

Assessment of illness acceptance and self-management in diabetic patients visiting primary care clinics

Abid Samed Özerol¹, Mustafa Çelik², Mehmet Fatih Fişenk³, Şeyma Ceylan⁴

¹Mamak District Health Directorate, Ankara, Türkiye

²Department of Family Medicine, Ankara Training and Research Hospital, Health Sciences University, Ankara, Türkiye

³Saray Family Health Center, Kahramankazan, Ankara, Türkiye

⁴Ankara Training and Research Hospital, Health Sciences University, Ankara, Türkiye

ABSTRACT

Objective: This study aimed to evaluate illness acceptance and diabetes self-management levels in patients with type 2 diabetes presenting to the Family Medicine Outpatient Clinic of Ankara Training and Research Hospital, Health Sciences University, and to examine the relationship between these levels and sociodemographic characteristics.

Methods: This cross-sectional and descriptive study included 412 diabetes patients who visited the outpatient clinic between March 11 and May 17, 2024. Participants completed a sociodemographic data form, the Acceptance of Illness Scale, and the Diabetes Self-Management Scale. Data were analyzed using SPSS 22.

Results: Higher illness acceptance scores were significantly associated with education level ($p=0.002$), physical activity ($p<0.001$), dietary adherence ($p<0.001$), regular hospital visits ($p=0.013$), no history of hospitalization ($p=0.002$), pneumococcal ($p<0.001$) and influenza vaccination ($p=0.017$), no insulin use ($p=0.021$), and absence of complications ($p<0.001$).

Higher self-management scores were significantly related to education ($p<0.001$), physical activity ($p<0.001$), diabetes education ($p<0.001$), dietary adherence ($p<0.001$), hospital visits ($p<0.001$), pneumococcal and influenza vaccination ($p<0.001$), insulin history ($p=0.001$), and absence of chronic diseases ($p=0.006$). A positive medium correlation was found between illness acceptance and self-management ($r=0.448$, $p<0.001$).

Conclusion: Educational level and healthy lifestyle behaviors were associated with higher illness acceptance and diabetes self-management levels in individuals with type 2 diabetes. In primary care, family physicians should consider these factors when supporting diabetes self-management through individualized care plans. Given the cross-sectional design of the study, these findings indicate associations and should not be interpreted as causal relationships.

Keywords: Type 2 diabetes, illness acceptance, acceptance of illness scale, diabetes self-management, self-management scale

Introduction

Diabetes mellitus is a chronic metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both, requiring lifelong management and treatment.^[1]

The prevalence of diabetes is rapidly increasing worldwide. In 2024, 589 million adults (aged 20–79 years) are living with diabetes. This number is projected to rise to 853 million by 2050. The vast majority of diabetes cases are type 2, and its increasing prevalence is associated with factors such as urban population growth, sedentary lifestyles, obesity, and ageing.^[2,3]

In the TURDEP-1 study conducted in our country, the prevalence of diabetes was determined to be 7.2%, while in the TURDEP-2 study, this rate rose to 13.7%, showing an approximately 90% increase in the incidence of diabetes. According to the IDF 2025 Atlas, there are approximately 9.6 million adults with diabetes as of 2024, and this number is projected to reach 14.1 million by 2050. These findings indicate that diabetes is spreading faster than expected in Türkiye.^[2,4,5]

Illness acceptance is an important psychosocial concept that refers to an individual's voluntary acceptance of their illness in all its aspects. In chronic diseases such as diabetes, individuals must adhere to complex treatment regimens for long periods of time; this can lead to various restrictions and difficulties in daily life. The literature reports that individuals with diabetes who have a high level of illness acceptance demonstrate better treatment compliance and glycaemic control.^[6-9] Studies conducted on patients using insulin have shown that low illness acceptance levels can negatively affect treatment compliance.^[10] Similarly, a positive relationship has been reported between illness acceptance and adaptation to chronic illness.^[11] In addition, the relationship between diabetes symptoms and

illness acceptance has also been evaluated in individuals with type 2 diabetes.^[12] These findings suggest that illness acceptance is an element that should not be overlooked in diabetes management.

Self-management refers to the active management of the treatment process by the individual using their knowledge, skills and behaviours related to their illness. Diabetes self-management includes many components such as medication use, dietary patterns, physical activity and self-monitoring.^[13,14] Studies have shown that the disease perceptions and self-efficacy levels of individuals with diabetes are related to self-management behaviours; structured education and self-management support programmes may be effective in reducing the risk of complications.^[13,15,16]

There are limited studies in the literature that jointly address the relationship between illness acceptance and diabetes self-management. Existing studies indicate that modifiable factors such as educational level, physical activity, and regular follow-up can positively influence both illness acceptance and self-management behaviours. The long-term and comprehensive monitoring of diabetic patients in family medicine practice presents an important opportunity to assess these psychosocial factors. It is thought that approaches supporting illness acceptance and individualised self-management education, even in short consultations, may have positive effects on treatment compliance and quality of life in diabetic patients attending family medicine clinics. We hypothesized that higher illness acceptance would be independently associated with better diabetes self-management among patients with type 2 diabetes attending a primary care clinic. This study aims to contribute to the literature by examining the relationship between illness acceptance and self-management levels in type 2 diabetes patients attending family medicine clinics and the factors associated with this condition.

