of the products considered by the target audience to select the suitable product [37]. Competitive behaviors are evaluated using interventions, which may be internal, e.g. Current personal behaviors, or external, such as bad policies [34].

Data-based decision making: Compilation of all interventions taking into account the results of formative research (quantitative and qualitative survey) [38].

Marketing mix: The right marketing mix can be essential to a program's success. When designing a program to determine the best mix for the target group, all four marketing mix elements (product, place, price, and promotion) are analyzed and considered [39]. It is a key concept in social marketing and is defined as a set of adjustable tools that can be combined to respond to the target market and group, and includes 1. The product: The behavior or suggestion that the target audience is expected to accept is a set of benefits and opportunities offered to the customer, and 2. Price: What the target audience sees as the price for accepting the new behavior, 3. Place: Where the consumer has access to products and information and where a voluntary exchange takes place, and 4. Promotion: The process of communicating with the target group about the product [34].

Results

Qualitative phase of formative research

In this study, 12 individual interviews were conducted with 6 men and 6 women, and 3 focus group discussions with a group of female employees, a group of male employees, and a group of management-level employees with 8 participants in each with a mean age of 45±10.2 years and work experience of 6±2.96 years. Based on the results of direct content analysis in the qualitative section, which included interviews and observations, facilitators, internal and external barriers related to F&V consumption behavior, and acceptance of training related to the importance of F&V consumption were extracted in five main categories, including product (with 3 subcategories including core product, actual product, and augmented product, place (with 1 sub-category of structural factors), price (with 4 subcategories, health factors, individual factors, organizational factors and structural factors related to fruit and vegetable consumption and 3 subcategories of structural factors, individual factors, and organizational factors related to the acceptance of health education), promotion and organizational support. Then, the social marketing criteria related to each of these factors were identified (Table 1).

Table 1. Development of benchmark criteria (mix of Anderson's Benchmark criteria and the national social marketing center)

Row	Benchmark Criteria	Definition
1.	Behavior	Daily consumption of at least two fruit units and three vegetable units
2.	Theory	Pender's health promotion model
3.	Segmentation of audiences	Individuals based on the preferred method of receiving information and organizational levels are divided into groups, the audience to receive direct education, the audience to receive indirect education, and management staff and office staff, respectively
4.	Exchange	The benefits of plentiful F&V intake will be communicated to the target group in all areas
5.	Customer-orientation	The target group's opinions, demands, needs, and preferences were extracted from personal interviews and group discussions and will be continuously revised according to their perspective
6.	Competition	Other food groups were a competitive factor for the recommended amount of F&V intake. Therefore, their importance in the nutrition triangle as one of the most important food groups will be introduced with a focus on presenting information on F&V consumption.
7.	Data-based decision making	Problematic constructs were extracted in the quantitative stage to be later prioritized for developing interventions with the results of personal and group interviews.
8.	Marketing mix Product A) Core product	a) Preventing cardiovascular diseases
	B) Actual product	b) Consuming a minimum of 5 F&V units a day
8.1	C) Augmented product	c) 1. Awareness of cardiovascular diseases and its correlation with low F&V intake 2. Education and information to reduce obstacles to consumption and introduce the benefits of F&V (physical, economic, social, and psychological) 3. Antioxidant factor as a positive and short-term outcome of fruit and vegetable consumption behavior in employees
8.2	2. Place A) Structural factors	1. Failure to use suitable educational spaces (heating system, seats, etc.) Outfitting with audiovisual equipment 2. Failure to select suitable days for education 3. Failure to select suitable hours for education Poor access to education
8.3	3. Price 3.1. About F&V consumption A) Health factors	a) 1. Digestive complications of F&V intake 2. Diseases communicated via F&V, especially the vegetables 3. The use of animal and human waste as fertilizer for vegetables 4. Use of agricultural toxins in F&V 5. Inorganic F&V
	B) Personal factors	b) 1. Laziness in F&V consumption Different tastes in F&V consumption at home Not believing in the benefits of F&V Being shy of bringing F&V to the office (especially among males) Uncertainty about the correct way to wash F&V Fruit peeling difficulty F&V washing and preparation difficulty The inconvenience of washing hands after having F&V in the workplace Bad food habits (excessive use of other nutrition groups) Unawareness of foods mixed with various F&V Preferring taste and enjoyment of foods instead of their true benefits Incorrect beliefs (e.g. individuals with healthy nutrition who fell ill soon and lived short, therefore, correct nutrition cannot guarantee health)
	C) Organizational factors	c) Lack of free time for consuming F&V at workplace (high workload) Lack of suitable spaces for F&V consumption (clients prevent peaceful consumption of F&V) Presence of many clients No fruit servings in meetings No specific time for serving F&V to staff

