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Evaluation of Health-Promoting Behaviors and Self-Management among Individuals with Type 2 Diabetes

Tip 2 Diyabetli Bireylerde Sağlığı Geliştirici Davranışlar ve Öz Yönetimin Değerlendirilmesi

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ABSTRACT

Aim: *This study was conducted to evaluate health promoting behaviors and self-management in patients with diabetes and determine the factors affecting.*

Material and Method: *This descriptive cross-sectional study was conducted with 205 individuals diagnosed with Type 2 diabetes at the internal medicine outpatient clinic of a secondary care hospital. Data were collected using an information form, the Type 2 Diabetes and Health Promotion Scale, and the Diabetes Self-Management Scale.*

Results: *The mean overall Type 2 Diabetes and Health-Promoting Scale score was 86.31 ± 19.71, and the mean overall Diabetes Self-Management Scale score was 6.16 ± 1.72. A significant difference was found between the individuals' mean total health promoting scores and their descriptive characteristics, including their level of education, income status, mode of treatment, regular health checks, perception of health status and perception of family support, and history of diabetes in the family ($p<0.05$). Additionally, it was shown that there was a significant relationship between the participants' mean total self-management scores and their marital status, financial status, form of treatment, regular health checkup, perception of health status, and perceived family support ($p<0.05$). A significant positive correlation was identified between participants' self-management scores and their overall health-promoting behavior scores ($p < 0.001$).*

Conclusion: *It was determined that individuals demonstrating health promoting behaviors had better diabetes self-management.*

Keywords*: Type 2 Diabetes, health promoting behaviors, self-management*

ÖZET

Amaç: *Bu araştırma diyabet hastalarının sağlığı geliştirici davranışlar ile öz yönetimini değerlendirmek ve etkileyen faktörleri belirlemek amacıyla yapıldı.*

Gereç ve Yöntem*: Tanımlayıcı ve kesitsel tipte tasarlanan bu araştırma, ikinci basamak bir hastanenin dahiliye polikliniğinde, Tip 2 diyabetli bireyler (n: 205) ile yürütülmüştür. Veri toplama aracı olarak bilgi formu, Tip 2 Diyabet ve Sağlığı Geliştirme Ölçeği ve Diyabet Öz Yönetim Skalası kullanılmıştır.*

Bulgular: *Diyabet öz yönetim skalası puan ortalaması 6.16 ± 1.72; Tip 2 diyabet ve sağlığı geliştirme ölçeği puan ortalaması ise 86.31 ± 19.71'dir. Bireylerin sağlığı geliştirici toplam puanları ile eğitim düzeyi, gelir durumu, tedavi şekli, düzenli sağlık kontrolü yaptırma durumu, sağlık durumu algısı ve algılanan aile desteği ve ailede diyabet öyküsü gibi tanımlayıcı özellikler arasında anlamlı bir farklılığın olduğu belirlenmiştir ($p<0.05$). Aynı zamanda, medeni durum, gelir durumu, tedavi şekli, düzenli sağlık kontrolü yaptırma durumu, sağlık durumu algısı ve algılanan aile desteği ile bireylerin öz yönetim toplam puan ortalamaları arasında anlamlı bir farklılığın olduğu saptanmıştır ($p<0.05$). Sağlığı geliştirici davranışlar ile öz yönetim puan ortalaması arasında pozitif yönde anlamlı ilişki bulunmuştur ($p<0.001$).*

Sonuç: *Sağlığı geliştirici davranışları hayata geçiren bireylerin diyabet öz yönetimlerinin daha iyi olduğu belirlenmiştir.*

Anahtar kelimeler: *Tip 2 Diyabet, sağlığı geliştirici davranışlar, öz yönetim*

INTRODUCTION

Diabetes, a chronic condition characterized by elevated glucose levels resulting from metabolic dysfunction and insufficient insulin secretion, poses a significant global health challenge (Ernawati, Wihastuti, & Utami, 2021). Currently impacting 537 million individuals aged 20 to 79 worldwide, this figure is projected to surge to 780 million by 2045 (International Diabetes Federation). Particularly prevalent in developing nations, diabetes stands as the foremost metabolic disorder, with Türkiye expected to contend with an estimated 13.4 million cases by 2045 (Suni et al., 2022). Approximately 90% of all diabetes cases are Type 2 diabetes, placing individuals at a heightened risk of developing debilitating complications like cardiovascular disease, retinopathy, and kidney disease. Research indicates that at least 80% of chronic diseases, including diabetes, may be managed through lifestyle modifications and engagement in health-promoting behaviors (Chahardah-Cherik, Gheibizadeh, Jahani, & Cheraghian, 2018). These behaviors play a crucial role not only in improving quality of life but also in reducing healthcare costs by preventing the onset and progression of disease (Mo & Winnie, 2010).

A health-promoting lifestyle supports disease prevention, encourages personal responsibility for health, and contributes to individual well-being (Alpar, Senturan, Karabacak, & Sabuncu, 2008). A healthy lifestyle and adherence to health-promoting behaviors are fundamental in the management of Type 2 diabetes and mitigating associated complications. By consistently maintaining these behaviors, individuals with diabetes can enhance their overall health and longevity (Kalangadan, Puthiyamadathi, Koottat, Rawther, & Beevi, 2020). Existing literature demonstrates a positive correlation between adopting a healthy lifestyle and improving health status and glycemic control among individuals with Type 2 diabetes (Greaves et al., 2011; Saffari, Karimi, Koenig, & Al-Zaben, 2015). Research findings indicate that patients with higher scores in health-promotion behaviors exhibit better diabetes management, emphasizing the importance for healthcare professionals to assess and support such behaviors in diabetic patients (Chen et al.,2013).

