

# Relationship between psychosocial elements and medical adherence in patients diagnosed with type II diabetes: Mediating role of illness perception

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## Abstract

**Context:** Self-care plays a vital role in the management of diabetes. Commitment to medical adherence in diabetes care is linked with lower morbidity, mortality, and treatment cost.

**Aim:** This study aimed on investigating the mediating role of illness perception concerning the relationship between psychosocial elements and medical adherence among patients with type II diabetes.

**Setting and Design:** This is a correlational study that is conducted based on a well-framed equation modeling path analysis method. The study's statistical population consisted of all patients diagnosed with diabetes who referred to the International Iranian Diabetes Control and Prevention Foundation located in the Milad Clinic, in Mashhad during the first half of 2018 ( $n = 5600$ ).

**Material ans Methods:** Using the convenience sampling method, 392 eligible cases were selected among 5600 patients. Participants assessed with illness perception questionnaire, Lazarus and Folkman stress coping inventory, Tangney's self-Control scale, the multidimensional scale of perceived social support, patient–doctor relationship questionnaire-9, and the medication adherence rating scale-5.

**Statistical Analysis Used:** SPSS20 and AMOS software were used to process and analyze the gathered data using structural equation modeling path analysis and the Sobel test.

**Results:** Findings confirmed the mediating role of illness perception concerning the relationship between psychosocial factors and medical adherence in patients diagnosed with type II diabetes ( $P < 0.05$ ). Social support can positively impact patients' illness perception ( $\beta = 0.2$ ). The emotion-focused coping style has a significant, negative, and direct effect on illness perception ( $\beta = 0.13$ ). It was found that self-control, problem-focused style, and the doctor-patient relationship had no significant effect on illness perception ( $P > 0.05$ ).

**Conclusion:** This study's findings suggest psychosocial factors including stress coping styles, social support, the patient–doctor relationship, and self-control associated with medical adherence. Moreover, the impact of psychological factors on medical adherence increases with higher illness perception.

**Keywords:** Adherence, Diabetes, Illness perception, Patient, Psychosocial, Stress

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## INTRODUCTION

Diabetes is perceived as a common metabolic disease.<sup>[1]</sup> Proper management of diabetes highly depends on the patients' self-care and medical adherence.<sup>[2]</sup> Poor medical adherence many times leads to the implementation of unnecessary medical procedures having a remarkably burdensome effect on any health system.<sup>[3]</sup> As a result, medical adherence has highly caught the attention of researchers.<sup>[4]</sup> Numerous psychological and social factors are known to be associated with medical adherence.

Considered as one of the major contributors to the development and persistence of chronic diseases, stress also plays a vital role in causing diabetes. Daily involvement of patients with stressful diabetes management procedure requires enough stress coping skills.<sup>[5]</sup> Effective coping strategies guide patients to reduce stress and improve self-control.<sup>[6]</sup> On the other hand, though, maladaptive coping strategies including negligence and illness denial probably bring about more serious, negative outcomes.<sup>[7]</sup> People representing higher levels of self-control prefer to employ strategies that are focused on coping with stress, thus promoting the chance of efficiently managing the disease and abiding by higher medical adherence.<sup>[8]</sup>

When it comes to severe diseases, social factors including social support can lower mental and physical complications in chronic cases like diabetes.<sup>[9]</sup> The higher the perceived social support, the better the medical adherence. Social support also decreases stress.<sup>[10]</sup> A doctor–patient relationship is also a form of social support.<sup>[11]</sup> An appropriate doctor-patient relationship endows patients with the gift of trustworthiness, causing higher therapeutic adherence.<sup>[12]</sup>

In general, every patient has an individual mental image of the disease that is called illness perception.<sup>[13]</sup> At the diagnosis stage, the patient tries to draw a cognitive picture of the disease, including their beliefs about the disease, identity, roots, repercussions, and relevant control or curing methods.<sup>[14]</sup> In this study, it was indicated illness perception is associated with medical adherence.<sup>[15]</sup> Besides, illness perception has a significant relationship with self-control,<sup>[16-18]</sup> social support,<sup>[19-21]</sup> coping styles,<sup>[22-24]</sup> and patient–doctor relationship.<sup>[25-27]</sup> On the other hand, the findings exhibited a relationship between medical adherence and self-control,<sup>[28-30]</sup> social support,<sup>[21,31,32]</sup> coping style,<sup>[33-35]</sup> and patient–doctor relationship.<sup>[36-38]</sup>