Row	Benchmark Criteria	Definition
8.3	3.2. Acceptance of health education A) Structural factors	a) Failure to continuously hold educational sessions Long educational sessions Untimely educational sessions Mistrust of teacher in terms of having the latest information Improper delivery of contents Boring educational content (e.g. the content should be assessed psychologically) Failure to evaluate the present state (providing topics without evaluating the present state) The unawareness of the target group from the important event to take place (not knowing the end and the final results. It is better to provide information during or after holding sessions) Failure to hold interactive sessions Repetitive educational topics (repeating what is known) Failure to hold in-person sessions Failure to follow healthy behaviors at the session (e.g. symbolically serving F&V at the same sessions) Failure to hold enough sessions (too few sessions) The failure by colleagues or others to perform the taught behavior (as an incentive to other workers as role models) Failure to present topics in an applied manner (e.g. producing various foods and desserts with F&V) Failure to present health information with a focus on the benefits of healthy behaviors (focusing more on F&V benefits) The instructor's inadequate command of topics Monotonous educational sessions Failure to provide relevant figures with educational topics or display educational topics (e.g. using PowerPoint) Failure to provide objective examples of behaviors (e.g. showing the objective and tangible benefits of using fruits and vegetables, or showing the side effects of abstention) Lack of direction for topics (observing the hierarchy of topics with a focus on the target group) Failure to hold sessions in small groups Failure to present topics regarding the objectivity of the benefits of F&V consumption (e.g. presenting a healthy diet
	B) Personal factors	b) Lack of happiness in staff (obstacle to participation in sessions) Workers' laziness to participate in sessions (laziness to climb up the stairs to attend sessions) Lack of belief to participate in sessions (force to change behavior is preferable to participation in sessions)
	C) Organizational factors	c) Presence of many clients Failure to make timely notifications of time, date, and place of sessions (given the workers' conditions in terms of workload, clients, and missions, they should be notified one week in advance to take part in sessions)
8.4	4. Promotion	Holding in-person sessions Holding virtual sessions (sending educational packages, social media, etc.) Using experts Introducing successful individuals in consuming F&V as role models Creating a competitive atmosphere to motivate participants

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Quantitative phase of formative research

The mean age of participants was 42.14±6.84. The critical way to obtain health information was via television (60.51) and health staff (30.00) (Table 2).

The lowest percentage of mean scores was related to the construct of commitment to the action plan (29.16%), behavioral outcome (46.56%), and previous related behavior with 46.75%, respectively (Table 3).

According to the stepwise multiple linear regression,previous related behaviors and behavioral outcome constructs of Pender's HPM predicted 38% of F&V consumption behavior (Table 4).

Developing intervention strategies

Reinforcement and induction strategies were developed by aggregating the results from the quantitative and qualitative sections with an information approach according to downstream and intermediate social marketing techniques (Table 5).

Table 2. Sociodemographic information of participants in the quantitative stage

Variables		Mean±SD/No. (%)
Age		6.84±42.14
Gender	Male	41(58.60)
	Female	29(41.40)
	Total	70(100)
Place of residence	Urban areas	66(94.30)
	Rural areas	4(5.70)
	Total	70(100)
Marital status	Single (never married)	10(14.30)
	Married	60(85.70)
	Total	70(100)
The crucial source of acquiring health information	Medical and health staff	21(30.00)
	TV	36(51.60)
	Radio	1(1.14)
	Books	4(5.70)
	Press	1(1.40)
	Friends and colleagues	2(2.90)
	Others (e.g. internet, cyberspace, etc.)	5(7.10)
	Total	70(100)