Health-promoting behaviors are recognized as pivotal elements in the self-management of Type 2 diabetes and in enhancing the overall quality of life for individuals with diabetes (Chahardah-Cherik et al., 2018). Encouraging patients to actively engage in self-management practices is essential for preventing complications associated with diabetes. Given that diabetes management is a multifaceted and lifelong endeavor, self-management encompasses a range of daily actions undertaken by patients to effectively control their condition (Kurnia, Amatayakul, & Karuncharernpanit, 2017).

Self-management variables in diabetes encompass a spectrum of activities essential for optimal disease control, including adherence to oral antidiabetic medication and insulin regimens, engagement in physical activity, establishment of a nutritious eating plan, avoidance of behaviors detrimental to health, regular blood glucose monitoring, foot care practices, maintenance of a healthy body weight, moderation of alcohol consumption, abstinence from smoking, and the development of daily health-related plans (Habibi Soola, Davari, & Rezakhani Moghaddam, 2022). In Type 2 diabetes, effective self-management serves as the cornerstone for achieving favorable glycemic control and mitigating the risk of both microvascular and macrovascular complications (Stopford, Winkley, & Ismail, 2013). Notably, a study involving Thai individuals with Type 2 diabetes highlights the association between diabetes self-management and glycemic control (Hurst, Rakkapao, & Hay, 2020). Recognizing the pivotal role of adherence to health-promoting behaviors and the significance of self-management in diabetes, this study aims to explore health-promoting behaviors and self-management practices while identifying influencing factors within this context.

MATERIALS AND METHODS

Research Type

The research is described as a descriptive and cross-sectional study.

Study Population and Sample

The population under investigation comprised individuals who sought medical care at the internal medicine outpatient clinic of a secondary care hospital located in Sakarya province, Türkiye, and were under follow-up for diabetes. The study was conducted between July 22, 2019, and September 20, 2019, involving a sample of 205 participants aged 18 years or older, diagnosed with Type 2 diabetes for a minimum of 1 year, non-pregnant, proficient in Turkish language, and willing to

participate in the study. The average duration required to complete the data collection form ranged from 15 to 20 minutes. The power of the study was calculated using the "G. Power-3.1.9.2" program. Based on the analysis of data from 205 individuals, an effect size of 0.715 was determined at a significance level of $\alpha = 0.05$, and the post-hoc power was calculated to be 1.00. The minimum power value to be obtained for post-hoc analysis is 0.67. The statistical power was deemed sufficient to detect significant effects.

Data Collection Tools

Research data were collected utilizing three main instruments: an information form, the Type 2 Diabetes and Health Promotion Scale (T2DHPS), and the Diabetes Self-Management Scale (DSMS).

Information Form: The information form used in the study comprised a total of twelve questions, covering various aspects related to the socio-demographic characteristics and diabetes-related factors of the participants. Specifically, it included five questions addressing socio-demographic attributes such as age, gender, marital status, education level, and income status. In addition, seven questions focused on diabetes-specific variables, including duration of diagnosis, treatment type, regularity of health check-ups, perceived family support, perception of health status, family history of diabetes, and participation in diabetes education programs (Huang, Zhao, Li, & Jiang, 2014; Erol ve Yanık, 2016; Üren ve Karabulutlu, 2018).

Type 2 Diabetes and Health Promotion Scale (T2DHPS): The Type 2 Diabetes and Health Promotion Scale (T2DHPS) was developed by Chen et al. (2013) as a tool to assess the lifestyle habits of individuals with Type 2 diabetes. Its Turkish adaptation, including validity and reliability testing, was conducted by Yıldız and Kavuran (2018). The scale comprises twenty-eight items organized into six sub-dimensions: physical activity, risk reduction behavior, stress management, enjoyment of life, health responsibility, and healthy eating. Respondents rate each item on a 5-point Likert scale ranging from 1 to 5, where higher scores indicate a healthier lifestyle conducive to improving health. The original scale demonstrated strong internal consistency, with a Cronbach's alpha value of 0.89, while the Turkish version yielded a Cronbach's Alpha value of 0.84 (Chen et al., 2013; Yıldız & Kavuran 2018). In the current study, the Cronbach's Alpha reliability coefficient for the scale was determined to be 0.90.

Diabetes Self-Management Scale (DSMS): The scale developed by Schmitt et al. (2013) underwent Turkish validity and reliability testing conducted by Eroğlu and Sabuncu (2018). Comprising sixteen items, the scale encompasses four sub-dimensions: glucose management, diet control, physical activity, and utilization of health services. Participants rate each item on a 4-point Likert scale, with scores ranging from 0 to 10. Higher scores on the scale indicate increased levels of diabetes self-management. The original scale demonstrated good internal consistency, with a Cronbach's alpha value of 0.84, while the Turkish adaptation yielded a Cronbach's Alpha value of 0.85 (Schmitt et al., 2013; Eroğlu & Sabuncu, 2018). In the current study, the Cronbach's Alpha reliability coefficient for the scale was determined to be 0.82.

