

Research Article

Reliability and validation of the Turkish version of the Low Back Outcome Score

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ABSTRACT

Objective: This study aimed to validate the Turkish version of the Low Back Outcome Score and check its reliability in patients with chronic low back pain (LBP).

Methods: Overall, 105 patients [81 women and 24 men; mean age: 49.5 years (18–65 years)] with a complaint of LBP for at least 3 months were included in this study. Test-retest reliability was assessed after 7 days. Overall score of LBOS was compared with the overall scores of “Rolland-Morris Disability Questionnaire,” “Oswestry Disability Index,” “Quebec Back Pain Disability Scale,” “SF-36,” and “Bournemouth Questionnaire for Back Pain” to calculate the convergent validity by using Pearson correlation coefficient.

Results: The questionnaire was noted to have high internal consistency. The test-retest analysis revealed an excellent correlation (ICC=0.80). Pearson correlation coefficient of the LBOS was assessed using VAS and had an excellent correlation with all the questionnaires included in this study.

Conclusion: The Turkish version of the LBOS questionnaire appeared to be a valid and reliable outcome measure.

Level of Evidence: Level III, Diagnostic study

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Introduction

Low back pain (LBP) is a major ailment, affecting approximately three-fourth of the general population in the industrialized world (1). Notably, it is the most frequent cause of disability and the first reason for orthopedic consultation in people under the age of 45 years (2). It represents a significant social and economic liability in developed countries (3). In the United States, approximately 30%–85 % of the population suffers from back pain at some point in their life (4). In Turkey, the prevalence of LBP is reported to be 20–46% during lifetime of 12 month period (5).

Studies on patients with LBP have been hampered by the difficulty in making objective measurements of outcome and the difficulty in accurately determining the speed of recovery or the response to conservative or surgical treatment. Additionally, the method of measurement may influence the apparent results of treatment (6). These difficulties have necessitated the development of question-

naires for subjective evaluation of pain and objective evaluation of patients (7).

The development of evidence-based medicine in Turkey has attained the highest priority in recent years. Information on epidemiological data and prevalence of LBP mostly comes from western industrialized countries (8). Few Turkish versions of LBP questionnaires have been published until date, such as Bournemouth questionnaire (BQ) (9), Oswestry Disability Index (ODI) (10), Rolland-Morris disability questionnaire (RMDQ) (11), Quebec back pain disability scale (QBPDS) (12), and The Short Form (36) (SF-36) Health Survey (13). The low back outcome score (LBOS) was published in 1992. It is designed as a quick and practical self-reporting scale to assess patients with LBP. It is a 13-item questionnaire, which includes questions regarding the current pain, employment, domestic chores, sports activities, resting, medical treatments, drug use, sex life, and daily activities (sleeping, walking, sitting, traveling, and dressing). The questionnaire is easy to understand, can be answered in about 5

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min, and scored in less than 1 min. (6, 14). Notably, only the Polish and Persian versions of LBOS are available (15, 16). This study aimed to validate the reliability of the Turkish version of LBOS as an effort toward the progression of evidence-based medicine and an attempt to improve the quality of assessment and evaluation of LBP in the Turkish population.

Materials and Methods

Questionnaire

LBOS consists of 13 questions. Each question needs to be answered and scored individually. All questions have four-point scaled numbers, except for the question for pain. However, each question is differently weighted in the total score.

Three different groups of questions can be identified. Items with a nine-point scoring system (pain, employment, and domestic and sports activities) wherein the score can be 0, 3, 6, or 9 points individually. Items with a six-point scoring system (resting, treatment or consultation, analgesia, and sex life) wherein the score can be 0, 2, 4, or 6 points. Items with a three-point scoring system (sleeping, walking, sitting, traveling, and dressing) wherein the score can be 0, 1, 2, or 3 points. The final total is obtained by summing the score of each item, and it ranges from 0 to 75, with lower values representing significant disability (6, 14).

Translation and cultural adaptation

Permission was obtained from the owner and developer of LBOS before beginning this study. The translation process was conducted in different stages by using the forward-backward model (17). First, two native Turkish speakers individually translated the English version of LBOS to the Turkish language. One of these translators was a physiotherapist with good knowledge of English translation, who was aware of the study to provide accurate conceptual meaning in the Turkish language. The other person was a professional translator and English literature expert who was unaware of the study concept and provided the accurate meaning of questions to minimize errors. Two separate translators then merged these two Turkish versions into a single questionnaire, which was then back-translated to English by two independent multilingual translators (one native English speaker with good knowledge of Turkish and the other vice versa), both unaware of the study to check its validity. These two versions of the English translation were then again merged into a single version.