Reviewing the relevant, antecedent literature, this study indicated the susceptibility of psychosocial status, self-care,

and high-risk consequences of week medical adherence procedures. On the other hand, illness perception is in relation to the physical and psychological factors related to chronic illness. Yet, this variable's mediating impact on medical adherence has not been studied, this study's focus is to investigate the mediating role of illness perception in the relationship between psychosocial factors and medical adherence in patients with type II diabetes.

## MATERIAL AND METHODS

This correlational study utilizes the structural equation modeling path analysis method. Certified by the Ethical Committee of the Islamic Azad University of Neyshabur, the code allocated to this proposal is IR.IAU.NEYSHABUR.REC.1397.006. Having been informed about the research aim, the participants willingly signed the written consent form.

### Participants

The study's statistical population consisted of all patients diagnosed with diabetes who referred to the International Iranian Diabetes Control and Prevention Foundation located in the Milad Clinic, in Mashhad during the first half of 2018 ( $n = 5600$ ). Based on the Cochran formula, the sample size was calculated as 384 patients and 400 cases, who were selected using the convenience method. As some questionnaires were considered invalid ( $n = 8$ ), only 392 patients' final intact questionnaires were analyzed. Inclusion criteria consisted of the following: physician's diagnosis of diabetes in at least the last six months, no other chronic mental or physical health condition, daily insulin taking, the individual ability to deal with the disease independently, education status: At least a high school diploma.

### Measurements

Having both met the inclusion criteria, and signed the consent form, patients completed demographic inquiries regarding age, gender, education, disease duration, type of treatment, illness, stressful records in the past 6 months, and psychotherapeutic history. Participants also responded to other standard questionnaires named in the following list:

The Medication Adherence Rating Scale (MARS-5), developed by Horne and Weinman.<sup>[39]</sup> It includes five questions about “forgetfulness,” “changing of dosages,” “stopping,” “ignorance,” and “taking medication less than prescribed.” The items were graded between 1 and 5 and the total score ranged from 5 to 25. Higher scores represented higher medical adherence. To test the constructive validity of the scale, the principal component analysis exhibited

a single factor: internal consistency through Cronbach's alpha was equal to  $\alpha = 0.62$ .<sup>[40]</sup> While the Cronbach alpha for MARS-5 was 0.74,<sup>[41]</sup> Iranian experts confirmed the content validity. The Cronbach's alpha measure of internal consistency was  $\alpha = 0.71$ .

The brief illness perception questionnaire developed by Broadbent *et al.* includes a nine-item scale, graded from 1 to 10. Broadbent *et al.* described the reliability of Cronbach's alpha as high ( $\alpha = 0.80$ ); the concurrent validity of the scale was found to be largely correlated with the modified disease perception questionnaire.<sup>[42]</sup> The Persian version though exhibited moderate reliability ( $\alpha = 0.59$ ) with the content validity confirmed.<sup>[33]</sup> Cronbach's alpha of internal consistency was  $\alpha = 0.69$  in this study.

The stress coping inventory developed by Lazarus and Folkman (1984) includes 66 items beginning from 0 for "not using" to 3 for "excessive usage." The focus of SCI is factors related to problems and emotions. Savóia *et al.* speculated the reliability using test-retest ( $r = 0.28$  to  $r = 0.49$ ) methods; the validity was confirmed by the factor analysis method.<sup>[43]</sup> The Iranian experts' reporting a Cronbach's alpha coefficient of 0.82 confirmed the validity of the inventory.<sup>[44]</sup> This study represented an internal consistency of  $\alpha = 0.78$ .

Tangney Self-Control Scale (SCS) developed by Tangney *et al.* consisted of 13 items. The higher the scores, the greater the quality of self-control. The items are rated from 1 to 5, with 1 for "never" up to 5 for "very high." Confirming the constructive validity, Tangney *et al.* reported a Cronbach's alpha's reliability coefficient of 0.85.<sup>[45]</sup> With a Cronbach's alpha of 0.83, the content validity of the Persian version was also confirmed.<sup>[46]</sup> The internal consistency of this study exhibited a Cronbach's alpha of  $\alpha = 0.81$ .