Materials and Methods

Our study is a descriptive and cross-sectional study conducted between 11 March 2024 and 17 May 2024 on patients aged 18 years and older who were diagnosed with diabetes, were able to communicate, and volunteered to participate in the study, who made planned visits to the Family Medicine Outpatient Clinic of Family Medicine Outpatient Clinic of Ankara Training and Research Hospital, Health Sciences University. Participants were recruited using a convenience sampling method among patients who attended the family medicine outpatient clinic during the study period. Patients presenting for routine examination, prescription renewal, laboratory testing, or follow-up were asked whether they had a diagnosis of diabetes. Eligible patients who agreed to participate after being informed about the study were included. Ethical approval for this study was obtained from the Ethics Committee of Ankara Training and Research Hospital, Health Sciences University, on March 06, 2024 (approval number: 2451). For a population of unknown size, a sample size of at least 384 was calculated with a 95% confidence interval and an assumed diabetes prevalence of 50%; as a result of the interviews conducted, a total of 412 patients were reached. Patients with no communication barriers who agreed to participate in the study were included. Patients younger than 18 years, those who did not consent to participate, those with communication barriers, and those with a duration of diabetes of less than one year were excluded from the study. Written and verbal informed consent was obtained from all participants after explaining the purpose of the study. Sociodemographic and clinical data were collected using a structured questionnaire developed by the researchers, including age, sex, body mass index, marital and educational status, income level, smoking status, duration of diabetes,

comorbid chronic diseases, diabetes education and its source (including education on foot care, medication use, nutrition, and physical activity), medication use, history of insulin use, hospital admission due to diabetes, diet adherence, pneumococcal and influenza vaccination status, and the presence of diabetes-related complications (including diabetic neuropathy, nephropathy, retinopathy, and cardiovascular complications). Physical activity was recorded as a dichotomous variable (yes/no) based on self-report of engaging in at least 150 minutes of moderate-intensity physical activity per week. Illness acceptance and diabetes self-management were assessed using the Acceptance of Illness Scale and the Diabetes Self-Management Scale.

The Acceptance of Illness Scale (AIS) was developed by Felton and Reverson and adapted for individuals in Turkish society by Büyükkaya Besen and Esen. The scale is a 5-point Likert-type measure consisting of 8 items. This scale measures patients' attitudes towards diabetes, and an increase in scores indicates increased illness acceptance. The scale's internal validity ($t=22.139$, $p<0.001$), stability over time ($r=0.71$, $p<0.001$) and internal consistency (Cronbach's Alpha= 0.79) were found to be high. In the study by Besen and Esen, the Cronbach's alpha reliability coefficient was determined to be 0.771 .^[7]

The Diabetes Self-Management Scale (DSMS), developed by Eda Koç, is a 5-point Likert-type scale consisting of 19 questions. The scale assesses diabetes self-management through three subscales (healthy lifestyle behaviours, blood glucose management, and use of healthcare services), with higher scores indicating better self-management. The overall Cronbach's alpha value of the scale was 0.86 , and 0.86 was also found for standardised items. The content validity index was above 0.80 , ranging from 0.83 to 1.00 .^[17]

Statistical analyses were performed using the SPSS 22 programme. Descriptive data were presented as frequency and percentage for categorical variables and as mean $\pm$ standard deviation for continuous variables. The normal distribution of continuous variables was assessed using the Kolmogorov-Smirnov test; parametric tests (Student's t-test, One-Way ANOVA) were used for normally distributed variables. The relationships between continuous variables were examined using Pearson's correlation test. Linear regression analysis was performed using the Enter method to determine the predictors of the total scores of the Acceptance of Illness Scale (AIS) and the Diabetes Self-Management Scale (DSMS). Variables considered clinically relevant based on the literature and clinical judgment, as well as variables found to be significant in pairwise comparisons, were included in the regression model. The assumptions of multiple linear regression were evaluated prior to the analysis. The normality of residuals was assessed through visual inspection, and multicollinearity was examined using the Variance Inflation Factor (VIF). VIF values ranged between 1.10 and 2.75, remaining below the commonly accepted threshold of 5. Autocorrelation was assessed using the Durbin-Watson test, and no significant violation was detected (DW = 1.821 and 1.695). The significance level was set at $p < 0.05$.

Results

The study included 412 patients with type 2 diabetes, 57.3% of whom were women ($n=236$). The mean age of the patients was 61.4 ± 11.7 years, and the mean body mass index was 29.4 ± 5.5 kg/m². Ninety-one percent of participants were married ($n=375$), and 36.2% had a high school education or higher ($n=149$). Forty-four point four percent were housewives ($n=183$), and 45.1% reported that

their income was less than their expenses ($n=186$). Thirty-four point five percent of participants engaged in regular physical activity ($n=142$), 64.1% used oral antidiabetic medication ($n=264$), and 78.6% had visited a hospital in the past year ($n=324$). Furthermore, 14.3% had received the pneumococcal vaccine ($n=59$), and 30.8% had received the annual influenza vaccine ($n=127$). Sixty-one point seven percent of participants had received diabetes education ($n=254$), 71.1% reported following a diabetes-related diet ($n=293$), and 22.6% had developed diabetes-related complications ($n=93$) (Table 1).