Ethical Consideration

The study commenced following approval (Date: 19.07.2019 and Approval Number: 230-50) from the ethics committee. Consent was also obtained from the hospital where the study was conducted. Additional approval was obtained from the researchers who conducted the Turkish validity and reliability studies of the scales. Prior to participation, the purpose of the study was explained to the patients, and their informed written consent was obtained. The study adhered to the ethical principles outlined in the Declaration of Helsinki.

Data Analysis

The data analysis was performed using SPSS version 23.0. Categorical variables were summarized using frequency distributions (number, percentage), while numerical variables were described using descriptive statistics (mean, standard deviation, minimum, maximum). Group differences were assessed using independent sample t-tests, One-Way Analysis of Variance (ANOVA), and post-hoc tests (such as Bonferroni and Tamhane's T2). The relationship between variables was examined using Pearson correlation tests. The reliability of the scales was evaluated using Cronbach's alpha coefficient. Statistical significance was set at $p<0.05$

RESULTS

In the study, the mean age of individuals with diabetes was 62.11 ± 11.11 years, with 67.8%

being female and 82.4% married. Socio-demographic findings are presented in Table 1.

Table 1. Distribution of Sociodemographic and Disease Characteristics of Patients (n=205)

		n	%
Gender	Female	139	67.8
	Male	66	32.2
Marital status	Married	169	82.4
	Single	36	17.6
Age (mean ± sd)		62.11 ± 11.11	
Education level	Literate	41	20.0
	Primary School	119	58.0
	Middle School	11	5.4
	High School	19	9.3
	University	15	7.3
Income status	Income less than expenditure	31	15.1
	Income equal to expenditure	154	75.1
	Income more than expenditure	20	9.8
Duration of diabetes diagnosis	1-5 years	79	38.5
	6-10 years	42	20.5
	11-20 years	41	20.0
	Over 20 years	43	21.0
Treatment modality	Oral antidiabetic drug (OAD)	131	63.9
	Insulin	43	21.0
	OAD +Insulin	31	15.1
Family history of diabetes	Yes	101	49.3
	No	104	50.7
Having regular health check-ups	Yes	184	89.8
	No	21	10.2
Diabetes education status	Received	105	51.2
	Did Not Receive	100	48.8
Perceiving Health Status	Good	72	35.1
	Medium	108	52.7
	Bad	25	12.2
Perceived Family Support	Yes	190	92.7
	No	15	7.3

Table 2. Type 2 Diabetes and Health Promotion Scale Sub-dimensions and Diabetes Self-management Scale Sub-dimension Mean Scores

Scales	Mean ± SD	Min-Max	Cronbach's alfa
Glucose management	7.07 ± 2.50	0.0-10.0	0.798
Diet control	6.20 ± 2.00	0.0-10.0	0.639
Physical activity	3.06 ± 3.65	0.0-10.0	0.913
Use of health services	7.46 ± 2.18	1.1-10.0	0.533
Diabetes self-management scale	6.16 ± 1.72	0.6-9.8	0.826
Physical activity behavior	13.51 ± 8.88	7.0-35.0	0.967
Risk reduction behavior	21.40 ± 6.63	7.0-35.0	0.763
Stress management behaviors	18.12 ± 3.63	8.0-25.0	0.440
Life enjoyment	12.89 ± 2.38	5.0-15.0	0.681
Health responsibility behaviors	10.78 ± 3.31	3.0-15.0	0.813
Healthy nutrition	9.62 ± 2.78	3.0-15.0	0.782
Type 2 diabetes and health promotion scale	86.31 ± 19.71	42.0-131.0	0.906

The participants' mean score was 6.16 ± 1.72 on the Diabetes Self-Management Scale (DSMS) and 86.31 ± 19.71 on the Type 2 Diabetes and Health Promotion Scale (T2DHPS) (Table 2).

The analysis revealed that the mean total score of the T2DHPS was significantly higher among individuals who were university graduates, had higher income than expenses, utilized oral antidiabetic drugs and insulin in their treatment regimen, had a family history of diabetes, attended regular health check-ups, received family support, and perceived their health as good or fair ($p<0.05$) (Table 3).

Table 3. Comparison of Sociodemographic and Disease Characteristics of Individuals with Diabetes and Type 2 Diabetes and Health Promotion Scale and Its Subscales