The multidimensional scale of perceived social support was developed by Zimet *et al.* (1998) The scale consisted of 12 items rated from 1 to 7 with 1 meaning "strongly disagree" to 7 meaning "strongly agree"). The scale is divided into three subscales: family (Fam), friends (Fri), or significant other (SO). The scales' three-factor structure was confirmed using exploratory factor analysis. The total internal consistency exhibited a score of  $\alpha = 0.89$ – $0.93$ ;<sup>[47]</sup> the subscales showing the same scores. According to the report of Naseri *et al.*, the Cronbach's alpha coefficient of three aspects of social support received from Fam, Fri, and SO were 89%, 86%, and 82%, respectively.<sup>[48]</sup> The internal consistency of this study was a Cronbach's alpha was  $\alpha = 0.89$ .

The patient–doctor relationship questionnaire developed by van der Feltz-Cornelis *et al.* consists of 9 questions. Respondents answer beginning from 1 to 5. Vander Feltz reported concurrent criterion validity between two diseases ( $R = 0.78$ ). The reliability coefficient of Cronbach's alpha was 0.94.<sup>[49]</sup> The Persian version showed high-reliability  $\alpha = 0.92$  and the content validity was confirmed.<sup>[50]</sup> In this study, internal consistency with a Cronbach's alpha was  $\alpha = 0.80$ .

### Statistical methods

Data were analyzed using the following software: SPSS 22 (SPSS Inc., Chicago, Ill., USA) and AMOS 23 (AMOS 23.0.x., IBM, SPSS Inc., Chicago, Ill., USA). Descriptive statistics (mean and standard deviation) and Pearson correlation were conducted in SPSS22 to test variables' relationship. The Kolmogorov–Smirnov test was utilized to confirm the normality of the data distribution assumption. To test the main question, a structural equation-based, on path analysis was run in the AMOS environment. To evaluate model fitness, the following indexes were implemented: comparative fit index, Incremental fit index, root mean square error of approximation, and CMIN/DF. The significant fitness level was considered 0.05.

## RESULTS

By removing invalid questionnaires, 392 intact cases out of 400 remained. It was found that the response rate was 98%. The average age of participants was  $46 \pm 11.7$  (age ranged from 25 to 68). Participants were 51% female. The education status report exhibited the majority of participants had a high school diploma (34.9%), 24% were undergraduate, 17.1% had a BA degree, 12.2% elementary, graduate (11.2%), and 0.5% had a master's degree. The marital status report of participants indicated 81.4% were married and 18.6% were single. The mean and standard deviation of the research variables is presented in Table 1.

The results of the Pearson correlation analysis indicated a positive, significant relationship between medical adherence and social support, self-control, and the patient–physician

**Table 1: Descriptive indicators of research variables**

Variable	Mean	SD
Disease perception	57	11.76
Emotion focused style	33.35	7.89
Problem focused style	30.54	5.22
Self-control	35.52	7.66
Social support	45	11.96
Doctor-patient relationship	24.89	6.01
Medical adherence	15.41	3.92

SD: Standard deviation

relationship. No significant relationship between medical adherence and stress coping styles was found [Table 2].

Figure 1 illustrates the standard coefficient of the relationships between the variables in the post-model-correction stage. The model fitness was confirmed by the indexes as depicted in Table 3.

Sobel’s test was used concerning the moderated role of illness perception the results of which are exhibited in Table 4. The self-control ( $\beta = 0.1$ ), social support ( $\beta = 0.09$ ), and physician–patient relationship ( $\beta = 0.18$ ) have a significant, positive impact on medical adherence. Finding suggest stress coping styles had no serious, significant impact on medical adherence ( $P > 0.05$ ). Besides, receiving social support has a significant positive direct effect on illness perception ( $\beta = 0.2$ ). The emotion-focused coping styles have a significant negative direct effect on illness perception ( $\beta = 0.13$ ). Self-control, problem-focused styles, and the doctor–patient relationship have were found to have no significant impact on individuals’ illness perception ( $P > 0.05$ ). The doctor-patient relationship

has a significant indirect effect on medical adherence through illness perception. Illness perception contributes to the significant indirect impacts of self-control and social support on medical adherence. The overall effect of psychosocial factors on medical adherence was 1.14.