The mean AIS score was 26.6 ± 8.1 , and the mean DSMS score was 61.6 ± 12.4 . The subscale mean scores of the DSMS were 38.4 ± 7.3 for healthy lifestyle behaviours, 12.7 ± 3.8 for blood glucose management, and 10.5 ± 4.0 for healthcare utilisation (Table 2).

Participants who were male, had a high school education or higher, were employed or retired, engaged in regular physical activity, visited the hospital regularly, received pneumococcal and influenza vaccinations, and followed a diet had significantly higher AIS and DSMS scores ($p < 0.05$). In addition, AIS scores were significantly higher among those with no history of insulin use, no hospitalisation, and no diabetes-related complications, whereas DSMS scores were significantly higher among those without chronic disease, those who had received diabetes education, and those with a history of insulin use ($p < 0.05$) (Table 3).

Unmarried participants and those without a history of hospitalisation had higher scores on the healthy lifestyle behaviours subscale. Male participants, those who were employed or retired, and those without chronic disease had significantly higher scores on the healthy lifestyle behaviours and blood glucose management subscales ($p < 0.05$).

Table 1. Distribution of participants' sociodemographic and diabetes-related characteristics.

Sociodemographic and diabetes-related characteristics		Mean±SD	
Age (years)		61.4±11.7	
Height (cm)		165.0±9.5	
Weight (kg)		79.6±14.7	
BMI (kg/m ²)		29.4±5.5	
		n	%
Gender	Women	236	57.3
	Men	176	42.7
Marital status	Married	375	91.0
	Single	37	9.0
Educational background	Middle school and below	263	63.8
	High school and above	149	36.2
Working status	Housewife	183	44.4
	Retired	135	32.8
	Employed	94	22.8
Monthly income	My income is less than my expenses	186	45.1
	My income is equal to my expenses	187	45.4
	My income is more than my expenses	39	9.5
Physical activity	Yes	142	34.5
	No	270	65.5
Diabetes medicine	Diet only	18	4.4
	OAD (Oral Antidiabetic Drug)	264	64.1
	Insulin	40	9.7
	Insulin + OAD	90	21.8
Hospital visits in the last year	Yes	324	78.6
	No	88	21.4
Pneumococcal	Yes	59	14.3
	No	353	85.7
Flu vaccine	Yes	127	30.8
	No	285	69.2
Training type*	Medication use	215	84.6
	Nutrition	198	78.0
	High blood sugar	127	50.0
	Low blood sugar	126	49.6
	Exercise	39	15.4
	Foot care	12	4.7
Educator*	Physician	184	72.4
	Nurse	133	52.4
	Dietitian	184	72.4
Diet application features	Avoiding sugary foods	291	70.6
	Avoiding salty foods	149	36.2
	Avoiding fatty foods	146	35.4
Complications of diabetes	Cardiovascular disease	41	44.1
	Nephropathy	27	29.0
	Neuropathy	12	12.9

Some patients provided more than one response. BMI: Body mass index; Mean ± SD: Mean ± standard deviation.

Table 2. Average scores obtained by participants from the scales.

Scales	Score (Mean ± SD)
AIS	26.6±8.1
DSMS	61.6±12.4
Healthy lifestyle behaviors (F1)	38.4±7.3
Blood sugar management (F2)	12.7±3.8
Healthcare services utilization (F3)	10.5±4.0

AIS: Acceptance of Illness Scale, DSMS: Diabetes Self-Management Scale, Mean ± SD: Mean ± Standard Deviation

Patients with a history of insulin use had higher scores on the blood glucose management and healthcare utilisation subscales, while those with secondary education or higher, those engaging in regular physical activity, those who had received diabetes education, those who visited hospitals regularly, those who were vaccinated, and those who followed a diet scored significantly higher on all subscales of the DSMS ($p<0.05$) (Table 4).

Table 3. Comparison of total scores on the acceptance of illness scale and diabetes self-management scale according to participants' sociodemographic and diabetes-related characteristics.

