

## Quality of Life and Factors Affecting it in Elderly Individuals with Type 2 Diabetes

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### ABSTRACT

**Aim:** This study was conducted to determine the quality of life and physical activity level of elderly individuals with type 2 diabetes and to examine the factors affecting the quality of life of individuals.

**Material and Methods:** This research is a descriptive relational study. The study was conducted with elderly individuals admitted to the internal medicine outpatient clinic of a district state hospital in Konya. The sample size of the study consisted of a total of 228 individuals. Mann Whitney U, Kruskal-Wallis, multiple regression analysis were used in the analysis of the data.  $p < 0.05$  was considered statistically significant.

**Results:** According to the data of the study, mean age of the participants was  $71.81 \pm 6.62$ . According to the linear regression analysis, it was determined that age, number of drugs used, total physical activity, with whom he/she lives, doing regular exercise, and physician check were effective on predicting the physical health component of quality of life ( $p < 0.05$ ). It was determined that the effective variables explained 70.4% of the change on the physical health component of quality of life. Age, total physical activity, with whom he/she lives and physician check were found to be effective on the mental health component of quality of life ( $p < 0.05$ ). It was determined that the effective variables explained 56.5% of the change on the mental health component of quality of life.

**Conclusion:** According to the results of the study, it was determined that elderly individuals with type 2 diabetes had a moderate quality of life and a low level of physical activity. It may be recommended to plan support programs that will encourage elderly individuals to engage in physical activity and increase their quality of life.

**Keywords:** Type 2 diabetes, Elderly individual, Quality of life, Physical activity, Nursing

## Tip 2 Diyabeti Olan Yaşlı Bireylerde Yaşam Kalitesi ve Etkileyen Faktörler

### ÖZ

**Amaç:** Bu çalışma tip 2 diyabeti olan yaşlı bireylerin yaşam kalitesi ve fiziksel aktivite düzeyini belirlemek ve bireylerin yaşam kalitesini etkileyen faktörleri incelemek amacıyla yapılmıştır.

**Gereç ve Yöntemler:** Araştırma, tanımlayıcı ilişkisel tiptedir. Araştırma Konya'da bir ilçe devlet hastanesinin dahiliye polikliniğine başvuran yaşlı bireylerde yapılmıştır. Araştırmanın örnek büyüklüğü toplam 228 bireyden oluşmaktadır. Verilerin analizinde Mann Whitney U, Kruskal-Wallis, çoklu regresyon analizi kullanılmıştır.  $p < 0,05$  istatistiksel olarak anlamlı kabul edildi.

**Bulgular:** Araştırma verilerine göre katılımcıların yaş ortalaması  $71,81 \pm 6,62$ , %62,7'si kadındır. Regresyon analizine göre yaş, kullanılan ilaç sayısı, fiziksel aktivite toplam, kiminle yaşadığı, düzenli egzersiz yapma, hekim kontrolünün yaşam kalitesinin fiziksel sağlık bileşenini yordadığı belirlenmiştir ( $p < 0,05$ ). Etkili olan değişkenlerin yaşam kalitesinin fiziksel sağlık bileşeni üzerindeki değişimin %70,4'ini açıkladığı belirlenmiştir. Yaş, fiziksel aktivite toplam, kiminle yaşadığı, hekim kontrolünün yaşam kalitesinin mental sağlık bileşeni üzerinde etkili olduğu görülmüştür ( $p < 0,05$ ). Etkili olan değişkenlerin yaşam kalitesinin mental sağlık bileşeni üzerindeki değişimin % 56,5'i açıkladığı saptanmıştır.

**Sonuç:** Araştırma sonuçlarına göre, tip 2 diyabeti olan yaşlı bireylerin yaşam kalitesinin orta, fiziksel aktivitelerinin ise düşük düzeyde olduğu saptanmıştır. Yaşlı bireyleri fiziksel aktiviteye teşvik edecek ve yaşam kalitelerini artıracak destek programlarının planlanması önerilebilir.