### DISCUSSION

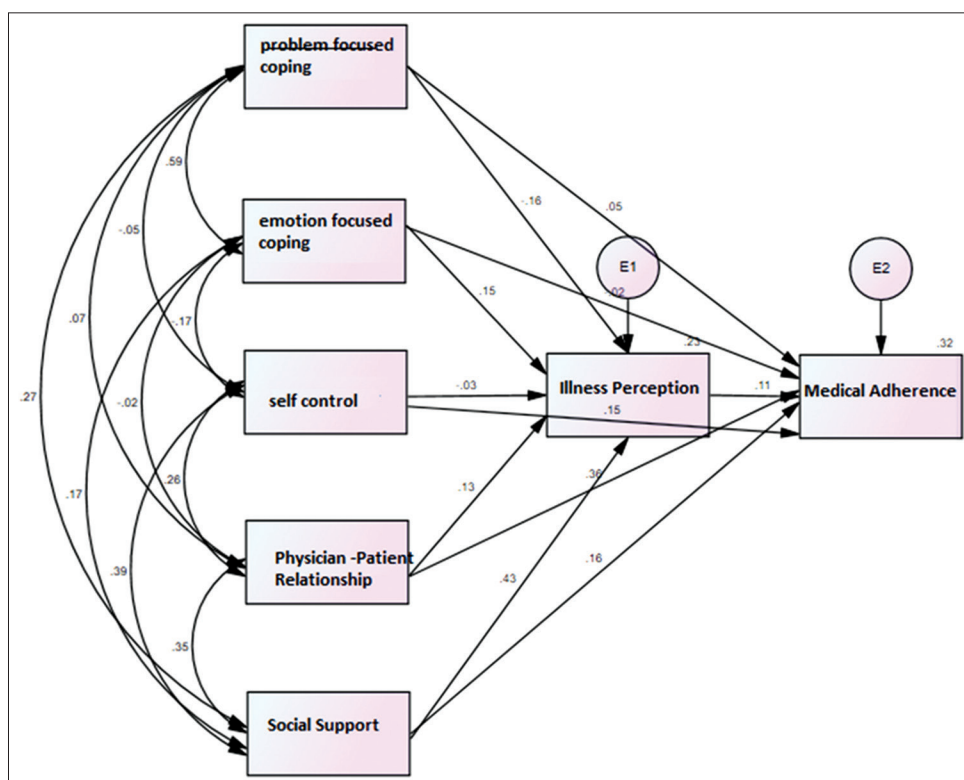
This study aims to investigate the mediating role of illness perception in the relationship between psychosocial factors and medical adherence of patients diagnosed with diabetes type II. The results indicated the moderating role of illness perception in the relationship between psychosocial factors and medical adherence. The findings of this study are consistent with the results of the following studies: Park *et al.*;<sup>[51]</sup> Seyyedrasooli *et al.*;<sup>[52]</sup> Rajpura and Nayak.<sup>[53]</sup>

Cognitive theories help justify the results of this study. According to cognitive theories and models, it is assumed people’s perceptions and evolution are factors dependent on cognitive and environmental elements. Among factors shaping individuals’ illness perception and care are

**Table 2: Correlation matrix**

Variable	Emotion focused style	Problem focused style	Self -control	Social support	Physician-patient relationship
Medical adherence	-0.10	0.05	0.32	0.36	0.25
P	0.06	0.34	0.001*	0.001*	0.001*

\* $P < 0.001$



**Figure 1:** Standard coefficient of the relationships between the variables in the post-model-correction stage

cognitive constructions and previous experience.<sup>[21]</sup> With the absence of proper illness perception, patients are less likely to comply with medical adherence.<sup>[42]</sup> Simply put, due to their low-risk perception of the disease, people tend to neglect physician's treatment guidelines. Besides, a proper patient-doctor relationship riched with mutual trust and meaningful interaction improves illness perception and medical adherence.<sup>[11]</sup>