The present study used the information approach to develop strategies according to the results from formative research in the environment because different approaches are observed in social marketing, downstream approach, midstream approach, and upstream approach. The goal of the downstream approach is to address the problem by facilitating access to solutions [40], where the customer is responsible for changing their behavior [41]. The midstream approach targets individuals who can help change group behavior, e.g. family, friends, and colleagues; and the upstream approach focuses on the main causes of problems [40]. Influencing policy and changing the people's environment, in other words, on decisions of groups and individuals who affect the target market, including policymakers, media figures, social actors, etc. [42, 43]. Therefore, given the scope, authority, time, and environment, this study employed a hybrid downstream-midstream approach. To achieve its goals, social marketing requires using and coordinating with other approaches, according to Santesmases, these approaches are divided into four groups, the legal approach is determined by rules and regulations, approvals, and executive guarantees; the technological approach is based on technological innovations and facilitates desirable behavior; the economic approach reduces the desired behavior's cost or increasing the undesirable behavior's cost to discourage; and the information approach focuses foremost on persuasive and encouraging information [44]. The present study used the information approach to develop strategies according to the results from formative research in the environment.

Kotler and Lee named three categories of products in social marketing, including the core product, the actual product, and the augmented product. The target group will receive the core product's benefits by performing the desirable behavior. The actual product is the desired behavior that the target group should choose, and the

Table 3. Mean and percentage of scores obtained in Pender's HPM constructs

Variables	Mean±SD	Total Score	Percentage of Score Obtained
Commitment to action plan	2.31±1.75	6	29.16
Behavioral outcomes	3.15±7.45	16	46.56
Previous related behavior	4.00±11.22	24	47.75
Situational influencers	12.05±34.15	56	60.98
Perceived barriers	12.19±42.62	60	71.03
Perceived self-efficacy	5.80±32.88	44	74.72
Interpersonal effects	8.59±42.70	56	76.25
Motivational factors	5.28±28.74	36	79.83
Preferences and immediate demand	1.57±4.84	6	80.66
Knowledge	1.41±4.05	5	81.00
Behavioral feelings	4.05±23.41	28	83.60
Perceived benefits	3.49±24.68	28	88.14

augmented product is the complementary services or a tangible provided to support the desired behavior [45]. The core product of the present study was the prevention of cardiovascular diseases, the actual product was daily F&V consumption with the suggested amount, and finally, the augmented product was education regarding the importance of F&V consumption. According to the qualitative section, most obstacles and problems according to the categorization of content analysis (structural elements, health factors, personal factors, and organizational factors) were related to structural factors of F&V consumption as the actual product, and education about the importance of F&V consumption as the augmented product. Therefore, considering the product's structural aspect was more crucial to developing strategies. In the qualitative section, the most problematic constructs in the target group corresponded to commitment to the action plan, behavioral consequences, and related previous behavior. In an investigation conducted by Gough et al., the two main barriers to a healthy diet were pessimism about the government's health messages and rejection. A healthy diet is caused by bad taste and inability to fulfill [46]. Also, in an investigation conducted by Verstraeten et al., the results confirmed the importance of investigating behavioral and environmental factors that influence and mediate healthy eating behaviors before intervention development [47]. In a survey conducted by Kabir et al., dietary behavior and consumption are influenced by a variety of factors, individual factors (cooking skills, food taste, food taboos, and knowledge and perceptions), societal factors (influence of peers and social norms), factors related to university (campus culture and frequency

Table 4. Results of stepwise multiple regression analysis on the relationship between the F&V consumption behavior and constructs of Pender's HPM

Criterion Variable	Steps	Predictive Variables	R	R^2	Adjusted R^2	F	P	B	β	T	P
F & V consumption behavior	1	- Previous related behavior	0.55	0.31	0.30	30.51	P<0.001	.23	0.55	5.52	P<0.001
	2	- Previous related behavior - Behavioral outcomes	0.63	0.40	0.38	22.91	P<0.001	0.16 0.18	0.39 0.35	3.73 3.30	P<0.001 P<0.002

Coefficient of determination: R^2=0.40, Adjusted R square=38%, F test=22.91, P<0.001.