**Anahtar Sözcükler:** Tip 2 diyabet, Yaşlı birey, Yaşam kalitesi, Fiziksel aktivite, Hemşirelik

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## INTRODUCTION

Elderly individuals constitute a significant portion of all individuals with diabetes (1). The prevalence of type 2 diabetes will continue to increase along with the increase in the elderly population (2). The fastest increase in the prevalence of type 2 diabetes was reported in the population aged 65 and over, in middle- and low-income countries. In the world, diabetes prevalence rises with age, with people over 65 having the highest estimated prevalence. The estimated number of diabetics aged 65-99 in 2019 is 135.6 million (19.3%). If current trends continue, the number of people with diabetes aged 65 and older (65-99 years) will be 195.2 million in 2030 and 276.2 million in 2045 (3). According to the Turkey Diabetes Epidemiology Study (2013), when the known prevalence of type 2 diabetes in our country was examined, it was reported to be 22.8% at the age of 65-69, 20.5% at the age of 70-74, 18.1% at the age of 75-79, and 15.3% at the age of 80 and above (4). In 2019, among countries in the EUR Region, adults aged 20-79 years Turkey has the highest age-adjusted comparative prevalence (11.1%). The number of people older than 65 years with diabetes in 2045 was estimated as 4.8 millions (3).

The increasing prevalence of diabetes in the elderly population affects the health-related quality of life of the elderly. Health-related quality of life includes physical, emotional and social functions (5,6). Many studies have demonstrated that individuals with type 2 diabetes have a lower quality of life than healthy individuals (7,8). In the studies, it was indicated that both socio-demographic and lifestyle factors affected the health-related quality of life (5,9). Accordingly, it is emphasized that there is a relationship between health-related quality of life and gender, age, economic status, educational status, body mass index, and accompanying risk factors (hypertension, dyslipidemia...) (10,11).

In particular, it has been shown that physical activity has a positive effect on both the physical and mental domains of health-related quality of life, especially among individuals with diabetes and the elderly (5,12). On the other hand, a sedentary lifestyle is considered a modifiable risk factor for type 2 diabetes and an independent indicator of poor quality of life (5). It has been reported that the quality of life of individuals with type 2 diabetes determines both complications and comorbid conditions, and that low quality of life leads to cardiovascular mortality (13). The aim of diabetes treatment is to prevent complications and to provide a good quality of life for the individual with diabetes (14). In a meta-analysis study, physical exercise (high and moderate intensity resistance exercise, 6-24 weeks) has been proven to be an effective insulin resistance (15). An other

study, long-term regular physical activity training (moderate intensity, aerobic exercise, three sessions per week, 90 min, 50%-80%  $\text{VO}_2$  max) has been shown to improve glycemic control, body composition, and cardiovascular fitness in T2DM patients (16). For these reasons, it is important to protect the elderly from the negative effects of type 2 diabetes and to ensure that they get older more actively by preserving their independence. Revealing the factors affecting health-related quality of life in the elderly also allows us to develop interventions to prevent the negative consequences of diabetes.

This study was conducted to determine the quality of life and physical activity level of elderly individuals with type 2 diabetes and to examine the factors affecting the quality of life of individuals.

1. How the mean scores of foot care behaviors of adults with type-2 DM differ according to their sociodemographic and disease/health-related characteristics?
2. What are the determining factors affecting the quality of life of elderly individuals with type-2 DM?

## MATERIAL and METHODS

The study was planned as a descriptive relational study. The data of the study were collected in the internal medicine outpatient clinic of Akşehir State Hospital. The research data were collected between 15 November 2021 - 14 March 2022. The hospital was selected by purposive sampling method. Purposive sampling method was used because there was only one state hospital in the place where the research was conducted. Individuals aged 65 and over with a diagnosis of type diabetes who presented to the Akşehir State Hospital internal medicine outpatient clinic and met the inclusion criteria of the study constituted the population of the study. The sample size was calculated with the G-power 3.1.9.2 program. The sample size of the study was calculated as 228 in total at a power of 90%, a confidence level of 95% and an effect size (quality of life variable) of 0.2156863 by considering the general health sub-score average of quality of life ( $33.58 \pm 39.78$ ) in the study of Kien et al. (9). The individuals was selected by convenience sampling method. While individuals who had type 2 diabetes, were aged 65 and over, were literate, had a diabetes duration of  $\geq 6$  months, and could communicate verbally constituted the inclusion criteria, individuals with type 1 diabetes, psychiatric and neurological diagnosis constituted the exclusion criteria of the study.