Self-control enhances medical adherence by moderating risky behavior. Patients with lower self-control have weaker control over their daily diet, weight, and health management.<sup>[8]</sup> Coping styles also were found to have an indirect effect on medical adherence by mediating the role of illness perception, even though these styles had no significant effect on medical adherence. This statement confirms the findings of Berner *et al.*<sup>[34]</sup> The mediation role of several demographic and psychological factors affirmed this finding. On the other hand, though, patients' decent employment of coping strategies in conjunction with good mental stability means there is no difference in therapeutic adherence.<sup>[54]</sup> Hwang *et al.*<sup>[35]</sup> reported the relationship between coping styles and medical adherence. This difference may be justifiable by the participants' characteristics, given the fact that the statistical population of this study exhibited, for instance, a lower educational status compared to that of Hwang *et al.* Copying styles focusing on emotion are held associated with emotional instability which aggravates the physical aspect of the

illness.<sup>[34]</sup> Getting high scores in emotion-focused tests leads to an inability for individuals to deal with impulsive behaviors and weakness in coping with chronic illness. On the contrary, when people with a problem-focused coping style face stressful conditions such as chronic illness, they show more emotional stability, calmness, and an ability to tackle the stressful situations with minimum distress or anxiety. Therefore, people with emotional coping styles avoid interaction with the disease, thus having a weaker mind image of the illness. Hence, this study's indication of the poor illness perception of people with emotion-focused coping styles.

The findings indicated the direct effect of social support on medical adherence which confirms the findings of Turan *et al.*<sup>[55]</sup>

Social support consists of functional support, structural support, and informational support.<sup>[56]</sup> Medical adherence goals are not reachable without Fam members' cooperation, especially partners. Fri and SO play role in medical adherence mainly through providing medical care information<sup>[57]</sup> and reducing daily life stress. The Fam can help patients through financial and sympathetic communication support. The limitations of this study include sample size, the inclusion of diabetic patients only, patients were not heterogeneity concerning educational status, income, age, occupation, and disease duration.

## CONCLUSION

Overall, the results indicated that there was a relationship between psychosocial factors such as stress coping styles, self-control, and the doctor-patient relationship and the illness perception and medical adherence. Illness perception

**Table 3: Fitness indexes of model**

Indexes	CFI	IFI	RMSEA	CMIN/df
Value	1	1	0.00	0.054
Accepted fitness index	≤0.095	≤0.095	>0.06	Nonsignificant

CFI: Comparative fit index, IFI: Incremental fit index, RMSEA: Root mean square error of approximation

**Table 4: Direct and indirect effects of psychosocial factors on adherence through sobel test**

Path	Regression weight	Sobel test	P
Self-control → medical adherence	0.10	-	0.029*
Social support → medical adherence	0.09	-	0.044*
Emotion-focused → medical adherence	0.01	-	0.52
Problem-focused → medical adherence	-0.07	-	0.84
physician-patient relationship → medical adherence	0.18	-	*0.001
Self-control → illness perception	-0.03		0.724
Social support → illness perception	0.19		0.001*
Emotion-focused → illness perception	0.13		0.077
Problem-focused → illness perception	0.13		0.05
physician-patient relationship → illness perception	0.13		0.075
Illness perception → medical adherence	0.17		0.001*
physician-patient relationship → perception → medical adherence	0.01	0.21	0.001*
Self-control → perception → medical adherence	-0.01	0.187	0.001*
Social support → perception → medical adherence	0.045	0.076	0.001*
Emotion-focused → Illness perception → medical adherence	-0.02	0.035	0.19
Problem-focused → Illness perception → medical adherence	0.02	0.006	0.84
Total	1.14		

\*P<0.05

played a mediating role between the above-mentioned psychosocial factors and medical adherence.

### Conflicts of interest

There are no conflicts of interest.

### Authors' contribution

Mohammad Rajabi developed idea, reviewed the studies, gathered data, drafted reports. Hasan Tozandeh Jani drafted paper, supervised intervention and contribute in writing. Ahmad Zende del contributed in analysis of data, translation, and drafting.

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