

# Can health promotion model constructs predict nutritional behavior among diabetic patients?

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Since, the nutritional behavior is a complicated process in which various factors play the role, this study aimed at specifying the effective factors in nutritional behavior of diabetic patients based on Health Promotion Model. This paper reviews the published articles from 2000 to the beginning of 2012, using the various data banks and search engines such as PubMed, ProQuest, Scopus, Elsevier, and the key words "perceived benefits and barriers, perceived self-efficacy, social support, activity related affect, situational influences, commitment to plan of action, immediate competing demands and diabetes, self-caring and diabetes. Unfavorable self-care situation especially, inappropriate nutritional behavior is related to some effective modifiable factors. Perceived benefits and self-efficacy regarding behaviors play a major role in the nutritional behaviors. Social support especially, spouses' support has a significant role in this regard. Moreover, there is a reverse relationship between perceived barriers and nutritional self-care. In addition, behavioral feelings, situational influences, commitment to plan of action and immediate competing demands and preferences can also impact and overshadow the nutritional self-care. Following the relationship between constructs of Health Promotion Model and nutritional behavior the constructs of this model can be utilized as the basis for educational intervention among diabetes.

**Key words:** Diabetes, health promotion model, nutritional behavior

## INTRODUCTION

Globalizations, changing in life-style and industrialization have important roles in the progression of chronic diseases such as cardiovascular diseases and diabetes.<sup>[1]</sup> Diabetes is a systemic metabolic disorder, which causes unhealthy metabolism of carbohydrates, lipids and proteins.<sup>[2-5]</sup>

Diabetes can have worse effects on the individual's life dimensions, and it does not have certain treatment.<sup>[6-8]</sup> Its complications can notably decrease life quality,<sup>[9]</sup> and may provide different personal and social problems.<sup>[10]</sup> Based on World Health Organization report, 4-5% of the health budget is for diabetes related diseases, in the way that diabetic medical cost is 2-5 times more than healthy individuals' medical cost.<sup>[11]</sup> Therefore, this problem has been attracted medical systems attention.<sup>[12,13]</sup>

It is estimated that the number of diabetic individuals has been increased from 171 million in 2000 to 366 million in 2030.<sup>[14]</sup> About 100,000 individuals are added to diabetic patients every year. It is predicted that about 75% of the diabetic population will be in developing countries until 2025.<sup>[15,16]</sup>

More than 3 million diabetic individuals are living in Iran, and 20% of this population are afflicted by diabetes or are prone to diabetes.<sup>[17]</sup> Based on the statistics the prevalence of diabetes will increase to 3 times until 2021.<sup>[18-20]</sup>

It is in the way that dietary intake is rapidly changing in the middle east.<sup>[21,22]</sup> These changes include, tendency to saturated lipid, cholesterol, carbohydrates, different food with high energy, and attractive appearance, but low nutritional value, oily and sugary snack and decrease in fiber intake which increase the risk of contagious disease.<sup>[23]</sup>

Based on published researches, increased refined food intake and consuming more trans-fat sources as well as decreased amount of fiber intake may be associated with diabetes.<sup>[24-27]</sup> Dietary intake management should be carried out mostly by the diabetic patients which require extended changes in the life-style.

Thus, diabetes needs self-caring behaviors in the whole life. Self-caring improves life quality and is effective in the lowering of disease cost and hospitalized times. There are a lot of scientific evidences that follow these recommendations and are effective in diabetes treatment and also leads to less referring of patients to

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**Received:** 05-01-2013; **Revised:** 18-01-2013; **Accepted:** 11-03-2013

physician, medication need, hospitalization and diabetes complications.<sup>[28,29]</sup>

Although self-caring has beneficial effects for diabetes, creation, and preservation of the self-care process is difficult for diabetic individuals.<sup>[30,31]</sup> Therefore, large groups of diabetes do not take care of themselves.<sup>[32-35]</sup> Other researches results reveal that continuity of self-caring is in low-level in the diabetic patients (30-40).<sup>[36-40]</sup>

Most patients do not pay attention to their nutritional orders in the way that in Asian countries and other societies, less than half of the patients utilizes appropriate diet order as a part of their treatment.<sup>[41]</sup> Diet is a complicated behavior, which does not change easily. According to the reports most of the patients never follow dietary prescription.<sup>[42-47]</sup> Even in most studies, although patients have high nutritional information, their practice is not suitable.<sup>[48-51]</sup>

Nutritional behavior is not as the effect of nutritional awareness and information, and it has been influenced by different factors.<sup>[52]</sup> Some researchers, believe that increase of awareness does not preserve self-caring behaviors, and it is not also enough for long-time control.<sup>[53,54]</sup>

Since, there are some problems in the creation and preservation of self-caring behaviors and its complication, it is necessary to use behavior changing models and theories,<sup>[55]</sup> because they recognize the basic factors which impact on behaviors and determine their relationship. One of the models and theories, which are effective in nutritional diet and healthy nutritional behavior is Health Promotion Model. Therefore, this study aimed at specifying the effective factors in nutritional behavior of diabetic patients based on the Health Promotion Model.

## METHOD

This study reviews the published articles from 2000 to the beginning of 2012, using the various data banks and search engines such as PubMed, ProQuest, Scopus, Elsevier in December 1<sup>st</sup>-29<sup>th</sup> 2012 by the corresponding author, and the key words" perceived benefits and barriers, perceived self-efficacy, social support, activity related affect, situational influences, commitment to plan of action, immediate competing demands, and diabetes, self-caring and diabetes [Figure 1].

### Perceived benefits and barriers

Self-caring in diabetes includes, personal, psychological, and social factors, which its cognition and perception help health services suppliers to plan and carry out desirable intervention to promote diabetic self-management behaviors. Perceived benefits and barriers have an important role in the self-care process among diabetes.