	Physical activity behavior	Risk reduction behavior	Stress management behaviors	Life enjoyment	Health responsibility behaviors	Healthy nutrition	Type 2 diabetes and health promotion scale total score
	Mean ± sd	**Mean ± sd**	**Mean ± sd**	**Mean ± sd**	**Mean ± sd**	**Mean ± sd**	**Mean ± sd**
Gender							
Female	13.48 ± 8.72	21.07 ± 6.45	17.92 ± 3.81	12.71 ± 2.37	10.53 ± 3.35	9.87 ± 2.76	85.58 ± 19.66
Male	13.58 ± 9.29	22.08 ± 6.99	18.53 ± 3.22	13.29 ± 2.38	11.30 ± 3.19	9.09 ± 2.76	87.86 ± 19.89
Test/p[t]	-0.07/0.944	-1.013/0.312	-1.124/0.263	-1.642/0.102	-1.578/0.116	1.888/0.060	-0.776/0.439
Marital status							
Married	13.80 ± 9.02	21.84 ± 6.75	18.09 ± 3.56	13.01 ± 2.32	10.85 ± 3.34	9.53 ± 2.76	87.12 ± 19.86
Single	12.14 ± 8.17	19.31 ± 5.62	18.25 ± 4.00	12.33 ± 2.63	10.42 ± 3.18	10.06 ± 2.88	82.50 ± 18.78
Test/p	1.022/0.308	**2.101/0.037**	-0.241/0.810	1.556/0.121	0.716/0.475	-1.037/0.301	1.280/0.202
Education level							
Literate	12.29 ± 8.36	18.10 ± 5.55	16.90 ± 3.54	12.12 ± 2.76	10.2 ± 3.51	9.83 ± 3.00	79.44 ± 18.11
Primary School	12.96 ± 8.20	21.77 ± 6.67	18.13 ± 3.74	12.95 ± 2.31	10.71 ± 3.3	9.61 ± 2.72	86.13 ± 19.05
Middle School	17.82±11.78	23.45 ± 7.46	19.09 ± 3.62	12.91 ± 2.59	11.55 ± 2.88	9.09 ± 2.39	93.91 ± 24.55
High School	12.42 ± 9.41	21.58 ± 4.68	18.58 ± 3.11	13.42 ± 1.74	10.00 ± 3.21	9.05 ± 2.93	85.05 ± 17.77
University	19.47±10.47	25.67 ± 7.25	20.00 ± 2.75	13.87 ± 2.10	13.27 ± 2.12	10.27 ± 2.84	102.53±19.03
Test/p[A]	**2.807/0.027**	**4.794/0.001**	**2.503/0.044**	1.985/0.098	**2.971/0.021**	0.555/0.696	**4.505/0.002**
Income status							
Income less than expenditure	9.00 ± 4.01	18.06 ± 6.53	15.87 ± 3.51	11.55 ± 3.17	9.16 ± 3.27	9.48 ± 2.97	73.13 ± 17.14
Income equal to expenditure	13.89 ± 9.23	21.38 ± 6.52	18.29 ± 3.53	13.05 ± 2.21	10.81 ± 3.33	9.66 ± 2.80	87.06 ± 19.33
Income more than expenditure	17.6 ± 9.20	26.70 ± 3.79	20.30 ± 2.92	13.80 ± 1.40	13.00 ± 1.41	9.55 ± 2.44	100.95± 13.68
Test/p[A]	**6.598/0.002**	**11.374/0.000**	**10.63/0.000**	**7.091/0.001**	**8.849/0.000**	0.056/0.946	**14.181/0.000**
Duration of diabetes diagnosis							
1-5 years	12.61 ± 8.27	20.29 ± 6.22	17.90 ± 3.78	12.77 ± 2.38	9.95 ± 3.17	9.24 ± 2.85	82.76 ± 18.48
6-10 years	16.19±10.39	21.76 ± 6.64	18.19 ± 3.49	12.95 ± 2.52	10.90 ± 3.48	9.90 ± 2.77	89.90 ± 21.33
11-20 years	13.51 ± 8.75	22.71 ± 7.00	18.88 ± 3.33	13.46 ± 2.04	11.78 ± 3.09	10.07 ± 2.55	90.41 ± 19.45
Over 20 years	12.56 ± 8.27	21.81 ± 6.89	17.72 ± 3.78	12.51 ± 2.54	11.21 ± 3.34	9.60 ± 2.87	85.42 ± 19.87
Test/p[A]	1.729/0.162	1.374/0.252	0.87/0.457	1.229/0.300	**3.276/0.022**	1.001/0.393	1.969/0.120
Treatment modality							
Oral antidiabetic drug (OAD)	13.08 ± 8.43	20.4 ± 6.31	17.89 ± 3.61	12.77 ± 2.33	10.29 ± 3.25	9.42 ± 2.78	83.84 ± 18.85
Insulin	13.12 ± 8.75	23.12 ± 7.27	17.84 ± 4.00	12.67 ± 2.80	11.33 ± 3.81	9.42 ± 2.57	87.49 ± 21.69
OAD +Insulin	15.90±10.70	23.23 ± 6.33	19.48 ± 2.90	13.71 ± 1.81	12.06 ± 2.25	10.74 ± 2.86	95.13 ± 18.30
Test/p[A]	1.327/0.267	**4.25/0.016**	2.632/0.074	2.196/0.114	**4.506/0.012**	3.037/0.050	**4.346/0.014**
Family history of diabetes							
Yes	14.51 ± 9.40	22.79 ± 6.80	18.58 ± 3.62	12.87 ± 2.40	11.12 ± 3.51	9.44 ± 2.74	89.32 ± 20.65
No	12.54 ± 8.28	20.04 ± 6.19	17.66 ± 3.60	12.91 ± 2.38	10.44 ± 3.09	9.80 ± 2.82	83.39 ± 18.39
Test/p[t]	1.598/0.111	**3.034/0.003**	1.826/0.069	-0.126/0.900	1.468/0.144	-0.933/0.352	**2.170/0.031**
Having regular health check-ups							
Yes	13.69 ± 8.98	21.79 ± 6.60	18.27 ± 3.59	13.13 ± 2.24	11.2 ± 3.12	9.86 ± 2.71	87.92 ± 19.22
No	11.95 ± 8.05	17.95 ± 5.95	16.81 ± 3.82	10.86 ± 2.65	7.10 ± 2.61	7.52 ± 2.58	72.19 ± 18.74
Test/p[t]	0.849/0.397	**2.546/0.012**	1.751/0.081	**4.303/0.000**	**5.793/0.000**	**3.762/0.000**	**3.563/0.000**
Diabetes education status							
Received	14.73 ± 9.77	22.84 ± 7.06	18.11 ± 3.76	12.77 ± 2.30	11.19 ± 3.33	9.26 ± 2.56	88.90 ± 21.43
Did Not	12.23 ± 7.69	19.88 ± 5.80	18.12 ± 3.51	13.02 ± 2.47	10.34 ±3 .24	10.00 ± 2.96	83.59 ± 17.43