The data of the study were collected using the Personal Information Form, SF 36 Quality of Life Scale, and Physical Activity Scale for the Elderly (PASE).

### Personal Information Form

In order to evaluate the socio-demographic health and disease characteristics of individuals, a personal information form was used. The form was prepared by the researchers based on the literature (5,9,13). The personal information form consists of a total of 20 questions.

### SF 36 Quality of Life Scale

The scale, which was developed by Ware and Sherbourne in 1987, evaluates the patient by considering the last four weeks (17). The scale, which was adapted to Turkish society by Koçyiğit et al. (18) by performing its validity and reliability study, is used in practice and research and general population studies. In reliability studies, the Cronbach's alpha values of the subscale scores were found to be between 0.73 and 0.76. The item-total score correlations were reported to be between 0.47-0.88. In the validity study, a multi-modality matrix was used and the correlation coefficients were found to be between 0.44 and 0.65 (18).

The scale consists of 36 questions in eight categories under the headings of function, restriction of roles, social functioning, mental health, vitality, pain, general perception of health, and health-related changes. As the scores of each dimension in the scale increase, the quality of life related to health increases. The answers to some questions are added as positive points and as negative points and are evaluated between 0 and 100 points. 0 indicates "poor health" and 100 indicates "good health". It is not possible to obtain a total score for the SF-36 quality of life scale. Instead, summary scores can be obtained for the physical and mental components of health in the SF-36 scale. While the physical health components are physical function, physical role, pain and general health perception subscales in the scale; mental health components are vitality, social function, emotional role and mental health subscales. In summary scores, the lowest score of "0" and the highest score of "100" points are obtained, and a high score indicates good health (17,18).

### Physical Activity Scale for the Elderly (PASE)

Physical Activity Scale for the Elderly (PASE) was developed by Washburn et al. to determine the physical activity level of the elderly and to evaluate home, work, recreational and physical activities (19). PASE evaluates the activities of the elderly in the last week. Its Turkish validity and reliability study was performed by Ayvat et al. (20). The Cronbach's alpha coefficient of the scale was 0.71 and the test reliability was 0.99. The test-retest reliability correlation coefficient was found to be 0.99-0.99, and 0.99 with a confidence interval of 95%. Walking activities are mild, moderate and vigorous-intensity activity.

While sports and recreational activities are recorded as never, rarely (1-2 days/week), sometimes (3-4 days/week), and often (5-7 days/week, the duration of the activities is classified as less than 1 hour, 1-2 hours, 2-4 hours, and more than 4 hours. The score is calculated according to the PASE weight determined for each activity in PASE. The weight scores are walking: 20, mild sports: 21, moderate sports: 23, severe sports: 23, strengthening and endurance exercises: 30, mild housework: 25, severe housework: 25, house repairs: 30, garden care: 36, garden works: 20, caring for someone else: 35, work: 21. The activity frequencies and the activity weights are multiplied to calculate the PASE scores of the activities. Individuals can get a minimum of 0 and a maximum of 400 points from the scale. The scale has no other cut-off values. A higher physical activity score indicates a higher level of physical activity (20).

### Variables of the study

**Dependent variable:** Quality of life sub-scale (physical health component, mental health component) scores

**Independent variable:** Socio-demographic and disease characteristics, physical activity level total score

### Data Collection

The data of the study were collected by the researcher in individuals admitted to Akşehir State Hospital internal medicine outpatient clinic in the waiting room after the examination by the questionnaire method between July and September 2021. Masks, visors and gloves were used while collecting data due to current pandemic conditions. Attention was paid to personal distance rules. The average duration of the survey was 20 minutes.

### Statistical Analysis

IBM SPSS 22 package program was used to analyze the data of the study. Frequency, mean and standard deviation were used for descriptive statistics. The conformity of the data to the normal distribution was evaluated using the Kolmogorov Smirnov test and Q-Q plots. Mann Whitney U, Kruskal-Wallis, multiple regression analysis were used in the analysis of the data.  $p < 0.05$  was considered statistically significant.