Galsgow showed there is a significant, but reverse relationship between perceived barriers and self-caring behaviors. Psychological barriers are important factors in self-management behaviors.<sup>[56-58]</sup>

There is a meaningful relationship between perceived benefits, barriers, and severity of the disease and preventive behaviors of diabetes complications. Perceived barriers lead to follow less prescriptive orders of health and treatment care workers.<sup>[59]</sup> Wen *et al.*, showed as perceived barriers among his research groups increase, prescribed physical activity and following nutritional diet decrease.<sup>[60]</sup> Koch, indicated a negative significant correlation between perceived barriers and self-caring behaviors.<sup>[61]</sup>

Perceived barriers are important factors in the self-care process.<sup>[62,63]</sup> Important barriers are non-awareness of healthy nutritional program, lack of support and perception of self-management.<sup>[63]</sup> Rothman *et al.* showed inappropriate diet and sport habit in these patients was related with perceived barriers.<sup>[64]</sup> It is seen in Krichbaum *et al.* study too. In his systematic review, he explains as perceived barriers rise; self-caring behaviors go down.<sup>[65]</sup> Whittemore emphasized that planners should pay attention to this factor in their educational interventions.<sup>[66]</sup>

Corina believes as perceived barriers increase, significant decrease happens in diabetic self-caring action.<sup>[67]</sup> The same results were seen in Adams *et al.* and Karter *et al.*'s studies.<sup>[68,69]</sup> Juan and Patti explain that perceived barriers have the strongest relationship with self-caring behaviors.<sup>[70,71]</sup> In spite of different studies, which exhibited reverse and significant relationship between self-caring behaviors and perceived barriers, one study did not receive this negative correlation.<sup>[72]</sup>

Perceived benefits are on the opposite side of perceived barriers which has an important role in diabetic patients self-caring. Pinto explained perceived benefits increase self-caring in diabetic patients.<sup>[73]</sup> Koch<sup>[61]</sup> and Patino *et al.*<sup>[74]</sup> also revealed there is a direct and meaningful correlation between patients' perception of self-caring benefits and obedient of these behaviors. Toobert *et al.*<sup>[75]</sup> and Charron *et al.*<sup>[76]</sup> found the same results. Abood *et al.* points that as diabetic patients' perception of self-caring behaviors benefits increases, this action goes up.<sup>[77]</sup> Wen *et al.*<sup>[60]</sup> explains net benefits (perceived benefits minus perceived barriers) have a direct relationship with self-caring behaviors. These studies found an important role for perceived benefits and barriers in the way that they showed a direct and significant relationship between perceived benefits with self-caring behaviors, but reverse and meaningful relationship with the perceived barriers. Perceived benefits refer to profitable perception of an action in order to decrease the disease

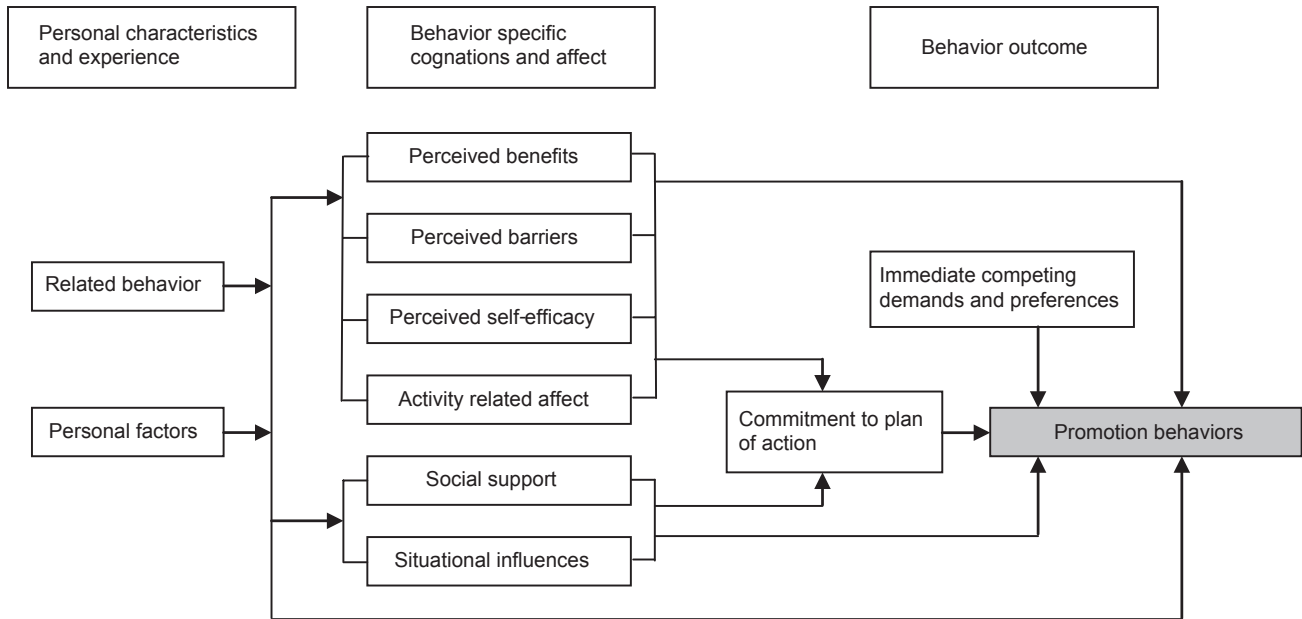


Figure 1: Pender's health promotion model

risks we must point individuals tend to spend their time and resources in activities, which increase positive results of their experiences with more likelihood.<sup>[78]</sup>

On the other hand, perceived barriers refer to the beliefs about real costs. It includes perceived negative aspects, which are potential and acts as barriers for doing behavior. In relation with the health promotion behaviors, the barriers may be imaginary or real. They are of imagination related to in availability, inappropriate, costly, difficult or time-consuming of a special action. Barriers are considered as obstacles or personal costs of behavior.<sup>[78]</sup> In fact, barriers generally stimulate a motivation to prevent gaining behavior and when an action readiness is low, but barriers are high, the action is impossible to happen. When action readiness is high and barriers are low, probability of the action is higher.<sup>[79]</sup> Studied articles related to perceived benefits and barriers are summarized in Table 1.

