



The Effect of Sociostructural and Collaborative Decision-Making on Diabetes Self-Management

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Abstract

Background: Diabetic self-management is important for controlling the diabetes complications and promoting health-related quality of life in these patients. The objective of this study was to examine a hypothetical model regarding influences of sociostructural determinants, collaborative decision-making and patient's beliefs system on diabetes self-management.

Methods: In a cross-sectional descriptive study from Dec 2010 to Mar 2010, 500 patients of Iranian adult patients with type II diabetes attended the outpatient diabetic clinics of the Shariati Hospital in Tehran were selected by convenience sampling. Data were collected by The Demographical Information, Social- Economical Status and Diabetic History Questionnaire and eleven self-reported scales of this research. Structural equation modeling (SEM) with LIZREL software applied for data analysis.

Results: The modified model had a desirable fitness to the observed data. Patient's beliefs system directly influenced the diabetes self-management. Sociostructural determinants influenced diabetes self-management indirectly via collaborative decision-making and Patient's beliefs system. In addition, collaborative decision-making significantly influenced patient's beliefs system that thereby impacted diabetes self-management.

Conclusions: Sociostructural determinants, collaborative decision-making and patient's beliefs system are integrated and cooperatively affect on diabetes self-management. Comprehensive intervention schedules required to improve these agents for encouragement the type II diabetes self-management.

Keywords: Diabetes, Self-management, Motivation, Beliefs, Decision-making

Introduction

Diabetes is one of the chronic diseases that substantially causing to disability, functional deterioration, morbidity, mortality and increased health costs (1, 2). Diabetic patients especially those with disease complications present adverse quality of life and serious impairments in global

functioning (1). It appears to be also that burden of diabetes in Iranian population is very high (3). Self-management behaviors are the cornerstone of blood sugar control and preventing the complications in type II diabetes (4). Self-management is the day to day managing actions of diabetes inclined to taking drugs, adherence to regimen,

weight loss planning, blood glucose monitoring, perform the regular physical activity and foot care by patients themselves (5).

Various factors have influence in regularly diabetes self-management (6-8). Adverse psychosocial agents and inappropriate therapeutic factors have negative effect in diabetes self-management (9-11). Also, socioeconomic conditions such as lower literacy and minus income hinder the excellent diabetes self-management (12). Socio-structural factors such as low support or assistance in family and poor health system agents such as displeasure with medical care as well have prominent impacts on diabetes self-management (13-15). Insufficient participatory decision-making and weak physician-patient communication destroy the diabetes self-management behaviors (16, 17). Diabetes-related factors including deficient education about diabetes, lower health literacy for diabetes management and demographic characteristics such as elderly may be decline diabetic self-management behaviors (18-20). Also, diabetes-related literacy, patient's beliefs, self-efficacy, access to the healthcare system, and surrounding circumstances of family and relatives affects on diabetes self-management behaviors (21, 22). Hence, individual factors and social, environmental and health care backgrounds influencing on diabetes self-management (23, 24).

The sociostructural determinants in this study included provider-patient communication, health care satisfaction, health care access, duration of diabetes, treatment type, diabetes severity, retinopathy, neuropathy, nephropathy, cardiovascular disease, income, insurance, social support, marriage status, educational level, life network, cigarette smoking, diabetes knowledge, Job, age, and sex. The patient's beliefs system included diabetes self-efficacy, belief of the efficiency of the treatment, belief of disease certainty, and motivation to treatment. In addition, the collaborative decision-making was only observable variable.

This model established upon the magnitude of preceding studies. In this model, sociostructural determinants and collaborative decision-making are exogenous factors and patient's beliefs system

and diabetes self-management are endogenous factors. It was assumed that among these determinants, patient's beliefs system would be the factor directly affecting diabetes self-management and sociostructural determinants would both directly influence diabetic self-management and indirectly influences diabetic self-management through collaborative decision-making and patient's beliefs system. Also, it was assumed that collaborative decision-making would directly impact diabetes self-management and indirectly impact diabetes self-management through patient's beliefs system (Fig.1).

The objective of this research was to examination an assumed model depicting impacts of both sociostructural determinants and collaborative decision-making on diabetes self-management with mediating role of patient's beliefs system in Iranian adults with type 2 diabetes.