Table 5. Developing social marketing strategies according to benchmarks

Marketing Mix	Strategies	Target Constructs of Pender's HPM
1. Product	Reduce inhibitors factors Holding weekly in-person educational sessions on a specific subject, in two days, and at two different times (to allow the target group to participate at the right time and place according to their working conditions) and presenting information virtually	Perceived barriers
1.1. Augmented product	Influencing attitudes toward behavior Reporting pretest results of consumption behavior according to the model's constructs (Pender's HPM) Antioxidant factor as a positive and short-term outcome of fruit and vegetable consumption behavior in employees	Behavioral outcomes, the previous related behavior, commitment to the action plan, behavior-related emotions
2. Place	Facilitating factors, providing alternatives Holding educational sessions in the office conference hall equipped with audiovisual equipment, heating, and a suitable physical space. Presenting topics virtually Holding educational sessions in two different hours (before and after noon) for the entire target group to participate Holding educational sessions in two different days to allow all interested participants to attend educational sessions	Perceived barriers
	Facilitating factors Presenting topics virtually Holding educational sessions in two different hours (before and after noon) for the entire target group to participate Holding educational sessions in two different days to allow all interested participants to attend educational sessions	Situational influences, perceived self-efficiency
3. Price	Provide alternatives, provide incentives for engaging in behavior, reassuring behavior Holding continuous and guided educational programs Holding educational programs for a maximum of one hour a week Developing an educational program at two different times and days of the week to allow workers to participate in two smaller groups Using nutrition experts, doctors, and capable experts from the agricultural Jihad organization proficient in scientific topics and good oratory skills to present educational topics and contents Using a team of nutrition experts from town health centers to present topics and contents for variety in education and preventing monotony	Perceived barriers
	Provide alternatives Holding educational programs for a maximum of one hour a week Developing an educational program at two different times and days of the week to allow workers to participate in two smaller groups	Situational influences
	Healthier role models Using nutrition experts, doctors, and capable experts from the Agricultural Jihad Organization proficient in scientific topics and good oratory skills to present educational topics and contents	Interpersonal influences
	Provide incentives for individual involvement in behavior Holding educational programs while considering all aspects of health (physical, economic, psychological, etc.) Updated information to suit workers' needs Holding interactive and brief educational courses and using audiovisual equipment to present topics Holding in-person and virtual educational programs Holding educational programs while stressing the benefits of F&V consumption to overcome present barriers	Perceived benefits, immediate preferences, and demand, incentive factors, behavioral outcomes
	Provide alternatives Holding in-person and virtual educational programs	Perceived self-efficiency
	Influencing attitudes toward behavior Holding educational programs while stressing the benefits of F&V consumption to overcome present barriers	Immediate preferences and demand, behavior-related emotions