**Interpersonal effects (social support)**

Since, the diabetes is a disease, which needs an extensive behavioral changes and dietary monitoring, interpersonal effects, and social support is an effective factor in the self-caring process.<sup>[80,81]</sup> The major part of caring in this disease is carried out in the house and in the family, which makes this disease to be called as a family disease.<sup>[82]</sup> Perceived social support in diabetic patients is not in an acceptable level.<sup>[83]</sup> Gillibrand and Cooper *et al.*'s studies clarified that diabetic patients require others' support and social support is not set in an appropriate condition

Table 1: Studied articles related to perceived benefits and barriers

Writer	Year	Type of study	Studied samples
Odea AJ	2003	Qualitative	213 individuals in 34 centered group
Klomegah RY	2006	Sectional	151 diabetic patients
Rafique G	2006	Qualitative	Semiorganized interview with 27 diabetic patients
Charron D	2001	Observation	80 adolescent girls with type 1 diabete
Daniel M	2002	Interventional	18 men and 16 women with type 2 diabete
Tan MY	2004	Sectional	128 type 2diabetic patients
Wen LK	2004	Sectional	138 type 2 diabetic patients over 55 years old
Koch J	2002	Clinical trial	31 African-American women with type 2 diabetes
Nagelkerk J	2006	Qualitative	24 adult type 2 diabetic patients
Rothman RL	2008	Sectional	139 type 2 diabetic adolescents
Corina G	2004	Interventional	150 diabetic patients
Adams AS	2003	Sectional	4565 diabetic patients
Karter AJ	2000	Sectional	44181 biabetic patients
Juan J	2001	Interventional	446 diabetic patients in 10 latin American countries
Patti L	2002	Interventional	170 diabetic patients
Gillibrand R	2006	Sectional	118 diabetic patients 16-25 years old
Pinto SL	2006	Sectional	type 1 and 2 diabetic patients
Patino AM	2005	Sectional	74 type 1 diabetic patients
Toobert DJ	2000	Review	7 researches to study the instruments
Abood D	2003	Interventional	53 individuals (28 in experimental and 25 in control)

among these patients.<sup>[72,84]</sup> As the support increases, usually, dietary intakes improve.<sup>[60]</sup> Gillibrand and Stevenson<sup>[72]</sup> and Albright *et al.*<sup>[85]</sup> revealed, a positive and significant relationship between social support and self-caring behaviors. They declared that social and family background is strongly followed by self-caring behaviors especially in the dietary intake area.

One of introduced barriers about following nutritional recommendation is the lack of social and family support. According to the results of a study, those who received more family support, easily followed nutritional diet and were more successful in their program.<sup>[86]</sup> Galsgow also believes social support is the most powerful determining factor in patients adherence to the prescribed diet among diabetic patients.<sup>[87]</sup> Other researches show social support in these groups is effective in their tendency to self-caring activities.<sup>[88,89]</sup>

Family support has high effect on following nutritional recommendation and doing the prescribed sport in diabetics.<sup>[90,91]</sup> Moreover, emotional stresses and lack of family support are self-caring barriers among these patients.<sup>[62]</sup> Trief *et al.*, in a 2 years research, came to this idea that married quality status (intimacy and adjustment) predicts faithfulness to self-caring aspects (dietary intake, sport and physician's recommendation).<sup>[80]</sup> Support and self-confidence is important predictors in metabolic control and following dietary intake among diabetic women.<sup>[92]</sup>

Factors such as intimacy among the family, existence or non-existence of conflict in the family and emotional situation in the family effect on patients' self-efficacy.<sup>[93]</sup> Garay-Sevilla *et al.* also relates the faithfulness to dietary recommendation and medicine to social and family support.<sup>[94]</sup> Hiroshi pointed to social support and its resources on diabetes treatment and control.<sup>[95]</sup> Based on Gleeson-Kreig *et al.*'s study, the more patient receives supports from family, the more is faithful to follow the self-caring activities.<sup>[88]</sup> Therefore, in a study on 98 patients, Ilias concluded suitable hemoglobin level is related with the received social support of the family.<sup>[96]</sup> The same results are in other researches.<sup>[97,98]</sup> Of course in Chlebowy and Garvin study, there was not seen any significant correlation between social support and behavior.<sup>[99]</sup>

As a whole, researches have shown that there is a significant relationship between social support and health in the way that those who have more social support, are healthier. In his Health Promotion Model, Pender has posed family support as interpersonal effects, which can predict health promotion behaviors. Any way, it is seen, social support is correlated with the following self-caring behaviors. Since, support and family close relationship in Iranian culture have a special situation, it seems presenting enough information about diabetes to patients' close relatives and their cooperation