## RESULTS

According to the data of the study, while 62.7% of the participants were female, 67.1% were married, 53.9% were primary school graduates, 78.1% had a moderate economic perception and 11.0% lived alone (Table 1). Furthermore, it was found that 86.0% of the participants received using only oral antidiabetic, 76.3% of them had regular drug

use, 6.1% of them had regular exercise, and only 14.5% had good perceived dietary compliance and daily blood glucose measurement frequency. Although 78.1% of them had chronic diseases other than diabetes, it was determined that 20.6% of them went to physician check every three months (Table 2). The difference in the comparison of the participants' quality of life subscales, physical and mental health component and sociodemographic variables was statistically significant ( $p < 0.05$ ) (Table 1). When the health characteristics of the participants and the quality of life subscale mean scores were compared, the difference in the comparison of both subscales and all variables except diabetes education and non-diabetic chronic disease was statistically significant. Furthermore, only the difference between the diabetes treatment method and the mental health component was found to be statistically significant ( $p < 0.05$ ) (Table 2). Those who use only oral antidiabetic, regular drug users, those who exercise regularly, those with good perceived dietary compliance, those who measure blood sugar every day, those who go to a doctor's check every three months was high both physical health component score and mental health component score (Table 2). While the mean age of the participants was  $71.81 \pm 6.62$ , their BMI was  $29.98 \pm 2.90$ , duration of diabetes was  $20.24 \pm 9.93$  year, and HbA1c was  $7.53 \pm 1.57$ . The mean scores of the subscales of the quality of life scale were  $58.64 \pm 24.11$  for the physical health component and  $67.02 \pm 19.56$  for the mental health component (Table 3).

According to linear regression analysis, it was observed that the age of elderly individuals ( $\beta = -0.301$ ), number of drugs used ( $\beta = -0.136$ ), total physical activity ( $\beta = 0.351$ ), with whom he/she lives ( $\beta = -0.201$ ), doing regular exercise ( $\beta = -0.103$ ), physician check variables were effective on predicting the physical health component of the quality of life scale subscale ( $p < 0.05$ ). It was determined that these effective variables explained 70.4% (Adjusted  $R^2 = 0.704$ ) of the change on the physical health component of quality of life. Furthermore, it was observed that age ( $\beta = -0.375$ ), total physical activity ( $\beta = 0.287$ ), with whom he/she lives ( $\beta = -0.198$ ), physician check ( $\beta = -0.120$ ) were effective on predicting the mental health component of quality of life ( $p < 0.05$ ). It was determined that these effective variables explained 56.8% (Adjusted  $R^2 = 0.568$ ) of the change on the mental health component of quality of life (Table 4).

## DISCUSSION

The prevalence of diabetes continues to increase all around the world. Physical activity is of great importance in controlling possible complications related to diabetes, especially in elderly individuals with diabetes (21,22). Physical activity may contribute positively to the quality of life of elderly individuals with type 2 diabetes by providing glycemic control (22). In line with this importance, the sociodemographic and health characteristics of elderly individuals with Type 2 diabetes and also the relationship between physical activity levels and quality of life were

**Table 1:** Distribution of the subscales of quality of life according to the sociodemographic characteristics of the participants

Socio-demographic characteristics		n (%)	Physical health component	Mental health component
Gender	Female	143 (62.7)	54.89±23.30	65.11±20.48
	Male	85 (37.3)	64.94±24.27	70.23±17.55
<i>p value*</i>			<b>0.001</b>	<b>0.036</b>
Marital status	Married	153 (67.1)	66.71±19.25	72.49±15.79
	Single	75 (32.9)	42.18±24.74	55.87±21.77
<i>p value*</i>			<b>&lt;0.001</b>	<b>&lt;0.001</b>
Educational status	Literate	105 (46.1)	48.23±25.03	59.39±21.58
	Primary school	123 (53.9)	67.52±19.35	73.53±14.91
<i>p value*</i>			<b>&lt;0.001</b>	<b>&lt;0.001</b>
Perceived economic status	Good	38 (16.7)	64.68±23.57	70.78±19.05
	Moderate	178 (78.1)	58.97±23.63	67.52±19.19
	Poor	12 (5.3)	34.63±19.55	47.66±16.93
<i>p value**</i>			<b>0.001</b>	<b>0.001</b>
With whom he/she lives	Alone	25 (11.0)	65.60±20.64	72.19±12.64
	With spouse	138 (60.5)	67.71±18.62	73.51±14.82
	With spouse and children	65 (28.5)	36.70±21.76	51.25±21.75
<i>p value**</i>			<b>&lt;0.001</b>	<b>&lt;0.001</b>

\*Mann Whitney U, \*\* Kruskal Wallis

**Table 2:** Distribution of the subscales of physical activity and quality of life according to the health characteristics of the participants.