Marketing Mix	Strategies	Target Constructs of Pender's HPM
	Decreased perception of a barrier Informing the target group to participate in the educational courses developed at least one week earlier Issuance of a circular for daily F&V consumption by the target group in the office and putting fruits on their desks Holding educational sessions about F&V consumption with individuals suffering from digestive complications Holding educational sessions regarding the use of agricultural pesticides in F&V production and safe consumption by an expert from the agricultural Jihad organization Holding educational sessions about the correct way to wash and disinfect F&V and prevent parasitic diseases	Perceived self-efficiency, perceived barriers
3. Price	Modeling, direct experience with healthy food, facilitating factors Introducing individuals with a positive experience of F&V as role models to present their experiences Issuance of a circular for daily F&V consumption by the target group in the office and putting fruits on their desks Issuance of a circular by the director to set a specific time of the workday to symbolically consume F&V Issuance of a circular to serve F&V and office meetings	Situational influences, interpersonal influences, incentive factors, behavior-related emotions, behavioral outcomes
	Direct experience with healthy food Hold a healthy snack program in the office	Immediate preferences and demand
	Influencing attitudes toward behavior Antioxidant factor as a positive and short-term outcome of fruit and vegetable consumption behavior in employees	Incentive factors, behavior-related emotions, and previous related behavior, commitment to the action plan, behavioral outcomes
	Social modeling of behavior Symbolic F&V consumption at specific work hours	Interpersonal influences, incentive factors, behavior-related emotions, situational influences, perceived barriers, perceived self-efficiency
	Facilitating factors Pamphlets and brochures Placing F&V on desks Send training package through office automation	Incentive factors, situational influences, Perceived barriers, perceived self-efficiency
	Use persuasion and reinforcement Holding a competition (by the officials of the department to introduce a successful person in the field of increasing the maximum level of changes in the amount of serum antioxidants)	Situational influences, perceived self-efficiency, incentive factors, behavioral outcomes, behavior-related emotions, the previous related behavior, commitment to the action plan, behavioral outcomes
4. Promotion	Use persuasion and reinforcement Placing posters In-person educational sessions Prepare fruit and vegetable serving by printing the image of Plate food (half a container is filled with fruits and vegetables, one-third with cereals and starches, and the other third with dairy and protein, nuts, etc.). Virtual networks	Perceived barriers, perceived self-efficiency, behavior-related emotions, incentive factors, situational influences, behavior-related emotions
	Reassuring behavior 1. Nutrition and Agricultural Jihad Organization experts	Perceived barriers, perceived self-efficiency, behavior-related emotions, incentive factors, situational influences, behavior-related emotions
	Social modeling of behavior Upload an image of consuming more fruits and vegetables in the profile of the group and the researcher in virtual networks	Incentive factors, situational influences, behavior-related emotions, interpersonal influences
	Self-help groups Transferring positive experiences	Perceived barriers, perceived self-efficiency, behavior-related emotions, incentive factors, situational influences, behavior-related emotions, interpersonal influences

Marketing Mix	Strategies	Target Constructs of Pender's HPM
4. Promotion	Organizational aspect Organizational interventions Participation of city health care centers and Agricultural Jihad Organization in implementing the program Participation of office directors and deputies in the program and supporting its implementation Issuing certificates of attending educational sessions (in-service certificates) by the office research deputy Issuance of a circular by the director to specify a specific work hour to serve F&V in groups Making the research deputy office available for coordination and follow-up Sending health messages through office automation Informing the target group to take part in educational sessions by the research department	Incentive factors, situational influences, interpersonal influences, Perceived barriers, perceived self-efficiency
	Friendly systems Holding a competition (by the officials of the department to introduce a successful person in the field of increasing the maximum level of changes in the amount of serum antioxidants)	Incentive factors, situational influences, interpersonal influences, behavioral outcomes, behavior-related emotions, the previous related behavior, commitment to the action plan, behavioral outcomes

F & V: Fruit and vegetable; HPM: Health promotion model.

of examination), and environmental factors (availability of cooking resources and facilities and food prices) [48].

According to the theoretical framework of Pender's HPM, influential factors can increase or decrease health promotion behaviors and occur when other important individuals, or behavior models, expect them, and to perform supportive actions, individuals are expected to be committed to health promotion actions because they act as a behavioral intermediary as well as the actual behavior [49]. Therefore, the research environment and its organizational orientation reveal the importance of using these constructs and their influence, where it is crucial to evaluate the cause of problems and facilitate their improvement. At the same time, related previous behavior, behavioral consequences, and immediate preferences, which predicted F&V consumption behavior, should also be the targets of developing strategies, since previous behaviors, inherited features of beliefs, emotions, and the fixation of health promotion factors, and when other behaviors are more appealing or are not influenced by the competitor's demands, commitment is less likely to create the intended behavior [49, 50]. Therefore, this study tries to consider these cases in developing all strategies. Most developed strategies were intended to cover present problems in the structural dimension and the most problematic and critical constructs. For example, to increase the interpersonal effects, a strategy was developed to use colleagues' positive experiences in F&V consumption to target the situational effects of the healthy snack program. Also, the strategies used to cover structures with a higher predictive ability of F&V consumption behavior stressed the benefits of behaviors that increase the mean score of these constructs and consumption behavior, since individuals are committed to behaviors whose personal interests are predictable [50]. Also, since most target group's health information was obtained from healthcare staff after television, strategies were developed for his group to deliver educational content and messages, since healthcare suppliers are crucial sources of interpersonal interaction that can increase or decrease commitment to health promotion behaviors [49, 50]. Moreover, strategies were developed to mitigate communication obstacles related to health factors of F&V consumption, e.g. fear of chemical toxins used in F&V, the use of agricultural Jihad organization's experts to correctly transfer information regarding the use of agricultural toxins, amount and time of use, and other factors, to ultimately create value for individuals to access an acceptable personal balance between change and stability [49, 50]. In the next dimension, personal factors, such as strategies were used to empower individuals to consume more F&V, including the strategy of showing how to wash F&V. Enhancing self-efficacy reduce perceived barriers to performing a particular health behavior [49, 50]. Since the results of the F&V frequency questionnaire were lower for the target group than recommended, efforts were made to tailor the reinforcement and inductive strategies to maintain or improve the behavior in question. Regarding the organizational factors, strategies were developed to increase the participation of office authorities in the coordination, design, and implementation of the program, e.g. providing in-service certificates to the target group for their participation in in-person educational sessions. Santesmases introduced four main strategies for social marketing, 1. The rein-