Receive							
Test/p[t]	**2.044/0.042**	**3.285/0.001**	-0.011/0.991	-0.745/0.457	1.85/0.066	-1.918/0.057	1.952/0.052
Perceiving Health Status							
Good	15.32 ± 9.90	21.11 ± 5.81	18.35 ± 3.84	13.07 ± 2.26	10.63 ± 3.08	9.44 ± 2.76	87.92 ± 20.62
Medium	13.45 ± 8.50	22.56 ± 6.93	18.24 ± 3.41	13.31 ± 1.94	11.25 ± 3.36	9.81 ± 2.60	88.62 ± 18.29
Bad	8.56 ± 4.83	17.20 ± 5.90	16.92 ± 3.84	10.60 ± 3.18	9.16 ± 3.30	9.28 ± 3.55	71.72 ± 17.31
Test/p[A]	**5.620/0.004**	**7.136/0.001**	1.575/0.210	**15.244/0.000**	**4.299/0.015**	0.593/0.553	**8.396/0.000**
Perceived Family Support							
Yes	13.88 ± 9.08	21.59 ± 6.57	18.24 ± 3.54	13.05 ± 2.31	10.96 ± 3.28	9.81 ± 2.76	87.52 ± 19.53
No	8.80 ± 3.55	18.93 ± 7.11	16.60 ± 4.50	10.93 ± 2.52	8.47 ± 2.90	7.27 ± 1.91	71.00 ± 15.52
Test/p[t]	**4.505/0.000**	1.499/0.135	1.689/0.093	**3.39/0.001**	**2.856/0.005**	**4.776/0.000**	**3.195/0.002**

A: One-way ANOVA test, t: Independent sample t test

Table 4. Comparison of Diabetes Self-management Scale and Its Sub-dimensions with Sociodemographic and Disease Characteristics of Individuals with Diabetes