**Table 2: Studied articles in interpersonal effects (social support)**

Writer	Year	Type of study	Studied samples
Albright TL	2001	Sectional	397 type 2 diabetic patients
Hiroshi O	2001	Sectional	117 diabetic patients
Glesson-Kreig J	2002	Sectional	95 diabetic patients dependent on insulin (Spanish)
Kohanovic R	2006	Qualitative	Deep interview with 16 type 2 diabetic women (Immigrants to Australia)
Schwartz AJ	2005	Sectional	50 diabetic patients over 40 years old
Klomegah RY	2006	Sectional	151 diabetic patients
Chlebowy DO	2006	Causal-comparative	91 type 2 diabetic patients
Trief PM	2001	Sectional	78 type 1, 2 diabetic patients
Ilias I	2004	Sectional	42 diabetic patients (22 men and 20 women)
Bovier PA	2004	Sectional	2000 students
Herpertz S	2000	Sectional	410 diabetic patients (157 type 1 and 253 type 2)
Gucciardi E	2008	Sectional	275 type 2 diabetic men and women
Bia YI	2008	Descriptive-correlation	156 diabetic aging people
Zhang CX	2008	Correlation	304 type 2 diabetic patients
Sacco WP	2006	Correlation	86 diabetic patients
Pineda Olvera AE	2007	Sectional	175 type 2 diabetic patients
Koch J	2002	Clinical trial	31 type 2 diabetic (African-American) women
Toljamo M	2001	Sectional	213 diabetic patients dependent on insulin
Cooper HC	2003	Review	21 articles in diabetes instruction
Epple C	2003	Sectional	163 type 2 diabetic patients
La Greca AM	2002	Sectional	74 type 1 diabetic adolescents
Ilias I	2001	Correlation	98 type 2 diabetic patients
Whittemore R	2005	Sectional	53 type 2 diabetic women
Pinar R	2003	Correlation	100 type 1 diabetic adolescents

and involvement in the treatment process and also the disease control can make the team work easier and help them to get maximum life quality and health. Studied articles related to social support are summarized in Table 2.

### Perceived self-efficacy

Today, we have evidences that one of the effective factor in self-caring of chronic patients especially, diabetes is self-efficacy. It is an important pre-requisite of behavior because it is as an independent part of individual basic skills. Of course, it must be pointed that the role of self-efficacy in starting and preserving healthy behaviors is shown in different researches.<sup>[100,101]</sup>



The studied researches findings point that self-efficacy is not in a desirable level in diabetic groups.<sup>[102]</sup> Bernal explains it is from medium to weak level.<sup>[102]</sup> Most of the researches indicated that self-efficacy impacts on self-caring behaviors.<sup>[102]</sup> Bernal studied the self-efficacy correlation in diabetes self-caring and concluded that it is related with self-caring of nutritional diet.<sup>[102]</sup>

Wen *et al.* who studied family support, nutritional diet and sport in American Mexican elderly diabetic individuals, observed that as self-efficacy raises, they better follow healthy nutritional diet.<sup>[60]</sup> In Aljasem's research who studied self-efficacy and barriers approach of self-caring behaviors in type 2 diabetes, found self-efficacy clarifies 4-10% of self-caring variance, and it is the most powerful predictor of these behaviors.<sup>[57]</sup> These were the same as Walker *et al.*'s results.<sup>[103]</sup> Stuijbergen *et al.* came to this point that increasing self-efficacy related to healthy behaviors can improve and promote these behaviors.<sup>[101]</sup> Krichbaum<sup>[65]</sup> and Norris *et al.*<sup>[104]</sup> also showed self-efficacy has a positive effect in diabetic healthy behaviors.

Bonds *et al.*<sup>[105]</sup> found a direct and significant relationship between self-efficacy and self-caring in his study on American diabetic patients. Walker *et al.*<sup>[103]</sup> and Woon<sup>[106]</sup> study explains the self-efficacy predictor role for nutritional behaviors based on the regression analysis results. Tan also revealed a direct and significant relationship between self-efficacy and preventive behaviors in type 2 diabetic patients in China.<sup>[59]</sup> The basic role of self-efficacy in weight control is also clarified in some studies.<sup>[107]</sup> Remond declares the same results;<sup>[108]</sup> However, contrary to the past researches, Gillibrand and Stevenson<sup>[72]</sup> and Chlebowy *et al.*'s<sup>[99]</sup> finding did not show any meaningful relationship between self-efficacy and glycemic control.

To Bandora, self-efficacy is the most powerful construct in predicting behavior change and generally those who show the most behavior change, have higher self-efficacy level to do special behaviors.<sup>[109]</sup> Self-efficacy effects on motivation and the stronger beliefs cause to repeat the behavior to come to his/her purpose; Thus, an individual with low self-efficacy is less doing healthy new behaviors or trying to change habitual behaviors. Based on the different researches about the effect of self-efficacy on function and behavior, this feeling has determining role in patients' self-caring success especially in their nutritional behavior. Therefore, in self-caring behavior change process of diabetic patients, self-efficacy promotion is very important. Studied articles related to self-efficacy are summarized in Table 3.

### Activity related effect

Chronic disease such as diabetes ruins family life and individuals' view to future,<sup>[110,111]</sup> threatens personal

**Table 3: Studied articles related to perceived the self-efficacy**

Writer	Year	Type of study	Studied samples
Bernal H	2000	Sectional	97 type 1 diabetic patients (Spanish)
Wen LK	2004	Sectional	138 type 2 diabetic patients over 55 years old
Ajasem LI	2001	Sectional	309 type 2 diabetic patients
Walker SN	2006	Sectional	179 rustic women 50-69 years old
Von Ah D	2004	Sectional	161 students
Stuijbergen AK	2000	Sectional	786 MS patients (630 women and 156 men)
Krichbaum K	2003	Systemic review	37 studied articles
Norris SL	2001	Systemic review	72 studied articles
Van Der Ven N	2003	Sectional	341 type 1 diabetic patients in Holland and America
Chlebowy DO	2006	Causal-comparative	91 type 2 diabetic patients
Bonds DE	2004	Sectional	320 type 2 diabetic patients
Gillibrand R	2006	Sectional	118 diabetic patients 16-25 years old
Bas M	2009	Interventional	96 fat people (76 women and 20 men)
Tan MY	2004	Sectional	128 type 2 diabetic patients
Redmond EH	2006	Interventional	91 type 2 diabetic patients

independency and creates dissimilar feeling with others.<sup>[112]</sup> Diabetes complications effect on patients' life aspects such as physical, psychological, social, economic, and family life. Researches have revealed that diabetes has a negative effect on general health, good feeling and life quality.<sup>[113]</sup>