Material and Methods

Study participants

In this cross-sectional descriptive study, among adult patients with type II diabetes who attended the outpatient clinics of the Shariati Hospital at Tehran University of Medical Sciences during the Dec 2010 to Mar 2010, 500 (245 men and 255 women) patients as a sample were selected by convenience sampling. Participants had mean age of 44.04 (range of 25-55). This sampling size selected dependent upon the participant's ratio to the model parameter's ratio, statistical population, subgroup analysis, data errors and possible missing data. The inclusion criteria were diagnosis of type II diabetes at least one year's age, providing informed content by participants to participation in the research; and participants attending to physicians and recording a medical history in diabetic outpatient's clinics of the Shariati Hospital. The exclusion criteria were diagnosis of type 1 diabetes; currently acute diabetes complications; other chronic diseases farther on than diabetes complications; severe psychological disorders; and recently diabetes diagnosis less than one year's age.

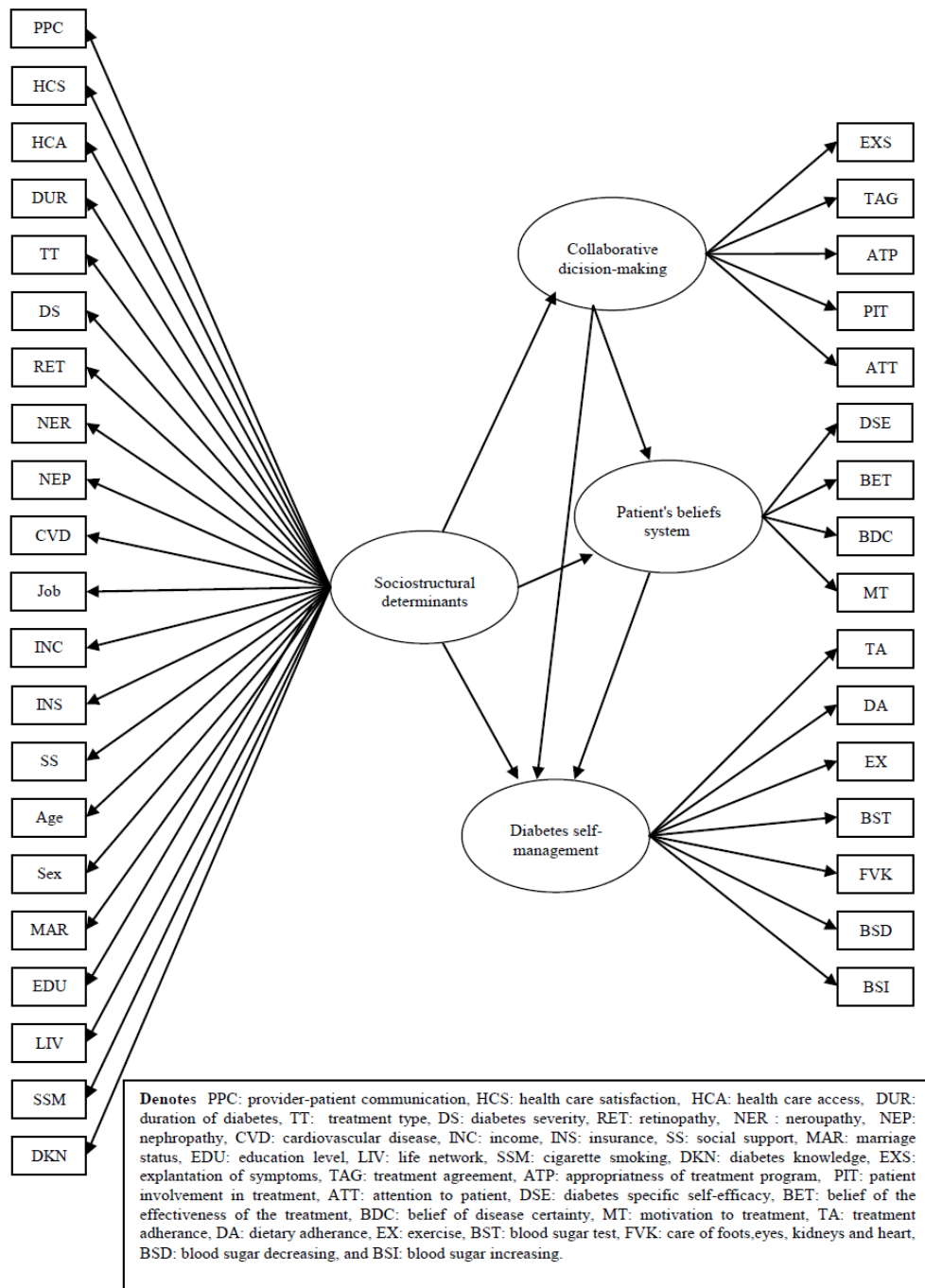


Fig. 1: Hypothetical model regarding direct and indirect impacts of sociostructural determinants, collaborative decision-making and patient's beliefs system on diabetes self-management