	Glucose management	Diet control	Physical activity	Use of health services	Diabetes Self-Management Scale Total Score
	Mean ± sd	Mean ± sd	Mean ± sd	Mean ± sd	Mean ± sd
Gender					
Female	7.02 ± 2.41	6.22 ± 2.01	2.97 ± 3.58	7.43 ± 2.22	6.13 ± 1.62
Male	7.17 ± 2.71	6.14 ± 2.00	3.25 ± 3.80	7.53 ± 2.10	6.25 ± 1.92
Test/p[t]	-0.400/0.689	0.289/0.773	-0.505/0.614	-0.280/0.780	-0.471/0.638
Marital status					
Married	7.22 ± 2.47	6.33 ± 1.87	3.16 ± 3.64	7.56 ± 2.15	6.29 ± 1.64
Single	6.37 ± 2.6	5.56 ± 2.47	2.59 ± 3.69	7.01 ± 2.27	5.60 ± 1.99
Test/p[t]	1.857/0.065	1.778/0.082	0.851/0.396	1.391/0.166	**2.206/0.029**
Education level					
Literate	6.60 ± 2.62	6.08 ± 2.12	2.90 ± 3.67	7.24 ± 2.20	5.93 ± 1.66
Primary School	7.15 ± 2.52	6.16 ± 1.93	2.74 ± 3.4	7.39 ± 2.21	6.09 ± 1.64
Middle School	6.85 ± 2.60	5.76 ± 1.92	4.85 ± 4.11	7.37 ± 2.35	6.29 ± 2.20
High School	7.19 ± 2.14	6.49 ± 2.09	2.34 ± 3.65	8.07 ± 2.15	6.29 ± 1.89
University	7.69 ± 2.57	6.78 ± 2.31	5.70 ± 4.13	8.00 ± 1.79	7.14 ± 1.81
Test/p[A]	0.649/0.628	0.595/0.667	**3.208/0.014**	0.747/0.561	1.506/0.202
Income status					
Income less than expenditure	5.87 ± 2.72	6.02 ± 2.24	2.29 ± 2.80	6.67 ± 2.43	5.36 ± 1.63
Income equal to expenditure	7.06 ± 2.42	6.17 ± 2.04	3.10 ± 3.73	7.43 ± 2.10	6.17 ± 1.7
Income more than expenditure	8.97 ± 1.54	6.67 ± 1.18	3.94 ± 4.04	8.94 ± 1.67	7.34 ± 1.37
Test/p[A]	**10.119/0.000**	0.682/0.507	1.287/0.278	**7.120/0.001**	**8.681/0.000**
Duration of diabetes diagnosis					
1-5 years	6.41 ± 2.42	6.15 ± 2.12	2.46 ± 3.50	7.30 ± 2.27	5.79 ± 1.73
6-10 years	6.98 ± 3.01	6.17 ± 2.10	4.15 ± 3.94	7.04 ± 2.44	6.25 ± 1.96
11-20 years	7.92 ± 2.19	6.52 ± 1.86	3.31 ± 3.65	8.02 ± 2.01	6.69 ± 1.68
Over 20 years	7.57 ± 2.10	5.99 ± 1.84	2.87 ± 3.46	7.65 ± 1.80	6.26 ± 1.35
Test/p[A]	**4.192/0.007**	0.534/0.659	2.106/0.101	1.705/0.167	2.654/0.050
Treatment modality					
Oral antidiabetic drug (OAD)	6.45 ± 2.55	6.05 ± 2.18	2.94 ± 3.6	7.14 ± 2.18	5.85 ± 1.76
Insulin	8.16 ± 2.04	6.40 ± 1.74	2.92 ± 3.56	7.83 ± 2.06	6.58 ± 1.64
OAD +Insulin	8.17 ± 2.00	6.53 ± 1.46	3.76 ± 3.97	8.32 ± 2.09	6.91 ± 1.29
Test/p[A]	**12.225/0.000**	1.000/0.370	0.674/0.511	**4.564/0.012**	**6.662/0.002**
Family history of diabetes					
Yes	7.43 ± 2.36	5.97 ± 1.84	3.5 ± 3.78	7.43 ± 2.24	6.29 ± 1.62
No	6.72 ± 2.60	6.42 ± 2.14	2.64 ± 3.48	7.50 ± 2.12	6.05 ± 1.81
Test/p[t]	**2.058/0.041**	-1.625/0.106	1.695/0.092	-0.244/0.808	1.005/0.316
Having regular health check-ups					
Yes	7.36 ± 2.41	6.42 ± 1.87	3.05 ± 3.66	7.74 ± 2.05	6.37 ± 1.60
No	4.57 ± 1.83	4.21 ± 2.03	3.17 ± 3.61	5.03 ± 1.71	4.34 ± 1.69
Test/p[t]	**6.369/0.000**	**5.088/0.000**	-0.149/0.882	**5.835/0.000**	**5.503/0.000**
Diabetes education status					
Received	7.47 ± 2.33	5.94 ± 2.00	3.78 ± 3.95	7.45 ± 2.27	6.31 ± 1.82
Did Not Receive	6.65 ± 2.62	6.46 ± 1.98	2.31 ± 3.14	7.48 ± 2.09	6.01 ± 1.61
Test/p[t]	**2.350/0.020**	-1.847/0.066	**2.949/0.004**	-0.092/0.927	1.272/0.205
Perceiving Health Status					
Good	6.99 ± 2.47	6.26 ± 2.00	3.67 ± 4.01	7.58 ± 2.11	6.29 ± 1.78
Medium	7.29 ± 2.38	6.24 ± 1.84	3.08 ± 3.48	7.51 ± 2.18	6.27 ± 1.54
Bad	6.35 ± 3.02	5.80 ± 2.64	1.24 ± 2.65	6.93 ± 2.34	5.36 ± 2.11
Test/p[A]	1.503/0.225	0.554/0.576	**4.250/0.016**	0.863/0.424	**3.200/0.043**
Perceived family support					
Yes	7.22 ± 2.46	6.36 ± 1.89	3.18 ± 3.72	7.58 ± 2.16	6.31 ± 1.65
No	5.11 ± 2.29	4.06 ± 2.25	1.63 ± 2.22	6.00 ± 1.87	4.36 ± 1.60
Test/p[t]	**3.218/0.002**	**4.495/0.000**	**2.443/0.024**	**2.747/0.007**	**4.406/0.000**

A: One-way ANOVA test, t: Independent sample t test

Table 5. Type 2 Diabetes and Health-Promotion Scale sub-dimensions and Diabetes Self management Scale Sub-dimensions Correlation

		Glucose management	Diet control	Physical activity	Use of health services	Diabetes self-management scale
Physical activity behavior	r	0.283	0.153	0.881	0.136	0.567
	p	**0.000**	**0.029**	**0.000**	0.052	**0.000**
Risk reduction behavior	r	0.447	0.228	0.280	0.338	0.462
	p	**0.000**	**0.001**	**0.000**	**0.000**	**0.000**
Stress management behaviors	r	0.240	0.194	0.168	0.236	0.305
	p	**0.001**	**0.005**	**0.016**	**0.001**	**0.000**
Life enjoyment	r	0.432	0.515	0.168	0.473	0.560
	p	**0.000**	**0.000**	**0.016**	**0.000**	**0.000**
Health responsibility behaviors	r	0.563	0.399	0.211	0.508	0.605
	p	**0.000**	**0.000**	**0.002**	**0.000**	**0.000**
Healthy nutrition	r	0.296	0.628	0.246	0.436	0.556
	p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Type 2 diabetes and health promotion scale	r	0.510	0.399	0.613	0.423	0.715
	p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

r: Pearson correlation coefficient

However, the mean total score of the DSMS was significantly higher among individuals who were married, had higher income than expenses, used oral antidiabetic drugs and insulin in their treatment protocol, attended regular health check-ups, received family support, and perceived their health status as good or moderate ($p<0.05$) (Table 4). The analysis revealed a significant positive relationship between the total mean scores of the two scales ($r = 0.715$, $p < 0.001$). This indicates that as individuals' adoption of healthy lifestyle behaviors increases, their self-management of diabetes also increases (Table 5).