Health characteristics		n (%)	Physical health component	Mental health component
<b>Diabetes treatment method</b>	Using only oral antidiabetic	196 (86.0)	58.96±24.43	68.24±19.44
	Using both insulin and oral antidiabetic	32 (14.0)	56.69±22.24	59.57±18.94
<b>p value*</b>			0.533	<b>0.006</b>
<b>Regular drug use</b>	Yes	174 (76.3)	63.97±21.87	71.52±17.04
	No	54 (23.7)	41.44±23.08	52.51±20.26
<b>p value*</b>			<b>&lt;0.001</b>	<b>&lt;0.001</b>
<b>Regular exercise</b>	Yes	14 (6.1)	86.83±5.31	85.48±3.80
	No	214 (93.9)	56.79±23.70	65.81±19.57
<b>p value*</b>			<b>&lt;0.001</b>	<b>&lt;0.001</b>
<b>Percieved dietary compliance</b>	Good	33 (14.5)	68.44±26.92	72.22±21.48
	Moderate	146 (64.0)	62.57±21.82	69.98±16.95
	Poor <sup>a</sup>	49 (21.5)	40.31±19.27	54.71±20.84
<b>p value**</b>			<b>&lt;0.001</b>	<b>&lt;0.001</b>
<b>Blood glucose measurement frequency</b>	Every day	33 (14.5)	62.08±22.23	71.80±18.68
	Sometimes	95 (41.7)	64.23±21.22	69.70±17.60
	Rarely <sup>a</sup>	100 (43.9)	52.20±25.87	62.82±20.91
<b>p value**</b>			<b>0.003</b>	<b>0.006</b>
<b>Physician check</b>	Once in 3 months <sup>a</sup>	47 (20.6)	68.60±21.52	75.05±16.27
	Every 6 months <sup>a</sup>	123 (53.9)	61.99±22.49	69.68±17.66
	Once a year or more <sup>a</sup>	58 (25.4)	43.45±22.74	54.86±20.58
<b>p value**</b>			<b>&lt;0.001</b>	<b>&lt;0.001</b>
<b>Receiving diabetes education</b>	Yes	50 (21.9)	61.96±24.44	64.35±21.34
	No	178 (78.1)	57.71±24.00	67.77±19.02
<b>p value*</b>			0.241	0.582
<b>Presence of chronic disease other than diabetes</b>	Yes	178 (78.1)	57.91±23.50	66.77±19.33
	No	50 (21.9)	61.22±26.24	67.90±20.54
<b>p value*</b>			0.262	0.379

\*Mann Whitney U, \*\* Kruskal Wallis, <sup>a</sup> Bonferroni corrected ANOVA test.

**Table 3:** Participants' age, BMI, HbA1c, number of chronic diseases, number of drugs used, quality of life subscale and mean physical activity scores.

Characteristics*	Findings	
Age (year)	71.81 ± 6.62	64-92
BMI (Kg/m <sup>2</sup> )	29.98 ± 2.90	19.96-42.53
Diabetes duration (year)	20.24 ± 9.93	1-46
HbA1c (%)	7.53 ± 1.57	5.60-13.40
Number of chronic diseases other than diabetes (n)	1.49 ± 1.15	0-5
Number of drugs used (n)	3.07 ± 1.63	0-10
Physical activity	92.39 ± 63.22	0-320
<b>Quality of life subscales</b>		
Physical health component	58.64 ± 24.11	2.50-93.75
Mental health component	67.02 ± 19.56	9.88-90.75

\* Mean ± Standart deviation, Minimum-Maximum.

examined this study. According to the results of the study, it was determined that elderly individuals with type 2 diabetes had a moderate quality of life and a low level of physical activity. Studies in the literature also support these results (7, 23). Al- Aboudi et al. reported Saudi diabetes patients have low levels of health-related quality of life (7). In another study was highlighted that physical inactivity negatively affects the quality of life of diabetic patients (23).