Instruments

Eleven self-reported instruments used to gather the data. Each tool is depicted in the following. The Diabetes Self-Management Scale was developed dependent upon the Summary of Diabetes Self-Care Behaviors and Diabetes Self-Management

Scale (8,25). This Scale is composed of seven diabetes regimen facets including Diet, medication, glucose testing, exercise, control of increase or decrease in blood sugar, foot care, and attending to physicians for impediment of diabetes complications. This scale contained

fourteen items in three parts of weekly self-management actions (Nine items), monthly self-management actions (two items) and annual self-management actions (three items). The higher total score showed the higher self-management behaviors. Content validity has confirmed by a board of diabetes professionals in Iran. Cronbach's alpha ($n=500$) for weekly, monthly, annual, and total scale of self-management behaviors was .95, .86, .67 and .95 respectively. Also, four weeks interval test-retest reliability on 34 patients for weekly, monthly and annual self-management behaviors was .92, .90 and .97 respectively that pointed out the higher reliability of scale (26).

The Diabetes Self-efficacy Scale was constructed dependent upon Self-Efficacy Scale for patients with type II diabetes (23,27), theoretical foundations, and related issues of Iranian culture. This scale consisted of 10 items including eight aspects of diet, exercise, glucose testing, medication adherence, foot care, prevention in increased or decreased blood sugar, and management of decreased or increased blood sugar. This instrument scored at 11-point Likert-scale and ranged from zero to 100 that larger scores suggested higher self-efficacy in doing diabetes self-management. In this research, Cronbach's alpha ($n=500$) was .96. Also, content validity has interrogated by a board of diabetes professionals. Also, four weeks test-retest reliability in 34 patients was .94 that demonstrated high test-retest reliability over time.

The Beliefs of Treatment Effectiveness Scale included items become adjusted from the Personal Models of Diabetes Questionnaire and Beliefs of Treatment Effectiveness scale (28, 29). This instrument has nine items in 11-point likert spectrum from 0% (never) to 100% (always). The score ranged from zero to 90 and higher scores indicated immense perceived belief that self-management behaviors could restrain diabetes and impede diabetic complications. In this research, Cronbach's alpha ($n=500$) was .94 that showed suitable internal consistency. Content validity too has appraised by a board of diabetes professionals. One monthly of test-retest reliability on 34 patients was .94 for this scale that indicated outstanding test-retest reliability of this scale.

The Illness Certainty Scale (ICS) has nine items in 11-point likert spectrum from 0% (never) to 100% (always) that developed on the basis of Illness Uncertainty Scale (IUS; 30). This scale appraises the illness certainty regarding to prognosis, medical care and coping with disease. The score ranged from zero to 90 that higher scores showed higher certainty regarding disease conditions and efficiency of treatment for prevention of diabetic complications. In this research, the Cronbach's alpha ($n=500$) was 0.92 and content validity has confirmed by a board of diabetes professionals. Also, this scale has suitable test-retest reliability by four weekly of test-retest reliability on 34 ($r=0.92$). The Treatment Motivation Scale (TMS) was developed in terms of the Treatment Motivation Scale and Treatment Self-Regulation Questionnaire (30, 31). This tool consisted of 6 items in 11-point Likert-scale from 0% (never) to 100% (always). The score ranged from zero to 60 in that higher scores point out excellent motivation for self-management and treatment. In this research, Cronbach's alpha ($n=500$) was .85 that showed good internal consistency. In addition, the scale content validity has approved by a team of diabetes professionals and the scale test-retest reliability in one monthly period on 34 patients was suitable ($r=.91$).

The Provider-Patient Communication Scale was developed based on the communication subscale of the Interpersonal Processes of Care and Provider-Patient Communication scale (23, 32). This scale is composed of eight items that evaluates clearly talking by physicians, explanation the medical care for patients, and responding to patients' concerns. The scale items have an 11-point Likert scale from 0% (never) to 100% (always) that ranged from zero to 80 and higher scores point out more desirable exchange of information or ideas between physicians and their patients. In this research, Cronbach's alpha ($n=500$) was .88 and content validity has confirmed by a board of diabetes professionals. Furthermore, there is good test-retest reliability over time for this scale ($r=.93$) by one monthly of test-retest reliability on 34 patients.