Sociodemographic and diabetes-related characteristics		AIS total score		DSMS total score	
		Mean±SD	p*	Mean±SD	p*
Gender	Women	25.6±8.2	0.004	60.2±11.9	0.011
	Men	27.9±7.8		63.3±12.8	
Educational background	Middle school and below	25.7±8.6	0.002	59.4±12.0	< 0.001
	High school and above	28.3±6.7		65.4±12.0	
Working status	Housewife	25.0±8.5a	0.001**	59.2±11.6a	0.002**
	Retired	27.2±6.0a,b		63.4±11.5b	
	Employed	28.4±8.4b		63.5±13.5b	
Physical activity	Yes	29.0±7.8	< 0.001	67.3±12.0	< 0.001
	No	25.4±8.0		58.5±11.5	
Chronic illness	Yes	26.3±8.4	0.060	60.7±12.6	0.006
	No	27.9±6.5		64.7±10.8	
Diabetes education	Yes	26.7±8.2	0.797	63.6±12.3	< 0.001
	No	26.5±7.9		58.3±11.7	
Diabetes medication	Diet only	28.3±10.9a	0.010**	59.7±15.1	0.064**
	OAD	27.3±8.0a		60.5±12.2	
	Insulin	23.0±6.8b		63.8±13.6	
	Insulin + OAD	25.9±7.9a,b		64.0±11.4	
Insulin use history	Yes	25.4±7.8	0.021	64.1±11.9	0.001
	No	27.3±8.1		60.1±12.4	
Hospital admission	Yes	27.1±8.2	0.013	63.8±11.5	< 0.001
	No	24.7±7.4		53.3±12.1	
Hospitalization	Yes	21.6±8.5	0.002	58.4±13.5	0.194
	No	26.9±8.0		61.7±12.3	
Pneumococcal	Yes	30.4±6.4	< 0.001	68.6±12.8	< 0.001
	No	26.0±8.2		60.4±11.9	
Flu vaccine	Yes	28.0±8.0	0.017	65.7±12.1	< 0.001
	No	26.0±8.1		59.7±12.0	
Diet	Yes	27.8±7.8	< 0.001	67.3±12.0	< 0.001
	No	23.8±8.2		58.5±11.5	
Complications	Yes	24.0±7.7	< 0.001	60.7±12.6	0.617
	No	27.4±8.0		64.7±10.8	

*Student's t-test and one-way analysis of variance (ANOVA) were used. A p value of <0.05 was considered statistically significant. AIS: Acceptance of Illness Scale, DSMS: Diabetes Self-Management Scale, Mean±SD: Mean±Standard Deviation

Table 4. Comparison of participants' sociodemographic and diabetes-related characteristics with the type 2 diabetes self-management scale.

Characteristics		Healthy lifestyle behaviors	p*	Blood sugar management	p*	Healthcare use	p*
		Mean ± SD		Mean ± SD		Mean ± SD	
Gender	Women	37.7±7.2	0.033	12.2±3.7	0.005	10.2±3.8	0.187
	Men	39.3±7.3		13.3±3.7		10.8±4.2	
Marital status	Married	38.1±7.2	0.002	12.7±3.7	0.929	10.4±4.0	0.089
	Single	42.0±7.4		12.7±4.0		11.5±4.0	
Educational background	Middle school and below	37.0±7.1	<0.001	12.2±3.8	0.001	10.2±3.9	0.049
	High school and above	40.8±7.0		13.5±3.5		11.0±4.1	
Working status	Housewife	36.9±6.8a	<0.001**	12.2±3.8a	0.042**	10.2±3.8	0.366**
	Retired	39.5±6.1b		13.3±3.4b		10.7±4.1	
	Employed	39.8±8.2b		13.0±3.9b		10.7±4.2	
Physical activity	Yes	42.7±6.7	<0.001	13.5±3.7	0.001	11.1±4.3	0.016
	No	36.2±6.5		12.2±3.7		10.1±3.8	
Chronic illness	Yes	37.9±7.5	0.003	12.4±3.8	0.005	10.4±4.0	0.273
	No	40.2±5.9		13.7±3.4		10.9±3.9	
Diabetes education	Yes	39.4±7.4	<0.001	13.4±3.6	<0.001	10.9±4.0	0.013
	No	36.8±6.7		11.6±3.8		9.8±4.0	
Insulin use history	Yes	38.7±7.3	0.461	14.1±3.1	<0.001	11.2±4.0	0.003
	No	38.2±7.3		11.8±3.9		10.0±4.0	
Hospital admission	Yes	39.3±6.9	<0.001	13.2±3.6	<0.001	11.3±3.8	<0.001
	No	35.0±7.7		10.9±3.8		7.4±3.2	
Hospitalization	Yes	34.8±7.9	0.013	12.5±3.6	0.856	11.0±3.6	0.506
	No	38.6±7.2		12.7±3.8		10.4±4.0	
Pneumococcal	Yes	42.4±7.3	<0.001	14.0±3.7	0.003	12.2±4.0	<0.001
	No	37.7±7.0		12.5±3.7		10.2±3.9	
Flu vaccine	Yes	40.8±7.3	<0.001	13.4±3.8	0.011	11.6±3.9	<0.001
	No	37.3±7.0		12.4±3.7		10.0±4.0	
Diet	Yes	40.7±6.3	<0.001	13.4±3.6	<0.001	11.0±4.0	<0.001
	No	32.9±6.4		10.9±3.5		9.1±3.8	

*Student t-test, **One Way ANOVA analysis. p<0.05 is considered statistically significant. OAD: Oral Antidiabetic Drug

AIS scores showed a positive correlation with healthy lifestyle behaviours, blood glucose management, healthcare utilisation, height, and monthly income, and a negative correlation with BMI. Healthy lifestyle behaviours scores were positively correlated with blood glucose management, healthcare utilisation, height, and monthly income, and negatively correlated with

weight and BMI. Blood glucose management scores were positively correlated with healthcare utilisation, height, and monthly income, and negatively correlated with BMI. Total DSMS scores were positively correlated with height and monthly income and negatively correlated with BMI and smoking status (Table 5).