It must be pointed if chronic disease is followed by depression prevalence, it is 3 times more in these groups and depression is about 61%.<sup>[114,115]</sup> Depression has a key role in controlling diabetes complications.<sup>[116-118]</sup> Depression is followed by the diabetic self-caring behaviors weakness and it may be one of risk factors for not doing self-caring behaviors.<sup>[119,120]</sup> In Lin's study, non-depressive diabetic patients can better control their blood sugar. Paul also showed that diabetic patients with low self-caring level have higher depressive level and lower general health. Gonzalez *et al.* explained that depression is related with not following self-caring aspects.<sup>[116]</sup>

Recent researches showed diabetic individuals talk about fear, phobia,<sup>[121]</sup> distress, grief and guilt feeling, and describe diabetic life as stressful experience.<sup>[122]</sup> In other study, the most important problem in diabetes self-caring was depression, stress, anxiety, fear, and worry in glycemic control.<sup>[123]</sup> Snock knew stress as one of the self-caring barriers in diabetic patients.<sup>[124]</sup> One of self-caring barriers in Guimaraes' research was unfounded fears.<sup>[125]</sup>

Patients who do not have desirable self-caring level had

more feeling of failure and disappointment. Because of this, they do not have the necessary motivation to take care of themselves and control the disease.<sup>[126]</sup> Some of problems in individuals of chronic disease are unpleasant mental imagination, fear of rejection, relationship problem with peers, fear of dependency and worry about self-efficacy.<sup>[127]</sup> Bulsara talks about better future hopefulness in challenging with the disease as an effective factor to being powerful in patients following prescribed diet.<sup>[128]</sup>

Ajoolat and Koorbin showed negative feeling in diabetic patients<sup>[129]</sup> because diabetes is followed with society negative view which labels the patients, threatens individuals' identity and increase negative feeling exposure. Rubin *et al.* declares that self-caring instructional program can better control patients' metabolic and good feeling and show meaningful increase of being good level and self-caring behaviors.<sup>[130]</sup> Littel suggested cognitive intervention can be used for patients who have not good feeling, self-confidence, and self-efficacy in order to control diabetes.<sup>[131]</sup> In America, vndern explained diabetic patients have higher self-caring, are more adjustable and have lower psychological problems.<sup>[132]</sup> Glasgow and Toobert also reported that patients' satisfaction of treatment and being in good level is as effective level in following self-caring.<sup>[133]</sup> It must be noted that feeling status related to behavior has been recognized in recent researches as an indicator of health behaviors. Feeling associated with behavior creates a direct emotional reaction or internal level response to think about this behavior, whether it is positive or negative, whether it is ridiculous, enjoyable or unpleasant? Behaviors following with the positive feeling are rarely repeated whereas those

following with the negative results are probably prevented. Sometimes some behaviors are probably followed with the negative and positive feeling. Therefore, it is necessary to study the relative balance between positive and negative feelings before, during and after the behavior. Studied articles related to activity related effect are summarized in Table 4.

### Situational influence

An individuals' recognition and perception of any situation or area can facilitate or inhibit behavior. Situational influences are in the health promotion behavior and consist of understanding available selections, request features and environmental aesthetic in which the behaviors conducted. The families must pay attention to this point that eating and preparing inappropriate food for diabetic individuals lead to an environment where they never follow their diet. This is the same as environmental effective factors which Pender declares as influenced factor impacts directly or indirectly on behavior in his Health Promotion Model. Eating food by the family which is not in these patients' diet is considerable point in unsupportive family behaviors.

In a research, forgetfulness, inaccessibility to appropriate food in the restaurant and lack of an idea in cooking are basic obstacles to get the nutritional purposes.<sup>[134]</sup> Monge-Rojas believed social environment does not prepare the facilities to choose healthy food.<sup>[135]</sup> Various literatures have explained family and peers have an important role in nutritional behaviors of studied individuals.<sup>[91,136]</sup> In other researches, the family members' taste is introduced as one of the important factor in unhealthy nutrition in the society which is more in women.<sup>[137,138]</sup> Peers' support is one of environmental impact factor in following self-caring behaviors in Cooper's study.<sup>[84]</sup>

Different qualitative researches have assessed the unfulfillment of suitable self-caring in diabetic patients and introduced the personal and environmental barriers for suitable self-caring in diabetes.<sup>[56,139]</sup> Davison and Berch, through mental models introduction of illness basic factor, personal characteristics, family, peers, and environment in a broader scale have made necessary the socio cultural conditions of each society, the exact investigation of these factors before planning any kind of intervention.<sup>[140]</sup>

Anyway, individuals are attracted to the situations and the area where they are more feeling adjusted, related and are healthy and secure, and where they feel un adjustment, unrelated, unhealthy and threatening, they never have acceptable function. As a result, we can explain situational influences have direct or indirect effect in healthy behaviors, and it is an important key to extend more effective strategies to facilitate gaining and preserving health promotion

**Table 4: Studied articles related to activity related action**

Writer	Year	Type of study	Studied samples
Zeneto JF	2002	Sectional	189 type 2 diabetic patients
Harris MD	2003	Review	-
Gonzalez JS	2007	Analysis-sectional	879 type 2 diabetic patients
Lin EHB	2004	Sectional	4463 diabetic patients
Park H	2004	Sectional	168 diabetic patients over 30
Lustman PJ	2005	Review	Review of the articles 1980-2002
Trief PM	2006	Sectional	1665 diabetic aging
Paul S	2000	Analysis-sectional	367 type 1, 2 diabetic patients
Russell G	2001	Review	-
Snock FJ	2002	Review	-
Guimaraes C	2009	Sectional	378 type 1, 2 diabetic patients
Polonsky WH	2002	Qualitative	-
Littlefield CH	2003	Sectional	193 diabetic patients 13-8 years old
Van Der Ven NC	2003	Sectional	341 type 1 diabetic patients in Holland and America

behavior. Studied articles related to situational influence are summarized in Table 5.