The quality of life of elderly individuals with type 2 diabetes is affected by demographic characteristics. In the results of the present study, a significant relationship was found between gender, marital status, education level, economic perception and with whom he/she lives, and physical/mental health components. Males, primary school graduates, and couples living together have higher physical and mental quality of life components than other groups. In

**Table 4:** Determining factors affecting the mental health and physical health component of quality of life.

Variables	Physical health component					Mental health component				
	Collinearity					Collinearity				
	$\beta$	t	P	Tolerance	VIF	$\beta$	T	p	Tolerance	VIF
Constant		8.662	<0.001				8.723	<0.001		
Age	-0.301	-5.460	<0.001	0.429	2,333	-0.375	-5.622	<0.001	0.429	2,333
BMI	-0.011	-0.290	0.772	0.836	1.196	-0.005	-0.011	0.991	0.836	1.196
Diabetes duration	-0.043	-0.911	0.363	0.574	1,743	0.091	1,587	0.114	0.574	1,518
HbA1c	-0.071	-1.561	0.120	0.635	1.575	-0.085	-1.561	0.120	0.635	1.575
Number of chronic diseases other than diabetes	0.048	1.100	0.273	0.687	1.456	0.013	0.255	0.799	0.687	1.456
Number of drugs used	-0.136	-3.127	0.002	0.689	1.451	-0.101	-1.923	0.056	0.689	1.451
Total physical activity	0.351	7.051	<0.001	0.527	1.897	0.287	4.772	<0.001	0.527	1.897
Marital status (1=single)	0.008	0.167	0.867	0.530	1.886	0.061	1.010	0.314	0.530	1.886
Educational status (1=literate)	0.068	1.537	0.126	0.665	1.504	0.025	0.472	0.637	0.665	1.504
With whom he/she lives (1=with spouse-children)	-0.201	-4.007	<0.001	0.521	1.918	-0.198	-3.282	0.001	0.521	1.918
Regular drug use (1=no)	-0.060	-1.389	0.166	0.704	1.421	-0.128	-2.454	0.015	0.704	1.421
Doing regular exercise (1=no)	-0.103	-2.619	0.009	0.849	1.178	-0.063	-1.329	0.185	0.849	1.178
Perceived Dietary compliance (1=poor)	-0.059	-1.264	0.207	0.594	1.684	0.003	0.154	0.957	0.594	1.684
Physician check (1=annually or more)	-0.101	-2.516	0.013	0.803	1.245	-0.120	-2.471	0.014	0.803	1.245
R <sup>2</sup> =0.722	Adjusted R <sup>2</sup> = 0.704	F=39.531	p<0.001			R <sup>2</sup> =0.594	Adjusted R <sup>2</sup> =0.568	F=22.292	p<0.001	

a study, it was indicated that higher depression symptoms were closely associated with increased sedentary time in women with Type 2 diabetes (24). On the other hand, it has been reported that those who are male have a higher health-related quality of life index compared to female (25). In a study, it was stated that the possibility of affecting sociodemographic characteristics (age, gender, educational status, economic status, being alone, etc.) and cognitive/mental functions of elderly individuals with diabetes

mellitus as social determinants of health was 3.75 times higher compared to undiagnosed elderly individuals (26). It was reported that age, rural lifestyle, retirement, lower level of education and low socioeconomic status were found to be independent risk factors for the component scores (physical and mental health) of SF-36 (27). In accordance with these results, it is observed that sociodemographic characteristics may affect the quality of life. In this case, these individual characteristics can be taken into account in the planning of

intervention programs that will improve the coping skills of the elderly with the disease. It may be said that especially old age, low perceived economic status of individuals will negatively affect the quality of life (27).