Table 5. Correlation of participants scale scores.

		AIS	F1	F2	F3	Total score
F1	r	.472				
	p	<0.001				
F2	r	.280	.522			
	p	<0.001	<0.001			
F3	r	.266	.431	.534		
	p	<0.001	<0.001	<0.001		
Total Score	r	.448	.886	.785	.740	
	p	<0.001	<0.001	<0.001	<0.001	
Age	r	-.044	-.072	-.068	.075	-.039
	p	.371	.144	.166	.131	.430
Height	r	.110	.190	.181	.093	.197
	p	.026	<0.001	<0.001	.060	<0.001
Weight	r	-.023	-.100	-.003	.045	-.045
	p	.642	.043	.954	.366	.362
BMI	r	-.099	-.222	-.110	-.018	-.170
	p	.045	<0.001	.025	.721	<0.001
Number of cigarettes smoked	r	-.035	-.301	-.103	-.125	-.239
	p	.773	.011	.396	.301	.046
Monthly income	r	.245	.236	.106	.091	.200
	p	<0.001	<0.001	.031	.065	<0.001

F1: Healthy lifestyle behaviors; F2: Blood glucose management; F3: Health care utilization; AIS: Acceptance of Illness Scale; BMI: Body mass index. Pearson correlation analysis was performed.

In linear regression analysis, variables significantly associated with the total AIS score were total DSMS score ($\beta=0.280$, $p<0.001$) and presence of diabetes-related complications ($\beta=-2.206$, $p=0.014$). The model explained 25.0% of the variance ($R^2=0.250$) and was statistically significant ($F=11.525$; $p<0.001$) (Table 6).

Variables significantly associated with total DSMS score included physical activity ($\beta=-4.641$, $p<0.001$), presence of chronic disease ($\beta=2.505$, $p=0.030$), diabetes education ($\beta=-2.342$, $p=0.018$), history of insulin use ($\beta=-4.302$, $p<0.001$), hospital admission ($\beta=-5.954$, $p<0.001$), pneumococcal vaccination ($\beta=-3.712$, $p=0.008$), influenza vaccination ($\beta=-2.150$, $p=0.041$), diet adherence ($\beta=-6.708$, $p<0.001$), and total AIS score ($\beta=0.460$, $p<0.001$). The model explained 47.1% of the variance ($R^2=0.471$) and was statistically significant

($F=29.105$; $p<0.001$). No significant associations were found for the remaining variables. After confirming that the assumptions of regression were met, multiple linear regression analysis was performed ($VIF < 5$; Durbin-Watson = 1.821 and 1.695). The 95% confidence intervals for the regression coefficients are presented (Table 6).

Discussion

The mean Acceptance of Illness Scale (AIS) score in our study was determined to be 26.6 ± 8.1 .^[18-20] In the literature, averages of 22.79 ± 6.72 in diabetic foot patients^[18], 30.66 ± 7.08 in pregnant diabetic patients^[19], and 27.56 ± 7.08 in cancer patients have been reported.^[20] These differences are thought to stem from the diversity in sociodemographic and clinical characteristics and disease types.

Table 6. Linear regression analysis of factors associated with AIS and DSMS total scores.

	B	95% CI for B	SE	Standardized β	t	p
AIS Total Score ($R^2=0.250$; $F=11.525$; $p<0.001$)						
Gender	.247	-1.942 to 2.435	1.113	.015	.221	0.825
Educational background	-.641	-2.231 to 0.949	.809	-.038	-.792	0.429
Working status	1.097	-0.190 to 2.384	.655	.119	1.676	0.094
Physical activity	-.411	-1.964 to 1.141	.790	-.024	-.521	0.603
Diabetes medication	-.246	-1.487 to 0.994	.631	-.027	-.390	0.697
History of insulin use	1.895	-0.392 to 4.182	1.163	.114	1.629	0.104
Hospital admission	.619	-1.169 to 2.407	.909	.031	.681	0.496
Hospitalization	1.650	-1.600 to 4.899	1.653	.048	.998	0.319
Pneumococcal	-1.750	-3.879 to 0.378	1.083	-.076	-1.617	0.107
Flu vaccine	.335	-1.275 to 1.946	.819	.019	.409	0.682
Diet	-.521	-2.217 to 1.174	.863	-.029	-.604	0.546
Complication	2.206	0.442 to 3.970	.897	.114	2.458	0.014
DSMS total score	.280	0.209 to 0.350	.036	.428	7.804	<0.001
DSMS total score ($R^2=0.471$; $F=29.105$; $p<0.001$)						
Gender	-.875	-3.712 to 1.961	1.443	-.035	-.607	0.544
Educational background	1.388	-0.708 to 3.483	1.066	.054	1.302	0.194
Working status	.141	-1.518 to 1.800	.844	.010	.167	0.867
Physical activity	-4.641	-6.600 to -2.683	.996	-.179	-4.658	<0.001
Chronic disease	2.505	0.241 to 4.770	1.152	.083	2.175	0.030
Status of receiving diabetes education	-2.342	-4.273 to -0.411	.982	-.092	-2.384	0.018
History of insulin use	-4.302	-6.327 to -2.277	1.030	-.169	-4.176	<0.001
Hospital admission	-5.954	-8.191 to -3.718	1.138	-.198	-5.234	<0.001
Hospitalization	2.549	-1.465 to 6.563	2.042	.048	1.248	0.213
Pneumococcal	-3.712	-6.447 to -0.977	1.391	-.105	-2.668	0.008
Flu vaccine	-2.150	-4.210 to -0.089	1.048	-.080	-2.051	0.041
Diet	-6.708	-8.788 to -4.628	1.058	-.246	-6.341	<0.001
AIS	.460	0.343 to 0.577	.060	.301	7.702	<0.001