DISCUSSION

The primary objective of this study was to assess the health-promotion behaviors and self-management practices among individuals with type 2 diabetes, while also examining their interplay. The findings were then analyzed in the context of existing literature. Gender and marital status did not demonstrate significant associations with health-promoting behaviors in this study. While certain studies corroborate these results by suggesting no disparity in health-promoting behaviors based on gender and marital status (Kalangadan et al., 2020; Tol, Mohebbi, Sadeghi, Maheri, & Eshraghian, 2014; Mirsamiyazdi et al., 2021), others present contrasting findings, indicating potential influences of gender and marital status on such behaviors among individuals with type 2 diabetes (Lim et al., 2023; Khazew, & Faraj, 2024; Saffari et al., 2015). Although our findings were not statistically significant, we hypothesize that the relationship between variables such as gender and marital status and health-promoting behaviors in individuals with diabetes may vary, warranting further investigation in this regard.

This study revealed that university graduates exhibited better health-promoting behaviors. This finding is compatible with a study conducted in Iran, which also reported a positive correlation between education level and health-promoting behaviors. Specifically, the study found that as the level of education increased, the adoption of health-promoting behaviors among individuals with diabetes also increased (Mirsamiyazdi et al., 2021). However, Kalangadan et al. (2020) reported contrary findings, stating that education level was not associated with health-promoting behaviors. Nevertheless, individuals with higher levels of education are often inclined to improve their lifestyle habits. Low education levels can pose as barriers to effective problem-solving. Therefore, it is imperative to ensure that individuals with lower levels of education have access to accurate health information and services. Health professionals should tailor their approach to accommodate individuals with lower education levels by providing information in a simple and understandable manner (Ardakani et al., 2019).

Consistent with findings from previous studies (Tol et al., 2014; Shafeea & Naji, 2021), our study

also observed that individuals with diabetes whose income exceeded their expenses exhibited better health-promoting behaviors. The reason for our finding being compatible with the literature can be attributed to the notion that individuals with higher socioeconomic status are more likely to possess better skills in risk reduction, health responsibility, enjoyment of life, and stress management, as well as have more opportunities to engage in physical activity and receive counseling.

The findings suggest that perceived family support plays a significant role in fostering healthy lifestyle behaviors among individuals with diabetes. This observation is consistent with previous studies conducted among Type 2 diabetes patients in Indonesia (Putra, Kusnanto, Asmoro, & Sukartini, 2019) and Iran (Fazli, Seyedrasooli, Jabbarzadeh Tebrizi, Sarbakhsh, & Hosseinzadeh, 2023). Family members often contribute to supporting patients with diabetes by assisting in food preparation and organizing mealtimes, encouraging physical exercise, facilitating blood glucose monitoring, and promoting other health-promoting behaviors (Shi et al., 2016).

Moreover, our study revealed that individuals with diabetes who used oral antidiabetic medications and insulin demonstrated better health-promotion behaviors compared to those in other treatment groups. However, when considering studies examining the relationship between treatment type and health-promoting behaviors among patients with diabetes, divergent results emerge. For instance, a study conducted in Korea reported that individuals with Type 2 diabetes who solely used insulin exhibited better health-promoting behaviors (Kim, Kim, & Choi, 2018). Conversely, a study in Iran found that the treatment modality for diabetes did not significantly influence health-promoting behaviors (Tol et al., 2014). It is thought that medication compliance, especially regular antidiabetic and insulin use, is effective in these results.

Consistent with previous studies (Kalangadan et al., 2020; Fazli et al., 2023), the scores on the T2DHPS were significantly higher among individuals with a family history of diabetes compared to those without. Individuals with a family history of diabetes are thought to have higher T2DHPS scores based on experience (Tezcan & Karabacak, 2022). For example, an individual who witnesses a family member experiencing diabetes complications may be motivated to adopt higher levels of positive health behaviors in order to avoid experiencing these complications. In our study, diabetic patients who rated their health as good or moderate exhibited healthier lifestyles compared to those who rated their health as poor. In a study conducted by Ware et al. (2022) with adults, it was determined that individuals with a more positive evaluation of their health status were better able to adapt to healthy living behaviors (Ware, Landy, Rabil, Hennekens, & Hecht, 2022). The high level of healthy living behaviors in the group that defined their health status as good and moderate may suggest that diabetic individuals adopt a healthy lifestyle to protect their health.

These findings underscore the importance of closely monitoring individuals with diabetes who have lower education levels, limited income, receive oral antidiabetic treatment, and lack family support in terms of health-promotion. Such individuals may benefit from targeted interventions aimed at enhancing their health-promoting behaviors and overall management of diabetes.