### Commitment to plan of action

World Health Organization has announced the rate of diabetic patients' faithfulness to self-caring behaviors is 50% in developed countries and less than 50% in developing countries.<sup>[141]</sup> Other researches show that the diabetic patients' commitment and faithfulness is in low level and treatment plan in acceptance is a major problem in these patients which is from 30% to 60%.<sup>[27,36]</sup> In a study conducted by Harris and Lustman 35-75% of patients never follow their diet, 30-70% control their sugar intake, 23-52% never take care of their feet, and 70-80% never have physical exercise.<sup>[142]</sup> Today we know that treatment and prevention of diabetic complications depend on the individual's desire and will power in self-management and self-caring behaviors.<sup>[143-145]</sup> For example, in a study in America, 40% of patients do not follow their dietary recommendation.<sup>[146]</sup> With many evidences due to the impact of treatment diet on diabetes, it is difficult to change diet and its preservation for the patients. In spite of enough awareness, lack of following the nutritional diet is repeated in some researches.<sup>[30,43]</sup> The investigations in different countries indicate the difficulty of following the nutritional diet and patients do not commit to follow the self-caring recommendation.<sup>[42]</sup>

Chapman's aimed to study the effect of psychosocial variables on related behaviors with diabetes self-controlling based on the health beliefs and planned behaviors and he explained the more is the barriers, the less is the commitment to follow healthy and recommended diets.<sup>[147]</sup> In Maizlish's study, the diabetic patients who do not follow recommended diets have not desirable blood sugar control. Story *et al.* consider the basic role of motivation in dietary commitment and lack of it, is an important factor to fail in life-style changes.<sup>[148]</sup>

**Table 5: Studied articles related to situational influences**

Writer	Year	Type of study	Studied samples
Brekke HK	2004	Interventional	73 type 2 diabetic patients
Rojas MR	2002	Sectional	1200 adolescents
Perez-Escamillia R	2008	Systemic Review	22 experimental and semi-experimental studies
Klomegah RY	2006	Sectional	151 diabetic patients
Reime B	2000	Sectional	1641 employers in 2 German companies
Deshmukh-Taskar P	2007	Sectional	1266 people 20-38 years old
Paradis AM	2006	Sectional	197 fat women and 129 fat men
Cooper HC	2003	Review	21 articles on diabetic instruction
Simoons D	2001	Sectional	3890 diabetic patients
Galsgow RE	2001	Library review	-

Dietrich points to not enough understanding of the disease seriousness as decreased factor in self-caring behaviors.<sup>[149]</sup> Witimor in his research showed the rate of treatment diet commitment and faithfulness has been increased with the family support. He declared it predicts self-caring faithfulness. He also introduced patients' satisfaction of treatment and caring as another behavior in self-caring commitment.<sup>[92]</sup> Trief *et al.* and Epple *et al.* believed social support is an important and effective factor in patients' commitment to treatment, which facilitates adjustment and self-caring behaviors.<sup>[80,81]</sup> The inhibited role of exaggerated purposes and unrealities are the decreased effective factor in treatment diet commitment.<sup>[150,151]</sup>

The nature of long-time treatment diet in chronic disease causes tiredness and in commitment to diet therapy.<sup>[152]</sup> Therefore, the improvement of faithfulness and self-caring behaviors is the first step to disease caring and managing. Those who can manage themselves diabetes take it serious and have the commitment to self-caring behaviors.<sup>[153]</sup> They can make parallel diabetes self-management with the daily life.<sup>[154]</sup>

To increase the treatment faithfulness, the following points are suggested: Simple treatment diets organization, encouragement and rewards to follow the diet, families, and friends' support.<sup>[155]</sup> Based on some researches, when caring is offered in patient-centered with empathy and concern and also their needs, values and preferences, patients' cooperation and his/her independency in making the decision and commitment to treatment will increase.<sup>[156]</sup> Thus, commitment for a plan is an initiator of a behavior event. It leads to behavior and goes ahead during the behavior. Studied articles related to commitment to plan of action are summarized in Table 6.

**Table 6: Studied articles related to commitment to plan of action**

Writer	Year	Type of study	Studied samples
Fitzgerald JT	2000	Sectional	672 type 1, 2 diabetic patients
Maizlish N	2004	Sectional	1817 type 1 diabetic patients
Story MT	2002	Qualitative	202 children, 293 baby sitters, 444 nutritional specialists
Whittemore R	2005	Sectional	53 type 2 diabetic women
Trief PM	2004	Sectional	78 type 1 diabetic patients
Epple C	2003	Analysis-sectional	163 diabetic patients
Wadden TA	2003	Qualitative	53 fat women
Locke EA	2002	Review	-
Campbell R	2003	Qualitative	10 qualitative articles study
Savoca MR	2004	Qualitative	44 diabetic patients 40-65 years old
Richard R	2005	Qualitative	28 type 2 diabetic patients
Ciechanowski P	2004	Analysis-sectional	4095 diabetic patients

### Immediate competing demands and preferences

Individuals' abilities are different to consider healthy behaviors and prevent them. Some people can be fluctuated in behavior or cut an activity. Immediate competing demands and preferences are some activities in behavior, which is appeared before aimed events and can overshadow the exposure of healthy behaviors.