Linear regression analysis was performed. A p value of <0.05 was considered statistically significant. For binary variables, "Yes" was coded as 0 and "No" as 1. Therefore, negative regression coefficients indicate higher scores among participants with the relevant characteristic. AIS: Acceptance of Illness Scale; DSMS: Diabetes Self-Management Scale.

In our study, it was found that retired patients with a high school education or above had higher AIS scores. In Büyükkaya's study, illness acceptance was reported to be higher among patients with a high income level^[7]; while another study conducted on patients with type 2 diabetes showed that illness acceptance was higher among working patients and those with a university education or above.^[6] Furthermore, Taşkın Yılmaz et al. found that individuals with an educational level

of primary school and above had higher illness acceptance compared to those who were illiterate, whereas employment status had no significant effect on illness acceptance.^[9] The finding in our study that sociodemographic characteristics such as educational level and retirement status were associated with illness acceptance is generally consistent with the results reported in the literature. This suggests that educational level and economic security may positively influence

individuals' health literacy, thereby improving their ability to understand, accept, and cope with the disease process.

In our study, it was found that participants who followed a diet and exercised regularly had higher AIS scores. This finding is consistent with the results of a study conducted by Döner and colleagues on diabetic foot patients and suggests that adapting to lifestyle changes may positively influence patients' illness acceptance process.^[18] However, caution is required when generalising the results due to differences between patient groups and sample limitations. Our findings demonstrate that non-pharmacological approaches, such as diet and exercise, play an important role in increasing illness acceptance in type 2 diabetes management, alongside pharmacological treatment, and suggest that this approach could contribute to clinical practice and the literature.

In our study, it was observed that illness acceptance levels were lower in patients hospitalised due to diabetes and who developed diabetes-related complications. The literature also reports that illness acceptance is higher in patients who do not develop complications due to diabetes and who have good metabolic control.^[8] Similarly, it has been reported that diabetic patients who use insulin and have high illness acceptance develop fewer complications and have better metabolic control parameters.^[10] A limitation of our study is that patients' metabolic control parameters could not be assessed; nevertheless, our findings suggest that individuals with low illness acceptance may not adequately adhere to treatment modalities, potentially increasing the risk of hospitalisation and complications. This situation demonstrates that illness acceptance is a critical psychosocial factor in diabetes management and that increasing the level of acceptance may contribute to the literature in terms of its potential to reduce complications and hospital admissions.

In our study, the mean DSMS for patients was found to be 61.6 ± 12.4 ; in Koç's study, this value was found to be 65.4 ± 11.8 .^[17] In our study, it was observed that self-management scores were lower in patients with low educational levels and housewife status. The literature also reports positive relationships between self-management and educational level and employment status; for example, in Koç's study, self-care behaviours and self-efficacy were found to be higher in patients with a high school education or above, while in the study by Bohanny and colleagues, they were found to be higher in working patients.^[17-21] These findings indicate that self-management in individuals with diabetes is influenced by sociocultural, educational, and economic factors and that strengthening self-management skills by taking these factors into account may have the potential to improve diabetes control.

In our study, it was observed that patients with a low body mass index who exercised regularly, had received diabetes education, and followed a diet had higher DSMS scores. Similarly, the literature reports that an increase in body mass index reduces self-management, while physical activity increases it^[17]; a study conducted on Hispanic adults in the United States reported that the self-efficacy of individuals with diabetes increased as a result of the education provided and the support of home health personnel.^[22] Furthermore, a study conducted in Indonesia on uncontrolled type 2 diabetic patients showed that individuals who received diabetes education experienced improvements in diabetes management.^[23] Similarly, the literature reports that patients who adhere to a diabetic diet have higher levels of self-management. Although metabolic parameters were not evaluated in our study, the findings suggest that regular exercise, weight control, diabetes education, and diet implementation can strengthen diabetes self-management. These results emphasise that focusing solely on pharmacological treatment in

diabetes management is insufficient and that a comprehensive treatment approach supported by non-pharmacological factors such as lifestyle and education is important.