In our study, self-management scores remained consistent across variables such as gender, educational status, duration of diagnosis, family history of diabetes, and participation in diabetes education. However, we observed that married patients with diabetes exhibited higher self-management scores compared to single patients. This finding is supported by previous research, which has shown that married individuals with Type 2 diabetes often receive emotional and physical support from their spouses, facilitating adherence to appropriate diet, weight loss, and follow-up care (Gunggu, Thon, & Lian, 2016). Our study's findings are in line with existing literature examining the relationship between marital status and diabetes self-management (Chen & Su, 2022; İsmailoğlu & Timuçin, 2022).

Individuals who underwent regular diabetes check-ups demonstrated higher self-management scores compared to those who did not. This underscores the importance of clear information and education provided during medical appointments, as patients who receive comprehensive guidance about their condition are more likely to understand the significance of disease self-care and adhere to diabetes self-management behaviors (Khalooei & Benrazavy, 2019; Bigdeli, Hashemi Nazari, Khodakarim, & Brodati, 2016). Moreover, our study revealed that

socioeconomic status plays a significant role in self-management, consistent with findings from Chen & Su, (2022). Mayberry et al. also reported that individuals with low socioeconomic status often have less confidence in their diabetes self-management skills, which may lead to ineffective blood glucose control (Mayberry, Harper, & Osborn, 2016).

Our study revealed that individuals with diabetes who used both oral antidiabetic medications and insulin exhibited higher self-management scores. This finding aligns with previous research indicating that individuals employing a combination of oral antidiabetic medications and insulin tend to monitor their blood glucose levels more effectively (Çiçek, 2019). However, contrasting findings have been reported in the literature. For instance, Alanyalı and Arslan found that self-management scores were higher among oral antidiabetic users (Alanyalı & Arslan, 2020). Similarly, another study reported lower self-management scores among individuals using a combination of insulin and oral antidiabetic medications compared to those on other treatment regimens (Bakır, & Zengin, 2023). Existing literature suggests that individuals receiving insulin treatment tend to have higher self-management scores compared to those receiving oral antidiabetic treatment alone. This disparity may be attributed to the fact that patients requiring insulin typically have more severe and complicated diseases, leading to increased support from health professionals to manage their conditions effectively (Khalooei & Benrazavy, 2019).

In our study, we found that patients who perceived their health as good exhibited higher levels of diabetes self-management. Similarly, in the study conducted by Putra et al., it was observed that health perception affects self-care practices, diabetes management strategies and overall quality of life (Putra et al., 2019). Health perception has an important role in shaping the self-management behaviors of individuals with diabetes. Individuals with diabetes who perceive their health as good may exhibit a positive attitude towards life. It is thought that patients with a high health perception actively participate in the treatment process and take part in effective diabetes management.

Another influential factor in diabetes self-management is perceived family support. A study conducted in Malaysia identified family support as a predictor of diabetes self-management, emphasizing that strong support from family members instills confidence in patients and contributes to better disease control and self-management (Gunggu et al., 2016). Consistent with these findings, our study revealed that individuals with diabetes who perceived family support reported higher levels of self-management. This association between diabetes self-management and family support has been corroborated by numerous other studies (Ojewale, Oluwatosin, Fasanmade, & Odusan, 2019; Onyango, Namatovu, Besigye, Kaddumukasa, & Mbalinda, 2022). Family support may exert both informative and evaluative effects, helping individuals manage their daily routines and cope with the stress associated with their condition.

Another significant finding from our study is the observed relationship between health-promoting behaviors and diabetes self-management. We found that individuals who engaged in health-promoting behaviors exhibited better diabetes self-management. This finding aligns with existing literature, which consistently emphasizes the positive impact of health promotion on diabetes management (Lee & Smith, 2012; Sadiq, 2023).

Limitations of the Research

An important limitation of our study is its lack of generalizability beyond the study population. Since the research was conducted in a single hospital and only included individuals with Type 2 diabetes who presented to the outpatient clinic during a specific time frame and agreed to participate, the findings may not be applicable to broader populations. The information gathered regarding self-management and health-promotion behaviors relied on self-reported data.

CONCLUSION

In conclusion, numerous factors influence health-promoting behaviors and self-management in individuals with diabetes. This study further highlights a significant positive relationship between health-promoting behaviors and various dimensions of diabetes self-management. The adoption of healthier lifestyle habits contributes significantly to improved diabetes self-management. Given the essential role of health-promoting behaviors in diabetes self-management, it is recommended that health professionals design targeted interventions aimed at promoting and supporting the adoption of

healthy lifestyle practices among patients with diabetes.

Ethics Committe Approval

Ethics committee approval was received for this study from the Sakarya University Faculty of Medicine Non-Interventional Ethics Committee (Tarih: 19.07.2019 ve Karar No: 230-50)

Author Contributions

Idea/Concept: Ö.A., A.S., E.D. Design: Ö.A., A.S., E.D. Supervision/Consulting: Ö.A., A.S., E.D. Analysis and/or Interpretation: Ö.A., A.S., E.D. Literature Search: Ö.A., A.S., E.D. Writing the Article: Ö.A., A.S., E.D. Critical Review: Ö.A., A.S., E.D.

Peer-review

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Conflict of Interest

The authors have no conflict of interest to declare.

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