On the other hand, the quality of life of elderly individuals with type 2 diabetes is affected by demographic characteristics as well as health characteristics. In the present study, a significant relationship was found between regular drug use, regular exercise, perceived dietary compliance, blood glucose measurement frequency, and physician check and the components of quality of life. It has been reported that those who use less medication have a higher health-related quality of life index compared to other groups. Meanwhile, a longer duration of diabetes and older age were reported to be negatively associated with the health-related quality of life index. (28). In another study, it was stated that women showed worse health-related quality of life than men. In the same study, it was reported that age, presence of acute and chronic complications, comorbidities, pharmacological treatment and glycemic control affect health-related quality of life. In addition, living alone and having a low socioeconomic status have been shown to negatively affect quality of life (28).

In a study, it was indicated that the quality of life of elderly individuals who used insulin and had low physical activity level was negatively affected (12). In another systematic review and meta-analysis study, it was reported that physical exercise, frequent blood sugar control, complications, hypertension, diabetes duration, more red meat diet and depression were associated with the quality of life of the patients with type 2 diabetes (26). Similar to the study results of Jing et al. it was also found in the present study that there was a relationship between physical exercise and blood sugar measurement and quality of life (29). Unlike the present study, another study reported that the quality of life was lower in diabetic individuals with longer disease duration and insulin use (30). This difference in the present study is due to the mental health component of quality of life. Stojanović et al. was stated that DM complications (angina pectoris, heart failure, diabetes nephropathy, and diabetes retinopathy) were found to be independent risk factors for the component scores (physical and mental health) of SF-36 (27). The results of this study show that diabetes management may have an effect on the quality of life. In case of failure to provide effective diabetes management (regular drug use, blood glucose measurement frequency, regular exercise, etc.), possible complications (nephropathy, neuropathy, diabetic foot, cardiovascular diseases etc.) of the disease may adversely affect the quality of life. It may be said that especially diabetes-related complications, the

presence of diabetes as well as other chronic diseases, and poor glycemic control of individuals will negatively affect the quality of life.

In the present study, it was found that age, number of drugs used, level of physical activity, with whom he/she lives, regular exercise, physician check were effective on the physical health component of quality of life. On the other hand, it was determined that age, physical activity level, with whom he/she lives, regular drug use and physician check were effective on the mental health component of quality of life. In a study, it was reported that there was a statistically significant negative correlation between quality of life and physical activity in individuals with type 2 diabetes (23). In another study, it was indicated that negative changes in the lifestyle of adults (physical activity restriction, dietary changes, etc.) led to increases in weight and waist circumference values, and glycemic parameters such as fasting and postprandial glucose (31). Controlling the risk factors (physical activity level, physician check, etc.) that can be changed among these risk factors, supporting the self-care of individuals for diabetes and the inclusion of a specially planned exercise program in the lives of individuals may improve the quality of life of individuals with type 2 diabetes.

## CONCLUSION

According to the results of the study, it was determined that elderly individuals with type 2 diabetes had a moderate quality of life and a low level of physical activity. It was determined that the factors such as age, number of drugs used, physical activity, with whom he/she lives, regular exercise, and physician check affected the physical and mental health components, which are subscales of quality of life. In line with the results of this study, low physical activity may negatively affect the quality of life of elderly individuals with type 2 diabetes. In the treatment of diabetes, it can be recommended to support elderly individuals with type 2 diabetes in the primary care follow-up, especially in the evaluation of their physical activity status and in gaining physical activity habits in a way to increase the motivation of the elderly individuals.

In this study, convenience sampling was used. Therefore, the results cannot be generalized to other elderly individuals with type 2 diabetes.

## Author Contributions

Idea/Concept: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun, Şeyma Balcı**, Design: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun**, Control/Supervision: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun**, Data Collection and/or Processing: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun, Şeyma Balcı**, Analysis and/or

Interpretation: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun**, Literature Review: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun, Şeyma Balcı**, Writing: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun**, Critical Review: **Nurcan Akgül Gündoğdu, Alime Selçuk Tosun**.

### Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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### Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki. Permission was obtained from the “Selçuk University Faculty of Nursing Non-Interventional Clinical Research Ethics Committee” (Ethics No:2021/37) to implement the study. Institutional permission was obtained to conduct the study. Written consent was obtained from the individuals who participated in the study by reading the Informed Voluntary Consent Form.

### Peer Review Process

Extremely peer reviewed and accepted.

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