The expert committee comprising the physiotherapist, English and Turkish literature experts, and two bilingual translators reviewed the resultant translation and its cultural adaptation. The

pre-final form of the questionnaire was constructed and evaluated in a pilot study group of 50 people (25 patients and 25 healthy individuals), and a clarity form was created to provide a better understanding of each question (face validity). The expert committee reviewed the evaluation and submissions of the pilot group and then created the final questionnaire (Appendix -1).

Patients and data collection

Overall, 135 patients with a mean age of 49.5 years (18–65 years) participated in the study. All participants had a complaint of LBP for at least 3 months. Patients with LBP because of spine tumors, fractures, or infection; a history of spine surgery; and pregnant women were excluded from this study. Overall, 30 patients who did not complete the survey or answered incorrectly were excluded from the study. Hence, the final number of participants was 105.

Participants had to answer the newly-developed Turkish version of the LBOS questionnaire along with the previously translated Turkish versions of RMDQ, ODI, QBPDS, SF-36, BQ, and VAS. Furthermore, 60 patients answered the LBOS questionnaire after 7 days for the test-retest reliability. Written informed consent was obtained from patients who participated in this study

Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences version 22.0 (IBM Corp.; Armonk, NY, USA) for Windows. Statistical significance was expressed as mean±standard deviation ($X \pm SD$) or percent (%). The test-retest value was assessed using the Intraclass Correlation Coefficient (ICC) and Internal consistency analysis by using Cronbach Alpha value. ICC values were above 0.80, thereby exhibiting an excellent correlation (18). The Cronbach's alpha value was 0.89 and was considered good (19). The structural validity of LBOS was examined through factor analysis by using Bartlett's test (BT), and the combined validity was assessed using the Kaiser-Meyer-Olkin (KMO) test. The combined validity was calculated by correlating the overall scores of the LBOS survey with the total scores of the Visual Analog Scale (VAS), RMDQ, ODI, QBPDS, BQ, SF-36, and related sub-parameters. In the Pearson correlation coefficient, the value " r " takes values ranging from -1 to $+1$. The closer the value of " r " is to $+1$, a more positive correlation is obtained. By contrast, the value of " r " closer to -1 gives a more negative correlation (20). Statistical significance was accepted as $p < 0.05$ (21).

Results

Overall, 81 women with the mean age of 50 years, and 24 men with the mean age of 47 years participated in this study. The median LBP duration was 88.5 months (women: 95 months, men: 66.5 months). Test-retest reliability analysis was conducted 1 week later, with 60 patients who had participated previously. The mean age of these patients was 45.6 years. Table 1 demonstrates the demographic data. ICC correlation for the retest reliability of the questionnaire was recorded as 0.992 (Table 2).

MAIN POINTS

- LBOS has high internal consistency and excellent reliability.
- LBOS has good time invariance.
- LBOS has excellent correlation with previously validated questionnaires.
- Turkish version of the LBOS was determined to be valid and reliable.