In our study, no significant difference was observed in DSMS scores between patients who developed diabetes-related complications and those who did not. The literature reports that education and self-management support programmes provided to diabetic patients may reduce the risk of complications.^[15] This difference may be due to the cross-sectional design of our study and the fact that self-management behaviours were measured only with questionnaire data, which may not have fully reflected the differences between the groups. Furthermore, the limited number of patients attending the family medicine clinic, as the majority of patients who developed complications were referred to departments such as internal medicine and nephrology, may be another reason for the lack of observed differences between the groups.

Regression analyses showed that the AIS score was affected by the DSMS score and the presence of complications, while the DSMS score was influenced by exercise, diabetes education, dietary adherence, history of insulin use, regular healthcare visits, and vaccinations (Table 6). These findings indicate that self-management is influenced not only by individual motivation but also by education, lifestyle, and healthcare services. The literature also supports that diabetes education and lifestyle interventions increase both self-management and illness acceptance.^[13,15,17,22,24,25] Therefore, in family medicine practice, individualized education, diet and exercise interventions, and regular follow-up may strengthen illness acceptance and self-management and reduce long-term complication risk. In primary care, continuity of care provides an opportunity to repeatedly assess patients' illness perceptions, health literacy, and

barriers to self-management. Brief motivational interviewing, patient empowerment strategies, and individualized counseling may help improve both illness acceptance and diabetes self-management during routine family medicine visits.

Limitations

This study has several limitations. First, it was conducted in a single center and included patients from a specific socio-cultural and socio-economic background, which limits the generalizability of the findings. Since the study was carried out among patients with type 2 diabetes attending the family medicine outpatient clinic of Ankara Training and Research Hospital, the results cannot be generalized to all individuals with diabetes in Türkiye. The number of eligible patients per day and the number of patients who declined participation were not systematically recorded; therefore, potential non-response bias could not be evaluated. Second, metabolic and biochemical parameters related to diabetes (such as HbA1c, fasting plasma glucose and lipid profile) were not included in the analyses, which may have limited the evaluation of the relationship between illness acceptance, self-management, and clinical outcomes. Third, data were collected using self-reported questionnaires, including the Acceptance of Illness Scale and the Diabetes Self-Management Scale. Although these validated scales provide valuable information, self-reporting may be subject to recall bias and social desirability bias. Finally, the cross-sectional design of the study does not allow causal inferences; therefore, the observed positive association between illness acceptance and diabetes self-management cannot establish a cause-effect relationship. Future multicenter, longitudinal studies including objective metabolic parameters and more diverse populations are recommended to confirm and expand these findings.

Conclusion

In our study, a positive association was found between illness acceptance and self-management levels in patients with type 2 diabetes. Regression analyses showed that illness acceptance was associated with self-management and the presence of complications, whereas self-management was associated with education, lifestyle, and treatment processes. The findings indicate that these processes are interconnected and should be addressed together. In primary care and family medicine practice, rather than focusing solely on pharmacological treatment, adopting a holistic approach that includes individualized interventions such as motivational interviewing, gradual exercise planning tailored to the individual's current physical capacity, and nutritional recommendations adapted to socioeconomic conditions may improve diabetes management by enhancing illness acceptance and self-management.

Ethical approval

This study has been approved by the Health Sciences University Ankara Training and Research Hospital Ethics Committee (approval date 06.03.2024, number 2451). Written informed consent was obtained from the participants.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: ASÖ, MÇ; data collection: ASÖ, MFF, ŞÇ; analysis and interpretation of results: ASÖ, MÇ; draft manuscript preparation: ASÖ. All authors reviewed the results and approved the final version of the article.

Source of funding

The authors declare the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest to disclose.

References

1. Kerner W, Brückel J. Definition, classification and diagnosis of diabetes mellitus. *Exp Clin Endocrinol Diabetes*. 2014;122(7):384-386. [\[Crossref\]](#)
2. International Diabetes Federation (IDF). *IDF Diabetes Atlas*. 11th ed. Brussels: IDF; 2025.
3. Sinclair A, Saeedi P, Kaundal A, Karuranga S, Malanda B, Williams R. Diabetes and global ageing among 65-99-year-old adults: findings from the International Diabetes Federation Diabetes Atlas, 9th edition. *Diabetes Res Clin Pract*. 2020;162:108078. [\[Crossref\]](#)
4. Satman I, Yilmaz T, Sengül A, et al. Population-based study of diabetes and risk characteristics in Turkey: results of the Turkish Diabetes Epidemiology Study (TURDEP). *Diabetes Care*. 2002;25(9):1551-1556. [\[Crossref\]](#)
5. Satman I, Omer B, Tutuncu Y, et al. Twelve-year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults. *Eur J Epidemiol*. 2013;28(2):169-180. [\[Crossref\]](#)
6. Şireci E, Yılmaz Karabulutlu E. Diabetes mellitus type II patients' acceptance of illness and determination of self efficacy levels for their care. *Anatol J Nurs Health Sci*. 2017;20(1):48-55.
7. Büyükkaya Besen D, Esen A. Adaptation of the Illness Acceptance Scale for diabetic individuals in the Turkish population. *TAF Preventive Medicine Bulletin*. 2011;10(2):155-164. [\[Crossref\]](#)
8. Arı N, Özdelikara A. The effect of family support on illness acceptance and treatment adherence in patients with type 2 diabetes mellitus admitted to internal medicine clinics: the case of Ordu province. *Turk J Diabetes Obes*. 2022;6(1):39-48. [\[Crossref\]](#)
9. Taşkın Yılmaz F, Şahin AD, TÜresin AK. The relationship between illness acceptance level and glycemic control in individuals with type 2 diabetes mellitus. *Cukurova Med J*. 2019;44(4):1284-1291. [\[Crossref\]](#)
10. Richardson A, Adner N, Nordström G. Persons with insulin-dependent diabetes mellitus: acceptance and coping ability. *J Adv Nurs*. 2001;33(6):758-763. [\[Crossref\]](#)