The Diabetes Knowledge Scale (DKN) was structured on the basis of the Diabetes Knowledge

Scale (33), the Diabetes Knowledge questionnaire (23), and general information package of diabetes specific to Iranian patients. This scale has 10 items with 11-point likert spectrum from 0% (never) to 100% (always) and scores have range extended from 0 to 100 that higher scores showed higher degree of Diabetes Knowledge. This scale has Cronbach's alpha equal with .91 in a sample of diabetes patients (33). Internal consistency by Cronbach's alpha (n=500) was .93 for this scale. Furthermore, the scale content validity has approved by a team of diabetes professionals and one monthly of test-retest reliability on 34 patients ($r=.95$) was appropriate.

The Patient Satisfaction to Health Care Scale has eight items regarding satisfaction to medical care that patients obtained by healthcare systems for past one year age. This scale constructed by Researchers and items included 11-point likert spectrum from 0% (never) to 100% (always). The score ranged from zero to 80 that higher scores suggested greater satisfaction regarding to health care. In this research, Cronbach's alpha (n =500) was .90. Content validity too has approved by a panel of diabetes professionals and four weekly of test-retest reliability on 34 patients was .94 that indicated good test-retest reliability.

The Access to Health Care Scale was constructed on the basis of one subscale of The General Practice Assessment Survey (34) and one item about cost of treatment. This scale items included 11-point likert spectrum from 0% (never) to 100% (always). The score ranged from zero to 80 that higher scores point out better access to health care. Cronbach's alpha (n=500) was .90 for the Access to Health Care Scale. In addition, content validity has verified by a team of diabetes professionals and test-retest reliability in period of four weekly on 34 patients ($r=.93$) was excellent.

The Social Support from Family Members Scale (SSFMS) was established upon the family and friends support subscale of the Chronic Illness Resources Survey and Social Support Scale (35, 23). The scale comprised 7 items including accepted emotional support, informational support, appraisal by their family members and tangible aids in the past 3 months that whole of the items express beneficially family support. This measure

was an 11-point Likert scale from 0% (never) to 100% (always) that scores ranged from zero to 70 and higher scores point out greater support from family individuals. Cronbach's alpha (n=500) was .92 for this scale. Also, the content validity has confirmed by a board of diabetes professionals and four weekly of test-retest reliability on 34 patients was .93 that showed excellent test-retest reliability.

The Collaborative Decision-making Scale was developed based on The Collaborative Care Planning Scale (CCPS; 36) and Rochester Participatory Decision-Making Scale (37). This scale be composed of 12 items in 11-point Likert spectrum from 0% (never) to 100% (always). The score ranged from zero to 120 in that higher scores point out improved collaborative decision-making. In this research, Cronbach's alpha (n =500) was .92 for this scale. Excessively, diabetes professional's team has approved the scale content validity and four weekly of test-retest reliability on 34 patients showed excellent test-retest reliability ($r=.93$). The Demographical Information, Social-Economical Status and Diabetic History Questionnaire is researchers-developed tool that comprise three facets of participants demographical information including age, gender, and marital status; social-economical status such as education level, employment, income, types of insurance, and whom living with; and diabetes history including diabetes duration, diabetes severity, diabetes complications, diabetes types and diabetes treatment (insulin therapy and oral agents therapy).

Procedure and Statistical Analysis

This research was executed at the Outpatient Clinics of Shariati Hospital in Tehran by individual procedure. Also, research performed with pay attention to prominent issues of research including informed consent, confidentiality and protection of human participants. Eventually, data analyzed by structural equation modeling (SEM) with LIZREL software.

Results

The mean age of the participants were 44.04 years (SD=6.59) and age ranged 25 to 55. They included

245 men (49%) and 255 women (51%). The mean duration of type II diabetes was 8.35 years (SD=3.34). regarding to treatment kind, 259 participants consumed oral drugs only to managing diabetes (51.8%) and 241 participants consumed insulin alone (48.2%). regarding to diabetes

severity, 217 participants (43.4%) had mild HbA_{1c}, 157 participants (31.4%) had moderate HbA_{1c} and 126 participants (25.2%) had severe HbA_{1c}. The correlation between variables, Mean, and SD are demonstrated in the Table 1.