Table 1. Demographic data

		Female X±SD	Male X±SD	Total X±SD
Total Number of Patients (%)		81 (77.1)	24 (22.9)	105 (100)
Number of Re-test Patients (%)		47 (78.3)	13 (21.7)	60 (100)
Age (years) (All patients)		50.22±16.23	47.21±15.66	49.53±16.08
Age (years) (Re-test)		49.11±16.68	50.54±16.08	49.42±16.42
Height (cm) (All Patients)		161.93±7.05	177.29±6.45	165.44±9.46
Height (cm) (Re-test)		162.53±6.58	174.92±6.79	165.22±8.34
Wight (kg) (All patients)		70.91±16.76	86.96±10.84	74.58±16.97
Weight (kg) (Re-test)		68.66±17.50	85.31±12.59	72.27±17.86
Marital status (%) (All Patients)	Married	49 (60.5)	21 (87.5)	70(66.7)
	Single	32 (39.5)	3 (12.5)	35 (33.3)
Marital status (%) (Re-test)	Married	24 (51.1)	11 (84.6)	35 (58.3)
	Single	23 (48.9)	2 (15.4)	25 (41.7)
Education (All patients)	Primary	41 (50.6)	4 (16.7)	45 (42.9)
	High school	2 (2.5)	3 (12.5)	5 (4.8)
	University	38 (46.9)	17 (70.8)	55 (52.3)
Education (Re-test)	Primary	24 (51.1)	4 (30.8)	28 (46.7)
	High school	1 (2.1)	2 (15.4)	3 (5.0)
	University	22 (46.8)	7 (53.8)	29 (48.3)
Employment (All patients)	Working	31 (38.3)	17 (70.8)	48 (45.7)
	Unemployed	42 (51.8)	1 (4.2)	43 (41.0)
	Retired	8 (9.9)	6 (25.0)	14 (13.3)
Employment (Re-test)	Employed	21 (44.7)	8 (61.5)	29 (48.3)
	Unemployed	22 (46.8)	1 (7.7)	23 (38.3)
	Retied	4 (8.5)	4 (30.8)	8 (13.4)
Smoking (n) (years) (All patients)		20 (24.7)	11 (45.8)	31 (29.5)
Smoking (n) (years) (Re-test)		8 (17.0)	7 (53.8)	15 (25.0)
Back Pain duration (months) (All Patients)		95.12±98.72	66.50±70.10	88.58±93.43
Back pain duration (months) (Re-test)		112.19±109.73	77.77±73.64	104.73±103.42

Table 3 demonstrates the internal consistency of LBOS. The Cronbach Alpha score was recorded as 0.895 for the entire survey, thereby indicating that the study had high internal consistency and excellent reliability. KMO test value was calculated as 0.928, indicating that the sample used in the research was appropriate. The BT value was 868.629, expressing that the sample data was homogeneous and sufficient (Table 4). These findings indicate that our survey for LBOS was both appropriate and adequate.

The factor analysis of LBOS is represented in the graph, which proved the single factor for analysis of the questionnaire (Figure 1). Because the questionnaire had a one-factor structure, the combination validity analysis was based on the total score. Consequent to statistical analyses, the total variance ratio of LBOS was determined as 57.771.

The total score of LBOS, as well as of RMDQ, ODI, BQ, SF-36, QB-PDS, and VAS, were determined using the Pearson correlation co-

Table 2. Test-retest results of Low Back Pain Outcome Score

	Interclass Correlation Coefficient	
	95% Reliability index	Upper and Lower Limit
LBOS (n:60)		
Question 1	0.963	0.939–0.978
Question 2	0.996	0.993–0.998
Question 3	0.932	0.889–0.959
Question 4	0.928	0.882–0.956
Question 5	0.877	0.802–0.925
Question 6	0.928	0.883–0.957
Question 7	0.881	0.808–0.927
Question 8	1.000	1.000–1.000
Question 9	0.938	0.899–0.963
Question 10	0.886	0.816–0.930
Question 11	0.774	0.621–0.865
Question 12	0.908	0.851–0.944
Question 13	0.943	0.906–0.965
Total points	0.992	0.987–0.995

Table 3. Internal consistency analysis for Low Back Pain Outcome Score

LBOS (n:105)	Cronbach's Alpha
Except the first question	0.879
Except the second question	0.897
Except the third question	0.880
Except the forth question	0.880
Except the fifth question	0.886
Except the sixth question	0.886
Except the seventh question	0.892
Except the eighth question	0.873
Except the ninth question	0.893
Except the tenth question	0.891
Except the eleventh question	0.892
Except the twelfth question	0.893
Except the thirteenth question	0.892
Total	0.895

Table 4. Keiser-Meyer-Olkin and Bartlett's Test

Low Back Pain Outcome Score	Keiser Meyer Olkin Test	Bartlett's Test	
		Chi-squared	p
	0.928	868.629	<0.001

Table 5. Low Back Pain Outcome Score correlation values

Questionnaires (n:105)		LBOS Pearson correlation r	p
VAS		–0.803	<0.001
SF-36	PF	0.869	<0.001
	RL	0.718	<0.001
	BP	0.835	<0.001
	SF	0.750	<0.001
	GMH	0.430	<0.001
	RLE	0.521	<0.001
	VGH	0.521	<0.001
	GHP	0.414	<0.001
	HCLY	0.269	0.006
BQ		–0.852	<0.001
RMDQ		–0.882	<0.001
QBPDS		–0.905	<0.001
ODI		–0.881	<0.001