11. Kütmeç Yılmaz C. The effect of illness acceptance on the level of adaptation to chronic disease in individuals with type 2 diabetes. *Ordu Univ J Nurs Stud.* 2024;7(3):667-676. [\[Crossref\]](#)
12. Özkan Tuncay F, Kılıç AN. Evaluation of the relationship between diabetes symptoms and illness acceptance in individuals with type 2 diabetes. *Ordu Univ J Nurs Stud.* 2024;7(3):595-603. [\[Crossref\]](#)
13. Abubakari AR, Cousins R, Thomas C, Sharma D, Naderali EK. Sociodemographic and clinical predictors of self-management among people with poorly controlled type 1 and type 2 diabetes: the role of illness perceptions and self-efficacy. *J Diabetes Res.* 2016;2016:6708164. [\[Crossref\]](#)
14. Hajos TRS, Pouwer F, de Grooth R, et al. The longitudinal association between glycaemic control and health-related quality of life following insulin therapy optimisation in type 2 diabetes patients. A prospective observational study in secondary care. *Qual Life Res.* 2012;21(8):1359-1365. [\[Crossref\]](#)
15. Powers MA, Bardsley J, Cypress M, et al. Diabetes self-management education and support in type 2 diabetes: a joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. *J Acad Nutr Diet.* 2015;115(8):1323-1334. [\[Crossref\]](#)
16. Marathe PH, Gao HX, Close KL. American Diabetes Association Standards of medical care in diabetes 2017. *J Diabetes.* 2017;9(4):320-324. [\[Crossref\]](#)
17. Koç E. Evaluation of illness self-management in individuals diagnosed with type 2 diabetes and development of the Type 2 Diabetes Self-Management Scale [specialization thesis]. Ankara: Gazi University Faculty of Medicine; 2020.
18. Döner E, Çırpan R, Çürük GN. Determining the relationship between attitudes toward illness and health and illness acceptance in patients with diabetic foot. *Journal of Ege University Nursing Faculty.* 2023;39(1):81-91. [\[Crossref\]](#)
19. Bień A, Rzońca E, Kańczugowska A, Iwanowicz-Palus G. Factors affecting the quality of life and the illness acceptance of pregnant women with diabetes. *Int J Environ Res Public Health.* 2015;13(1):68. [\[Crossref\]](#)
20. Czerw AI, Bilińska M, Deptała A. The assessment of the impact of socio-economic factors in accepting cancer using the Acceptance of Illness Scale (AIS). *Contemp Oncol (Pozn).* 2016;20(3):261-265. [\[Crossref\]](#)
21. Bohanny W, Wu SFV, Liu CY, Yeh SH, Tsay SL, Wang TJ. Health literacy, self-efficacy, and self-care behaviors in patients with type 2 diabetes mellitus. *J Am Assoc Nurse Pract.* 2013;25(9):495-502. [\[Crossref\]](#)
22. Bernal H, Woolley S, Schensul JJ, Dickinson JK. Correlates of self-efficacy in diabetes self-care among Hispanic adults with diabetes. *Diabetes Educ.* 2000;26(4):673-680. [\[Crossref\]](#)
23. Pamungkas RA, Chamroonsawasdi K. Self-management based coaching program to improve diabetes mellitus self-management practice and metabolic markers among uncontrolled type 2 diabetes mellitus in Indonesia: a quasi-experimental study. *Diabetes Metab Syndr.* 2020;14(1):53-61. [\[Crossref\]](#)
24. Üstündağ Ş, Dayapoğlu N. Evaluation of barriers encountered by individuals with type 2 diabetes in disease management. *Journal of Adnan Menderes University Health Sciences Faculty.* 2021;5(3):514-533. [\[Crossref\]](#)
25. Aytemur M, İnkaya B. Investigation of diabetes complication risk perception and diabetes self-management skills in individuals with diabetes. *Turkish Journal of Diabetes and Obesity.* 2022;6(2):121-130. [\[Crossref\]](#)