To Brekke and Sunesson, considerable attention to some food leads to lack of self-caring in diabetes.<sup>[134]</sup> In Vijan *et al.*'s study; one of diabetic patients' preferences is to prepare food with low-cost in spite of the conflict with the recommended diets.<sup>[86]</sup> Story and Stang pointed to taste and flavor as criteria to choose food.<sup>[157]</sup> In Robin's research, taste, and the flavor was a barrier to choose healthy food in diabetics.<sup>[66]</sup> In fact, food attraction, design, and decoration are effective on choosing any food in the way that colorful package and confections with low nutritional values may impact on the choice.<sup>[158]</sup> Food preferences are influenced by many factors, affecting on nutritional behaviors, which are clear in Pirouznia and Naska *et al.*<sup>[159,160]</sup> Lord and Richman have paid attention to patients' preferences and competing demands as impact factors on self-caring behaviors, which lead to treatment diet faithfulness and noted to simplicity and complexity of treatment diet as preferences.<sup>[158,161]</sup>

Hosseyeni *et al.*<sup>[162]</sup> and Kelishadi *et al.*<sup>[163]</sup> know the patients' tendency to some foods and unhealthy diets such as fried food, which is consistent with individuals' taste as impact factors on the lack of self-caring behaviors.

Richard believes that patients want to follow the diets with less complexity, more benefits, less complications and more plain.<sup>[161]</sup> On the other hand, individuals want to use those food prepared easily in a short time, which is not congruent with their recommended diet.<sup>[137,164]</sup> Even some researchers report labeling parties as the lack of self-caring behaviors.<sup>[123]</sup>

**Table 7: Studied articles related to immediate competing demands and preferences**

Writer	Year	Type of study	Studied samples
Brekke HK	2004	Interventional	73 type 2 diabetic patients
Vijan S	2005	Sectional	446 diabetic patients
Story M	2005	Sectional	2700 children 6-18 years old
Robin J	2000	Systematic review	Meta-analysis of 72 articles 1985-1999
Pirouznia M	2000	Analysis-sectional	532 students
Naska A	2006	Review	-
Lerman I	2005	Review	-
Richard R	2005	Sectional	47 type 2diabetic patients
Reime B	2000	Sectional	1641 employers in 2 German companies
Girois SB	2001	Sectional	10336 American responses and 698 Swiss responses
Russell G	2001	Review	-

Studied articles related to immediate competing demands and preferences are summarized in Table 7.

### DISCUSSION AND CONCLUSION

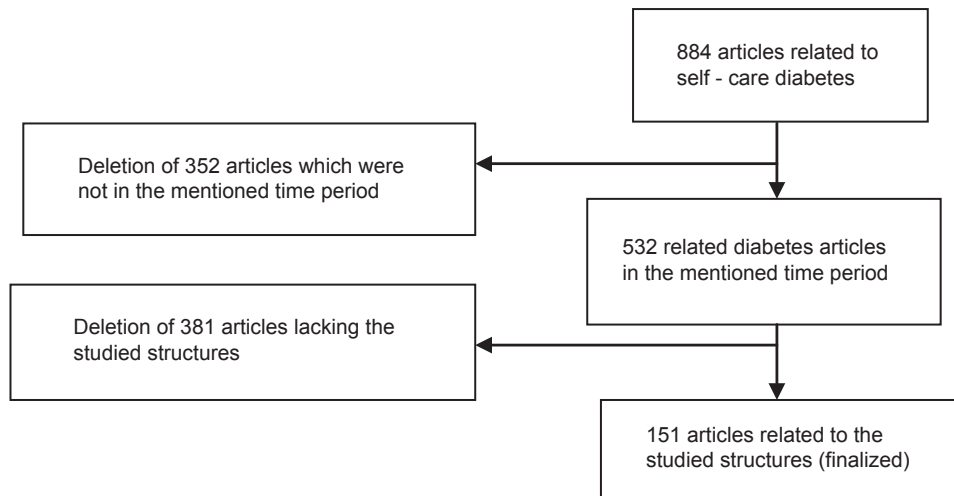
Regarding the association of self-caring and nutritional behaviors with some factors such as perceived self-efficacy, perceived benefits, and barriers, perceived social support, the commitment to plan of action and immediate competitors with healthy dietary patterns, it seems that Pender's Health Promotion Model is a good choice to predict self-caring behaviors in diabetic patients and also for instructional interventions.

This model describes a frame-work to explain healthy behaviors, which concentrate on individuals going to positive states and increasing healthfulness. Pender's model emphasizes on cognitive processes importance on controlling behaviors. In this model, the determinant concepts in health promotion behavior includes personal features and experiences, cognition, and emotion of the behavior. Health promotion behaviors are activities which are practical based on the individuals' life-style. This model is practical for healthy behaviors in which threatening is not an important source of motivation for behavior. It describes how to decide on special behavior of health promotion and concentrates on individuals going to positive states and increasing healthfulness. Pender's Health Promotion Model is shown in Figure 2.

In the revised studies of Health Promotion Model, 61% support the importance of perceived benefits to impact on healthy behavior. In Health Promotion Model, perceived benefits act as behavior direct motivational factor and behavior indirect motivational factor (that is made through commitment to behavior in which its benefits are predictable). Furthermore, among researches tested Health Promotion Model 79% has explained support as important barriers for Health Promotion Model determinants. Perceived barriers affect on health promotion behavior in a direct way through barriers to act and indirect way through commitment decreases faithfulness to plan.

As Bandora believes self-efficacy is an individual's judgment of some one's abilities to organize and fulfill a series of activities. Self-efficacy is not related to an individual's skills, but is associated to judgment about what everyone can do with these skills. Judging the individual's self-efficacy is different from anticipated results. Perceived self-efficacy is judgment about the individual's ability to do a special level of an action but anticipated results are the judgment about probable results (such as benefits and costs), which this action creates.