Table 1: the correlation between variables, Mean, and SD

Variables	1	2	3	4	5	6	7	8	9	10	11
Mean of variables	45.77	57.47	45.51	60.62	59.68	58.06	43.8	49.76	38.71	41.02	68.81
SD of variables	21.81	20.15	14/15	16.36	25.49	20.46	9.01	13.56	16.29	15.72	20.04
1. Diabetes Self-Management	-										
2. Beliefs of Treatment Effectiveness	.77**	-									
3. Patient satisfaction to health care	.66**	.65**	-								
4. Illness Certainty	.72**	.75**	.68**	-							
5. Diabetes Self-efficacy	.78**	.76**	.66**	.75**	-						
6. Diabetes Knowledge	.74**	.71**	.63**	.72**	.77**	-					
7. Treatment Motivation	.66**	.65**	.54**	.66**	.70**	.66**	-				
8. Provider-Patient Communication	.67**	.75**	.62**	.69**	.68**	.68**	.61*	-			
9. Social Support from Family Member	.77**	.77**	.61**	.71**	.76**	.68**	.58*	.63**	-		
10. Access to health care	.75**	.74**	.67**	.72**	.77**	.72**	.65*	.63**	.70**	-	
11. Collaborative decision-making	.70**	.70**	.70**	.70**	.72**	.72**	.63*	.69**	.68**	.73**	-

*P < .05 **P < .01

At the beginning, the examination of the hypothetical model exhibited these fit indices:

$\chi^2_{(624, n=500)} = 3692.64$, $P < .001$, goodness-of-fit index (GFI)=.71, Comparative Fit Index (CFI)=.78, adjusted GFI (AGFI)=.68, root-mean-square error of approximation (RMSEA)=.09, normed fit index (NFI)=.74, parsimonious GFI (PGFI)=.063, Akaike information criterion (AIC) =3850.64. The fitness indices did not demonstrate an admirable fitness of this model. GFI and CFI

over .90, RMSEA less than .80, and non-significant Chi-square/df ratio ranged 1 to 5 are desired and indicate an excellent fitness of the model.

RMSEA ranged .08 to .10 and GFI, NFI, CFI with AGFI ranged .85 to .90 is satisfactory. According to the results, except RMSEA value that was below .10, the other indices don't arrive at the appropriate value. AGFI and NFI were lower than the suitable value (> .90). Lower AIC and higher PGFI do not show a hypothetical model parsimonious. χ^2/df ratio were 5/91 that

positioned out of standard range and do not point out a suitable fitness of the model.

According to the Fig. 2, in structural model exclude direct path coefficient between collaborative decision-making and patient's beliefs system, other coefficients was significant. Also, in measurement model, except path coefficients between diabetes duration, job, age, and life

network to sociostructural determinants, other paths were significant. Dependent upon these results, the hypothetical model don't fit the observed data in an Iranian patients with type II diabetes. Therefore, model modification was essential on the basis of both statistical results and theoretical rationality.