LBOS: low back pain outcome score; VAS: visual analogue scale; SF-36: short form-36; PF: physical function; RL: role physical; SF: social functioning; BP: bodily pain; GMH: general mental health; VT: vitality; RLE: role emotional; GHP: general health; HCLY: health change; BQ: Bournemouth questionnaire; RMDQ: Roland Morris Disability Questionnaire; QBPDS: Quebec Back Pain Disability Scale; VAS: visual analogue scale; ODI: Oswestry disability index

efficient method. According to these results, the LBOS questionnaire had an excellent correlation with all comparative scores. The correlation of LBOS is demonstrated in Table 5. The response of all participants, both men and women, summarized as the total score for each questionnaire or as subscale score is presented in Table 6.

Discussion

The purpose of this study was to translate the LBOS questionnaire in the Turkish language, perform a validity study, and check its reliability in the Turkish population.

LBOS is a 13-item questionnaire, which includes questions regarding the current pain and its consequences on the various aspects of life, such as employment, domestic chores, sports activities, resting, medical treatments, drug use, sex life, and daily activities (sleeping,

walking, sitting, traveling, and dressing) (6). LBOS has been previously translated into Polish and Persian languages (15, 16). Persian version states that further investigation of the psychometric properties of the LBOS would be helpful in diverse spinal conditions (16). We chose to translate LBOS in Turkish because the questionnaire covers vast aspects of life and is easy to understand, can be completed in about 5 min, and scored in less than 1 min.

Table 6. Mean patient total scores for each questionnaire

Questionnaires		Female (n=81) (X±SD)	Male (n=24) (X±SD)	Total (n=105) (X±SD)
LBOS		34.89±17.54	46.21±17.30	37.48±18.04
VAS		7.37±2.61	5.28±2.51	6.89±2.72
SF-36	PF	36.08±28.14	58.11±28.70	41.12±29.62
	RL	23.77±37.06	53.13±43.18	30.48±40.28
	BP	45.88±22.10	62.81±17.36	49.75±22.21
	SF	54.92±24.50	72.90±20.40	59.03±24.72
	GMH	60.05±15.61	68.03±17.24	61.89±16.27
RLE	RLE	35.80±44.34	61.11±43.59	41.59±45.24
	VGH	47.83±15.54	59.58±18.05	50.51±16.80
	GHP	54.26±15.81	59.79±18.27	55.52±16.48
HCLY	HCLY	39.51±23.67	38.54±18.03	39.29±22.43
	BQ	40.35±17.09	29.08±14.71	37.77±17.78
RMDQ		14.20±7.33	9.25±8.19	13.07±7.76
QBPDS		41.21±19.47	26.96±20.54	37.95±20.52
ODI		21.11±12.80	12.21±8.19	19.08±12.45

LBOS: Low Back Pain Outcome Score; VAS: visual analogue scale; SF-36: short form-36; PF: physical function; RL: role physical; SF: social functioning; BP: bodily pain; GMH: general mental health; VT: vitality; RLE: role emotional; GHP: general health; HCLY: health change; BQ: Bournemouth Questionnaire; RMDQ: Roland Morris Disability Questionnaire; QBPDS: Quebec Back Pain Disability Scale; VAS: visual analogue scale; ODI: Oswestry Disability index

LBP can be acute (<4 weeks), subacute (4–12 weeks), or chronic (>12 weeks) (22). Greenough and Frazer, who created the original version of LBOS, did not mention the duration of pain in their patients (6). Moreover, Azimi et al., the author of the Persian version, and Misterska et al., who developed the Polish version, refrained from citing the duration of pain in their studies (15, 16). We assumed that patients with acute LBP might express subjective exacerbation of their symptoms and tried to address this issue by selecting patients with chronic LBP. Table 7 compares the results of the original LBOS questionnaire with the Turkish and other versions.

The internal consistency analysis of LBOS was assessed using the Cronbach Alpha coefficient. In the original Greenough and Fraser study, Cronbach's alpha was 0.85 (14). Internal consistency analysis of both Polish and Persian versions was 0.77 (15, 16). The Cronbach Alpha value in this study was 0.895, which indicates a high internal consistency and reliability of the Turkish version.