**Figure 2:** Process of study identification

89% of researches in Health Promotion Model support the importance of self-efficacy as a determinant factor of health promotion behavior.

It seems, in this model, perceived self-efficacy is affected by activity related effects. The more positive is the affect, the higher will be the perception of self-efficacy. Therefore, it is mutual. It means that with the more perception of self-efficacy, the positive affect will increase. Self-efficacy impacts on functioning perceived barriers. Higher self-efficacy leads to lower perception of the target behavior fulfilling barriers. Self-efficacy stimulates health promotion behavior directly through efficient expectation and influences on perceived barriers and determining commitment level or insisting on planning behavior indirectly.

Furthermore, sensitive states are created before, in and after the action, based on the stimulation of characteristics with behavioral events. These emotional responses may be weak, moderate or severe, categorized or saved in mind from cognitive view and followed with later thought about behavior. It must be pointed that activity related affect is recognized in recent researches as health behavior determinants. Activity related affect creates a direct emotional reaction or internal level response about thinking of behavior whether the behavior is positive or negative and whether it is ridiculous, enjoyable or unpleasant?

Those behaviors following positive feeling are rarely repeated whereas those with negative results are inhibited. For some behaviors, both positive and negative feelings might be considered. Thus, a relative balance between positive and negative feelings before, during and after the behavior is very important to be studied. In fact, activity

related affect is effective directly and indirectly through self-efficacy and commitment to planning.

Based on the model, interpersonal impressed factor (social support) is cognitions associated with others' behaviors, beliefs, and attitude. They may correspond with reality. The important interpersonal resources in health promotion behavior are the family (spouse), peers, and health care workers. The interpersonal impressed factors are norms and standards (expecting important individuals), social support (financial or emotional encouragement), and modeling (learning replacement through others' observation, which leads to special behavior).

In Health Promotion Model, interpersonal effective factors impact directly on health promotion behaviors and indirectly through social pressure or encouraging to commitment to plan of action. Anyway, desirable motivation to behavior in a consistent rout with interpersonal effective factors leads to increase the probability of those behaviors with high encouragement or reinforced socially. The importance of this construct as a determinant in Health Promotion Model is recognized. On the other hand, the individual' understanding and recognizing any situation or domain can facilitate or prohibits the behavior.

Situational influence in health promotion behavior contains understanding available selections, request features and aesthetic aspect of an environment where the behavior is acted. Individuals are more attracted to the situations and environments where they feel adjustable, related, healthy, and secure and never have desirable functioning in the situations and environments where they feel unadjustable, unrelated, unhealthy, insecure, and threatening. It seems that in Health Promotion Model, situational influences have direct

and indirect impact on healthy behaviors. Behaviors may be impressed directly by situations where appear in an environment full of targeted signals. 56% of studied researches report situational influences as an anticipator of health promotion. Situational influences may be an important key to extend more impressed and new strategies to facilitate acquisition and preservation of health promotion behaviors in different populations.

Commitment plan of action is an initiator of a behavioral event. It propels the individual to do behavior and goes them a head during it unless a demand or competitor is created in which s/he cannot prevent or resist. Human beings are generally act more organized and regular behaviors than disorganized ones. To Ajzen and Fishbin, purpose and commitment are the major determinants in voluntary behaviors.<sup>[79]</sup>

However, competitor's demands and preferences can remove the action fulfillment which the individual is committed. The competitor's demand is different from barriers because it must be inclusively acted another behavior in barriers based on unpredicted external demands. The competitor's preferences are different from the shortage of time because the 1<sup>st</sup> one prefers an action fulfillment on positive healthy action based on rating personal preferences. People are different in their abilities to keep the attention and prevent healthy behaviors stop. Some individuals have the ability developmentally or biologically to be fluctuated in functioning to others or to leave some activities. To prevent and inhibit competitor's preferences need self-regulation and control ability. High commitment to fulfill an action may preserve the individual of competitor's preferences and requests. In Health Promotion Model competitor's preferences and request directly effect on healthy behavior probability and decrease the commitment effect to act. Only one research has studied the competitor's requests as healthy behavior predictable. Although there are several diet therapy menus<sup>[165,166]</sup> and beneficial dietary patterns to control the complications of diabetes, discussed barriers may inhibit from following those diets.<sup>[167,168]</sup>

Considering the extensive studies, it is clarified this model is not used in nutritional instruction of diabetic patients. Therefore, this is considerable for instructional interventions because of past success such as physical activity and following reasons:

- Nutritional behavior is a complicated one in which various factors are involved. Since, this model is an ecological approach to change the behavior and consider personal, interpersonal and social factors, it seems to be helpful in recognizing effective factors in the creation and preservation of the behavior

- The basic part of diabetes control and treatment is upon self-caring and this model emphasize on self-regulation. Thus, this is effective in changing behavior
- It is practical in the whole life and is not dependent on immediate threatening. Therefore, it seems to be useful in disease control in the life
- Family support is an important factor in the creation and preservation of healthy nutritional behaviors. Thus, this model, which introduces family, friends, and health-care workers as important resources in commitment to healthy behaviors is effective in creating this behavior

## ACKNOWLEDGMENT

This article is a part of Ph.D thesis in self-caring of metabolic patients nutritional behaviors; hence, we appreciate all the professors supporting this research.

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**How to cite this article:** Mohebi S, Sharifirad G, Feizi A, Botlani S, Hozori M, Azadbakht L. Can health promotion model constructs predict nutritional behavior among diabetic patients?. *J Res Med Sci* 2013;18:346-59.

**Source of Support:** This article is a part of Ph.D thesis in self-caring of metabolic patients nutritional behaviors; So, we appreciate all the professors supporting this research, **Conflict of Interest:** None declared.