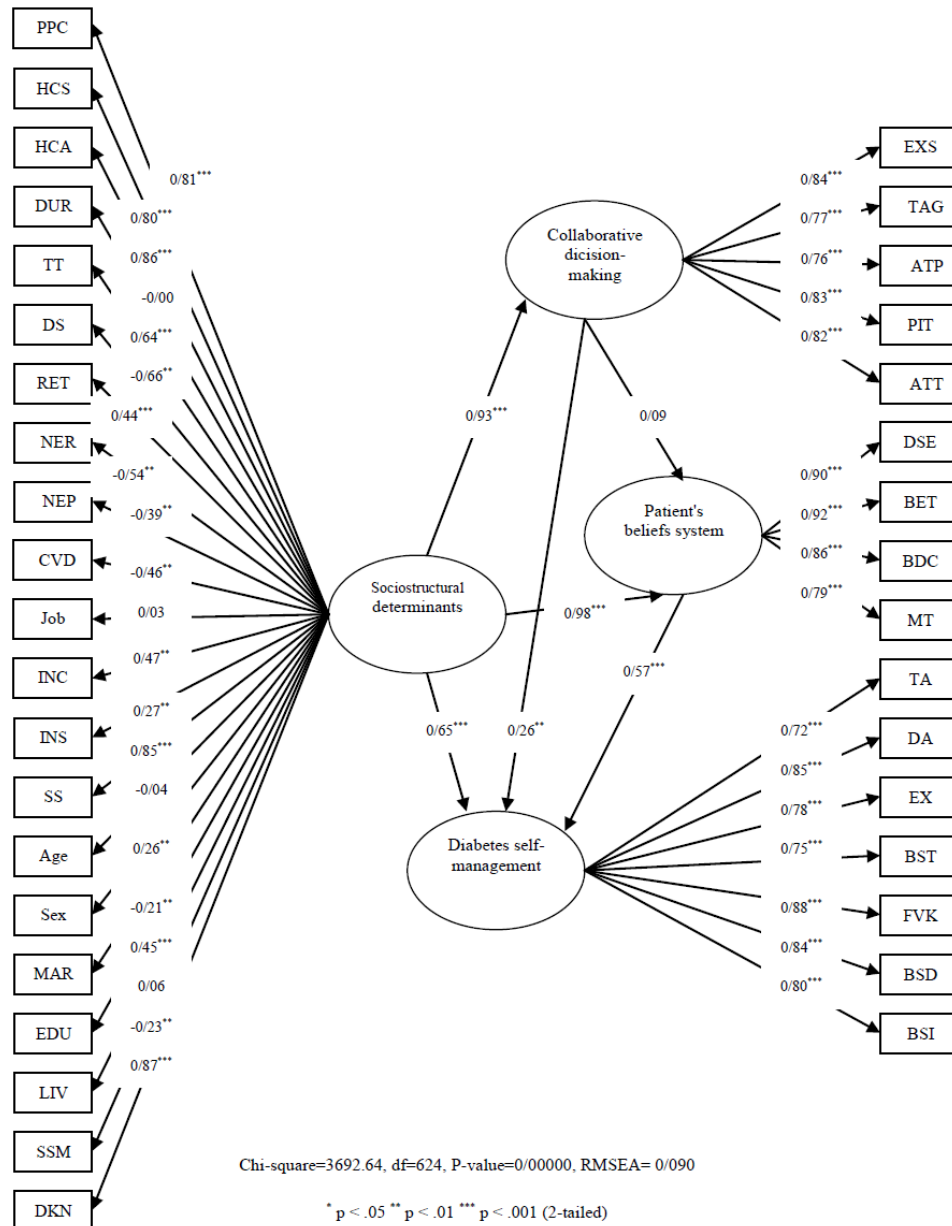


Fig. 2: Hypothetical model with standardized estimates regarding direct and indirect impacts of sociostructural determinants, collaborative decision-making and patient's beliefs system on diabetes self-management

Initially, on the basis of statistical results of hypothetical model, the path from diabetes duration, job, age, and life network to sociostructural determinants were removed in measurement model. Also, from a theoretical standpoint, the paths from marriage status, educational level, cigarette smoking, income, treatment type, diabetes severity, retinopathy, neuropathy, nephropathy, cardiovascular disease to sociostructural determinants were removed. In addition, the paths from treatment agreement and patient involvement in treatment to collaborative decision-making, the paths from belief of disease certainty and treat-

ment motivation to patient's beliefs system and the path from dietary adherence to diabetes self-management were removed. Eventually, in terms of theoretical standpoint and results of goodness-of-fit indices of the first model, the direct paths from sociostructural determinants and collaborative decision-making to diabetes self-management were logical to be removed in the structural model. According to the examination of the hypothetical model, these variables directly not sufficient to bring about self-management actions but probably by mediating patients beliefs indirectly impact on self-management.