A comparative study was performed of two time intervals for test-retest reliability-a method designed by Marx et al. (23). The

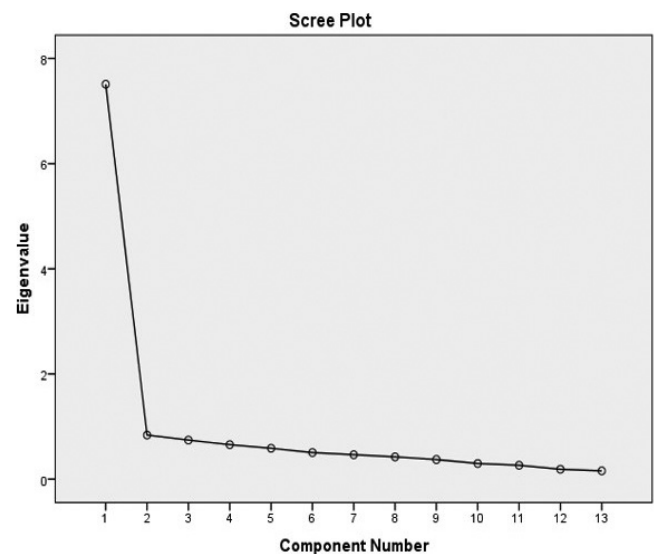


Figure 1. Factor analysis

Table 7. Comparison of Turkish version of LBOS results with other versions of LBOS

LBOS Questionnaire	Number of Patients (n)			Test-retest time	Internal Consistency	LBOS Validity		Test-re test Reliability
	Female	Male	Total		Cronbach Alpha value	Correlation with ODI	Correlation with QBPDS	Pearson coefficient Values
Original version	66	73	144	7 days	0.85	-0.87	-	0.92
Turkish version	81	24	105	7 days	0.895	-0.881	-0.905	0.992
Polish version	38	47	85	2 days	0.77	-0.784	-0.759	0.34
Persian version	90	73	163	7 days	0.77	-0.83	-	0.82

LBOS: Low Back Pain Outcome Score; ODI: Oswestry disability index; QBPDS: Quebec back pain disability scale

author advocated no statistical difference in test-retest results between 2 days and 2 weeks, and recommended test-retest to be implemented within this range (23). In the study by creators of LBOS, test-retest analysis interval was 7 days, and they determined the p value to be 0.92 (6). In Polish version, the test-retest interval was 2 days with a p value of 0.34 (15). In the Persian version, authors opted for a test-retest interval of 1 week and obtained a p value of 0.82 (16). In our study, the p value for each question ranged between 0.774 to 1.00, and the total p value for test-retest analysis was 0.992. Therefore, this result was equivalent to those determined by authors of the original version and other validation studies. Hence, it proves that the Turkish version of LBOS is highly consistent over time.

A first factor analysis was performed using the KMO and Bartlett's tests to determine the validity. The KMO test value was determined to be 0.928, and the Bartlett's test value was 868.629. These results indicate that the questionnaire is appropriate for factor analysis. Subsequently, the total scores of LBOS, RMDQ, ODI, BQ, QBPDS, SF-36, and VAS were compared using the Pearson correlation coefficient for factor validation. When the results were examined, the Turkish version of LBOS exhibited an excellent level of correlation, thereby proving its validity.

In the study of the original version, the overall correlation score of LBOS with ODI was -0.87 (6). In the Polish validation study, the total correlation score of LBOS with ODI was -0.784, and -0.759 in the correlation with the QBPDS (15). In the Persian version, the LBOS correlation with ODI was -0.83 (16). In this study, the Turkish version of the LBOS had a correlation of -0.881 with ODI and -0.905 with QBPDS.

The Pearson correlation coefficient of the Turkish version of LBOS was obtained in comparison to the original, Persian, and Polish versions.

The LBOS was determined to have high internal consistency. Test-retest analysis proved that LBOS had excellent time invariance. In addition, the data size of the questionnaire was adequate and appropriate for factor analysis. Moreover, the factor analysis proved that the Turkish version of LBOS had a single factor variance. The questionnaire had an excellent correlation with the RMDQ, ODI, BQ, QBPDS, SF-36, and VAS. Hence, the Turkish version of the LBOS was determined to be valid and reliable.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Gazi University, Institute of Health Sciences (26/01/2017 - 14574941-100- E.13619).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

Author Contributions: Concept - G.A., S.C.; Design - G.G., R.S.; Supervision - S.C.; Resources - G.A.; Materials - G.A.; Data Collection and/or Processing - G.A., G.G.; Analysis and/or Interpretation - G.A.,

G.G.; Literature Search - F.K.; Writing Manuscript - F.K.; Critical Review - S.C., F.K.