forcement strategy: With a positive attitude toward the target idea or behavior and the behaviors that are compatible, the strategy's goal is to reinforce the condition, e.g. giving rewards, economic or non-economic incentives, and legal norms. 2. The enforcement or induction strategy: When the attitude toward the idea or behavior is positive yet the desired social behavior is not formed. This strategy tries to enforce behavior, e.g. through social controls, facilitating material and human resources for the desired behavior, and motivating. 3. Logical strategy: When the desired social behavior is employed yet the attitude toward the behavior is negative. This strategy tries to change attitude to suit the behavior through actions, such as encouragement and control. 4. The exposure strategy: When attitudes and behaviors are compatible but contradictory to the desired social behavior. This strategy is intended to change behavior and attitude, which is the most difficult state to change. This strategy uses economic penalties, mandatory actions, threats, and more [42, 45]. Therefore, given the results of formative research, the suitable strategies for this study were reinforcement and induction strategies, since the results of qualitative analysis of the target group corresponding to F&V consumption were overall positive. Nevertheless, several participants consumed three to five units of F&V a day according to the guidelines, while others, despite their positive attitude toward the behavior, did not have sufficient daily F&V intake.

One of this study's strengths is its combination of qualitative and quantitative research in the development of strategies. The second is the separate participation of various groups, including women, men, and organizational authorities in focused group discussions and personal interviews. The third strength was the entire target group's participation in the quantitative stage and the use of two separate standardized questionnaires to obtain a better insight into F&V consumption behavior and the target group's F&V intake. The study's crucial limitations include the lack of participation of staff families to obtain important information about the target group for the development of strategies, partial completion of questionnaires through self-representation by the target group, which put its integrity in doubt, and the third limitation regarding the F&V frequency was its evaluation of F&V consumption by the target group over the last six months, making mistakes in recollection of usage frequency in the target group likely. It is suggested that the results and appropriate solutions obtained from this study be available to city officials, such as the governor, and health systems, such as the city health center, which have legal authority and are responsible for the health of people, to develop an operational plan for nutrition in the covered departments, it should be implemented with the focus on fruit and vegetable consumption in the office.

Conclusion

Although social marketing is a planning process, the use of theory can lead to the development of effective marketing strategies. Therefore, social marketing by determining the social marketing approach (downstream, midstream, upstream) can determine the theory or model's aims and the use of its constructs in research to facilitate people's perception of the problem in question and develop more accurate strategies by covering all aspects of behavior to take more effective action to improve it.

Suggestions for future studies

To continue the change in nutritional behavior created in the target group that the government employees are in the present study, it is necessary not to neglect the participation of the families of this group because many food groups that may compete with fruit and vegetable consumption among employees should be provided in the home environment for the family to consume in priority. Therefore, to improve behaviors, such as nutritional behaviors that are not only related to work environments, the role of the family should also be considered as a crucial factor and should be included in the study as one of the effective factors in reaching the goal of the study and stronger and more complete strategies should be development based on this factor, therefore it is suggested to plan effectively for family participation and cooperation in future research.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Isfahan University of Medical Sciences (Code: IR.MUI.RESEARCH.REC.1398.465).

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Authors' contributions

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Conflict of interest

The authors declared no conflict of interest.

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