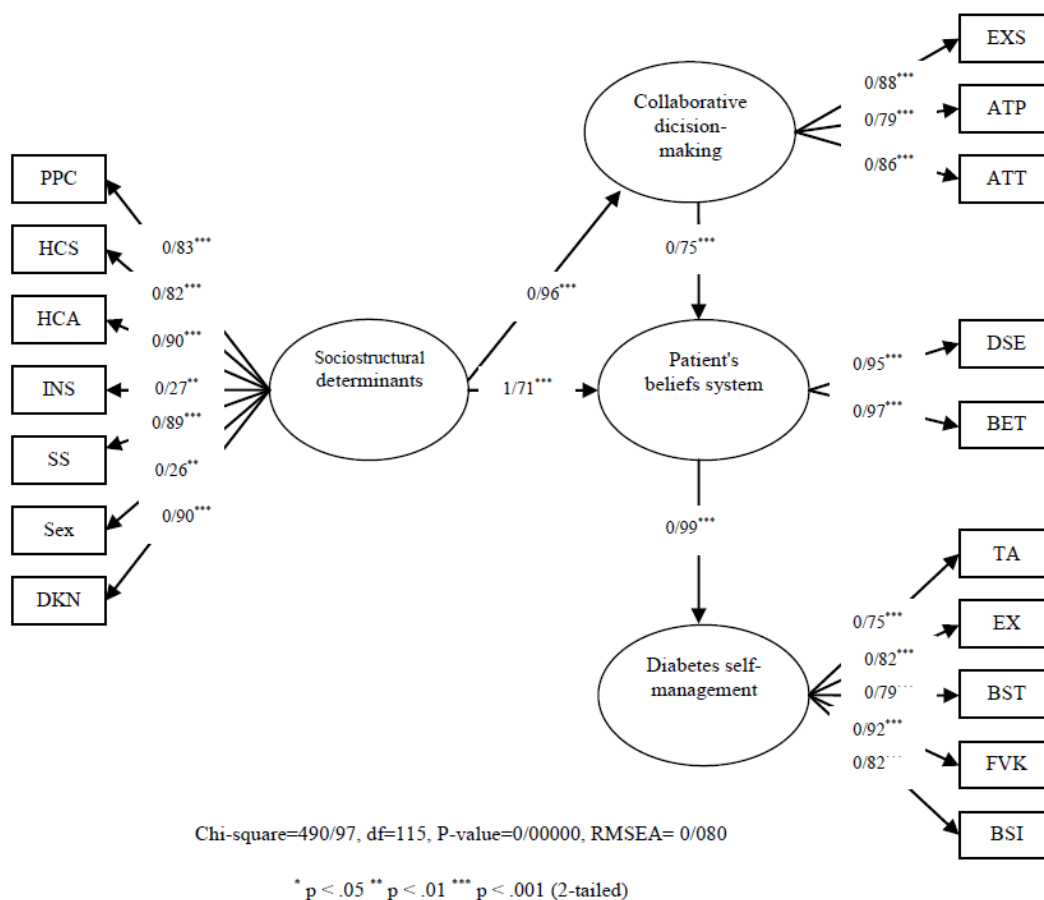


Fig. 3: Ultimate model with standardized estimates regarding direct and indirect impacts of sociostructural determinants, collaborative decision-making and patient's beliefs system on diabetes self-management

The results of the revised model demonstrated improved model fitness: χ^2 (115,N=500)=490.97, $P= .000$, $GFI= .90$, $AGFI=.86$, $CFI=.99$,

$RMSEA=.080$, $NFI=.98$, $PGFI=.67$, $AIC= 566.97$. $RMSEA$, GFI , CFI , NFI and $AGFI$ all arrived at the appropriate value of model fitness.

Significantly declined AIC showed that an admirable model parsimonious. Also, χ^2/df ratio were 4/26 that positioned in usual range and showed a established goodness-of-fit for model. These statistics suggested that the modified model had a desirable fitness to the observed data. According to Fig. 3, the coefficients between factors in the revised model were too becomes better and whole of paths were significant.

Results showed the patient's beliefs system directly influencing the diabetes self-management. Patients with higher self-efficacy and who is confident to therapy efficiency were more probably to carry out diabetes self-management. Hence, Figure 3 showed that the standardized coefficient between Patient's beliefs system and diabetes self-management was excellent ($\beta=.99, P<.001$).

In the ultimate model, results revealed that sociostructural determinants significantly influencing collaborative decision-making ($\beta= .96, P < .001$) and patient's beliefs system ($\beta=1.71, P<.001$), which in turn, impacted diabetes self-management (Fig. 3). Therefore, sociostructural determinants did not have significant influence on diabetes self-management directly; but, sociostructural determinants affect on diabetes self-management indirectly via collaborative decision-making and Patient's beliefs system. Also, in the ultimate model collaborative decision-making did not directly influencing diabetes self-management merely affect on patient's beliefs system ($\beta= .75, P < .001$) which in turn, resulted in diabetes self-management ($\beta= .99, P < .001$).

Discussions

The results of the present investigation on the basis of the goodness-of-fit indices show that the first hypothetical model failed to obtain admirable fitness with the observed data. Afterwards, according to the modified model totally goodness-of-fit indices were improved and obtained the suitable values. Also, the paths were significant for structural and measurement model.

The hypothetical model was established upon preceding evidence, in what the associations between these determinants and self-management were frequently inspected using regressions analysis that

could not discover any indirect influences between factors. Direct and indirect associations were likely the fundamental mechanism in what manner these numerous factors influencing diabetes self-management. It may be concluded that the hypothetical relationships in the first model on the basis of external studies did not entirely convey to Iranian patients with type II diabetes supposedly due to cultural differences. In fact, Iranian patients with diabetes may combine their own insight and experience into the diabetes self-management. It can be said if diabetic patients have different opinions about physician's advices dependent upon insight or their own experience; they reject physician's advices and do not pursue the therapy. Therefore, the belief's systems in the Iranian culture may directly influence on diabetes self-management.