Conflict of Interest: The authors have no conflicts of interest to declare.

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Appendix -1 Low Back Outcome Score Turkish version

Bel Sonuç Skoru**1. Lütfen, geçen hafta boyunca ortalama olarak belinizde ne kadar ağrınız olduğunu aşağıdaki çizgi üzerinde işaretleyiniz.**

	0	1	2	3	4	5	6	7	8	9	10	
Hiç ağrı yok												Mümkün olan en şiddetli ağrı

(0-2 = 9; 3-4 = 6; 5-6 = 3; 7-10 = 0)

Lütfen aşağıdaki altı bölümde sizin durumunuza en uygun olan cevabı işaretleyiniz.**2. Şu anda çalışıyor musunuz?**

- | | |
|---|---|
| Her zamanki işimde tam zamanlı olarak çalışıyorum | ☐ 9 |
| Hafif bir işte tam zamanlı olarak çalışıyorum | ☐ 6 |
| Yarı zamanlı çalışıyorum | ☐ 3 |
| Çalışmıyorum / işsizim | ☐ 0 |
| Maluliyet maaşı alıyorum | ☐ 0 |
| Ev hanımı / öğrenci / emekli | ☐ gündelik işler için skor |

3. Şu anda ev işlerini ya da ufak tefek işleri yapabiliyor musunuz?

- | | |
|---|----------------------------|
| Normal olarak yapabiliyorum | ☐ 9 |
| Her zaman olduğu kadar, ama yavaş yavaş yapabiliyorum | ☐ 6 |
| Çok az, her zamanki kadar değil | ☐ 3 |
| Hiç yapamıyorum | ☐ 0 |

4. Şu anda spor ya da aktif hareket gerektiren işleri (örneğin dans etme) yapabiliyor musunuz?

- | | |
|---|----------------------------|
| Her zamanki kadar yapabiliyorum | ☐ 9 |
| Neredeyse her zamanki kadar yapabiliyorum | ☐ 6 |
| Biraz yapabiliyorum, normalden oldukça az | ☐ 3 |
| Hiç yapamıyorum | ☐ 0 |

5. Ağrı nedeniyle gün boyunca dinlenme ihtiyacı duyuyor musunuz?

- | | |
|--|----------------------------|
| Hayır, hiç duymuyorum | ☐ 6 |
| Biraz | ☐ 4 |
| Günün yarısı kadar dinlenme ihtiyacı duyuyorum | ☐ 2 |
| Günün yarısından fazla dinlenme ihtiyacı duyuyorum | ☐ 0 |

6. Ağrınız sebebiyle ne sıklıkla bir doktora başvuruyorsunuz veya herhangi bir tedavi alıyorsunuz (örneğin fizik tedavi)?

- | | |
|------------------------|----------------------------|
| Hiçbir zaman | ☐ 6 |
| Nadiren | ☐ 4 |
| Yaklaşık ayda bir kez | ☐ 2 |
| Ayda bir kereden fazla | ☐ 0 |

7. Ağrınız için ne sıklıkla ağrı kesici ilaç alma ihtiyacı duyuyorsunuz?

- | | |
|--------------------|----------------------------|
| Hiçbir zaman | ☐ 6 |
| Bazen | ☐ 4 |
| Neredeyse her gün | ☐ 2 |
| Her gün birkaç kez | ☐ 0 |

Lütfen ağrınızın aşağıdaki faaliyetleri ne kadar etkilediğini en iyi açıklayan kutucuğu işaretleyiniz.

	Etkisi yok	Hafif / Çok değil	Orta derecede / Zor	Ciddi derecede / İmkansız
8. Cinsel yaşam	☐ 6	☐ 4	☐ 2	☐ 0
9. Uyku	☐ 3	☐ 2	☐ 1	☐ 0
10. Yürüyüş	☐ 3	☐ 2	☐ 1	☐ 0
11. Oturma	☐ 3	☐ 2	☐ 1	☐ 0
12. Seyahat etme	☐ 3	☐ 2	☐ 1	☐ 0
13. Giyinme	☐ 3	☐ 2	☐ 1	☐ 0