Alike to former inquiries the results of this research demonstrated that patient's beliefs system directly impacted diabetes self-management in this Iranian sample (6, 38-40). Particularly, type 2 diabetic patients who have stronger belief in the efficiency of therapy and higher self-efficacy to manage diabetes and hinder related complications were more likely to carry out diabetes self-management than those who had a fragile beliefs system.

According to the result of this study, Sociostructural determinants similar to prior studies did not directly impact on diabetes self-management in this structural equation modeling (17, 23, 41-43). Sociostructural determinants have indirectly impact on diabetes self-management via collaborative decision-making and patient's beliefs system in Iranian patients with type 2 diabetes. In terms of prior studies, some sociostructural determinants like knowledge are essential however not adequate for diabetes self-managements and there are other agents joining between knowledge and consequences (23, 40). Bains and Egede suggested that sufficient knowledge is influential so that to enhance diabetes self-management, however other psychosocial factors as well are engaged in self-management (12). In this study, collaborative decision-making and particularly the patient's beliefs system were connections between sociostructural determinants and diabetes self-

management, that is to improve diabetes self-management, interventions for sociostructural factors should be planned to enhance knowledge and make better patient's beliefs system.

Social support as indicator for sociostructural determinants is one origin for diabetes self-efficacy in which might promote or reduce self-efficacy (44). Also, to promote patients' adjustment of diabetes self-management, coordination between patients' beliefs and clinicians' beliefs concerning their diabetes and therapies must be produced. This accordance may result in improved diabetes self-management (45). Therefore, better therapeutic relationship between the physician and the patient may promote patients' diabetes self-management via patient's beliefs modification about self-care behaviors. Family members with providing social support reinforce carrying out the diabetes self-management excessively may be impact on patient's beliefs about diabetes management that result in improved diabetes management. Bohlen and colleagues mentioned existence of therapeutic impediments and troublesome in access to medical care might result in adverse provider-patient relationships and lower health literacy that eventually reduced diabetes self-management (46). Also, Yeaw, Aagren, & Christensen think to be true for some patients upward economic burden of medical care services affect on the patient's beliefs that all right negatively impacted diabetes self-management (11).

Similar to prior studies, this study showed that sociostructural determinants have indirectly impact on diabetes self-management via collaborative decision-making (23, 47). One clarification for this finding is collaborative decision-making influenced by some sociostructural determinants such as age, gender, social support and health literacy. Therefore, these agents have considerable influence on collaborative decision-making that in turn along with patient's beliefs system affect on the diabetes self-management. According to the findings of this structural equation modeling, collaborative decision-making indirectly impact on type II diabetes self-management via patient's beliefs system. This result approves the findings informed by Rose, Harris, Ho, and Jayasinghe (39), and Lee and Lin (45). In one probable explanation,

can be suggested collaborative decision-making raise the confidence's patient to therapist together with patient's self-efficacy for diabetes self-management and finally patient carry out better self-management. Lee and Lin mentioned patients with higher confidence to physicians probably have higher self-efficacy and positive outcome expectations that together with desirable adherence to therapy and worthwhile therapeutic consequences (45). Kellow, Savige, & Khalil quoted patient's engagement in treatment improve self-efficacy and go together with enhancement in treatment adherence and health consequences (48). In other explanation, collaborative decision-making forming the foundation for the patient's beliefs system and finally lead to diabetes self-management.

In spite of the significant results, this study definitely has particular restrictions. The cross-sectional study was restricting the power to recognize causal relationships between factors. Convenience sampling method and selected target sample restricted the generalization of the findings. Utilizing self-reported instruments may have influenced the results. Some associations between these factors may necessity to be examined and confirmed in the future studies. Additional adjustment in this research domain may donate to the enhancement of diabetes self-management and medical consequences in diabetic patients. Hence, mixed design to assessing diabetes self-management, research replication with other community, and examining other kinds of sociostructural factors such as workplace conditions are recommended. Eventually, clinical trials established upon the findings of the present investigation are recommended.

Conclusion

This study showed that patient's beliefs system has direct influence on diabetes self-management and sociostructural determinants and collaborative decision-making via patient's beliefs system indirectly impact on diabetes self-management in Iranian patients with type II diabetes. Therefore, to foster diabetes self-management and alteration of patient's entire lifestyle, extensive intervention

agendas are necessary to make better sociostructural setting such as patients' improved literacy, and improving collaborative decision-making which may increase patients' opinions about the efficiency of the medical care and self-efficacy and then encourage diabetes self-care.

Ethical considerations

In this study, authors completely observed the ethical issues such as Informed Consent, misconduct, data falsification or fabrication, plagiarism, redundancy, double submission or publication, etc.

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