

Research Article

Adaptation and validation of the Turkish version of the Quality of Life Profile for Spinal Deformities in idiopathic scoliosis

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ABSTRACT

Objective: The Quality of Life Profile for spinal deformities (QLPSD) was developed to evaluate the quality of life of patients with scoliosis and other spinal deformities. The purpose of the study was to systematically translate the QLPSD into Turkish and examine the reliability and validity of the Turkish version.

Methods: This methodological study was conducted with 125 participants with idiopathic scoliosis. After the translation of the QLPSD into Turkish systematically, all participants answered the Turkish version of the QLPSD (T-QLPSD) and Scoliosis Research Society–22 items (SRS-22) questionnaires. Intraclass correlation coefficient (ICC) and Cronbach's α statistics were used to test the reliability of the tools: convergent and construct validity of the tools was assessed using exploratory factor analysis and Pearson's correlation analysis.

Results: One hundred twenty-five participants were included in the study. The mean age of them was 13.7 ± 2.2 years. For the T-QLPSD total score, Cronbach's α was 0.91, and the ICC was 0.94. A very good correlation was found between T-QLPSD and SRS-22 total scores ($r = -0.71$). Participants with mild scoliosis reported less back pain ($P = .038$), better back flexibility ($P = .001$), and body image ($P = .044$) compared to moderate scoliosis.

Conclusion: The T-QLPSD was found to be a reliable and valid scale for assessing quality of life in idiopathic scoliotic patients in Türkiye.

Level of Evidence: Level II, Diagnostic Study.

Introduction

Idiopathic scoliosis is a common spinal deformity in the pediatric age group.^{1,2} Patients with idiopathic scoliosis are affected psychologically and physiologically by the presence of back pain, stiffness, and worsening body image, which causes a decrease in the quality of life (QoL).¹ The subjective assessment of QoL is an increasingly emphasized situation in the monitoring and management of scoliosis treatment.³

The Quality of Life Profile for Spinal Deformities (QLPSD) was developed to evaluate the QoL of patients with scoliosis and other spinal deformities.^{4,5} This questionnaire was also used to examine the treatment effects on QoL in adolescents with spinal disorders.⁶ The scale has strong reliability and validity.^{4,5} German, French, English, Korean, Persian, Greek, and Chinese versions of the QLPSD have also been adapted and validated. These versions of the scale also had good reliability and validity.^{3,6-12} Also, the ease of use of the questionnaire was demonstrated in the other versions.^{8,9}

The Scoliosis Research Society Questionnaire–22 items (SRS-22) is commonly used to assess QoL. However, it presents certain challenges, such as difficulty in responding to some questions for the adolescent age group and evaluating issues like pain, which may not be a significant problem for these patients.^{13,14}

However, the QLPSD has never been adapted to Turkish yet. Therefore, the aim was to make linguistic and transcultural adaptations of the Turkish version of the QLPSD (T-QLPSD) and to evaluate its reliability and validity.

Materials and methods

The study was conducted at University of Health Sciences, Istanbul Kanuni Sultan Süleyman Training and Research Hospital, Physical Medicine and Rehabilitation Clinic between April 2021 and October 2022. The study protocol was designed by following the guidelines on adaptation, validity, and reliability of the questionnaires.¹⁵

Firstly, permission was obtained from Jose M. Climent for the cross-cultural adaptation, validity, and reliability analysis of the QLPSD (the original name in Spanish is *CAVIDRA*). Afterward, the questionnaire was translated from Spanish to Turkish by a professional translator (forward translation). The researchers reviewed the questions and established a consensus. It was retranslated into Spanish by 2 professional translators who were blind to the study (reverse translation). The re-translated version was compared with the original version of the QLPSD, and the translators and authors made final decisions for the items. This version of the scale was piloted in

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15 patients with idiopathic scoliosis. Necessary changes were made based on feedback from these patients, and the final Turkish version of the QLPSD was created (Appendix 1).

The T-QLPSD and SRS-22 were used to collect data from the participants. Demographic and clinical data such as gender, age, weight, height, the curve magnitude, the location of the curve, and treatment methods were also collected.

The QLPSD consists of 21 items in 5 domains: 7 items for psychosocial functioning, 4 items for sleep disturbances, 3 for back pain, 4 for body image, and 3 for back flexibility. The answers given to the items were determined on a 5-point Likert scale. The total score ranges from 21 to 105, with higher scores indicating a lower QoL.^{4,5}

The SRS-22 questionnaire consists of the following 5 domains: 5 items for function and activity, 5 items for pain, 5 items for self-image and appearance, 5 items for mental health, and 2 items for satisfaction with management. Each item scores 1 (worst) to 5 (best).¹⁶

Participants with idiopathic scoliosis aged 10-16 years and with spinal curvature of 10°-40° were included in the study. The sample size of the study was recommended to have 5-10 participants for each item¹⁷; therefore, 125 participants were included in the final analysis.

The protocol was approved by the Ethics Committee of Istanbul Kanuni Sultan Süleyman Training and Research Ethical Committee (Approval Number: KA EK/2021.04.121; Date: April 8, 2021), in line with the principles of the Declaration of Helsinki. Verbal and written consent were obtained from all participants. The study was registered on Clinicaltrials.gov (ID: NCT04846296).

Statistical analysis

Statistical Package for the Social Sciences (SPSS) version 23.0 (IBM SPSS Corp.; Armonk, NY, USA) was used. The distribution of the variables was analyzed using Kolmogorov–Smirnov test; therefore, nonparametric and parametric tests were selected. A value of 0.7 was considered the minimum requirement for internal consistency using the Cronbach’s α method.¹⁸ Test–retest reliability [intraclass correlation coefficient (ICC)] was used to evaluate temporal stability. Exploratory factor analyses were conducted to assess validity. The QLPSD and SRS-22 were compared using Pearson’s correlation analysis to establish convergent validity. The degree of correlation was evaluated based on the coefficient values: $r = 0.81-1.0$ corresponds to “excellent,” $r = 0.61-0.80$ corresponds to “very good,” $r = 0.41-0.60$ corresponds to “good,” $r = 0.21-0.40$ corresponds to “fair,” and $r = 0.0-0.20$ “poor.”^{6,19} The known-group construct validity was measured using independent samples *t*-test by comparing

the T-QLPSD scores of participants with Cobb angle <5° with those of participants with Cobb angle $\geq 5^\circ$.^{3,20} Floor and ceiling effects were evaluated based on the percentages of participants achieving the lowest and highest possible scores in each domain and the overall score, and percentages more than 15% was considered statistically significant.¹⁶

Results

One hundred forty-seven participants who met the inclusion criteria were asked to participate to the study. Twenty participants who did not fully answer the questions, and two participants with spinal deformities other than adolescent idiopathic scoliosis dropped out. One hundred twenty-five of them (85 females and 40 males) were included. Thirty participants were randomly selected for the retest.

The average age of the participants was 13.7 ± 2.2 years. The mean Cobb angle was $23.9 \pm 9.0^\circ$. About 68.8% ($n = 86$) had only

Table 1. Demographic and clinic data of the pretest population

Pretest population (n=15)	
Age (years) [mean (SD)]	13.3 (1.3)
Gender	
Female/male	10/5
BMI [mean (SD)]	20.2 (2.6)
Cobb angle [mean (SD)]	22.1 (6.6)
Location of the curvature, n (%)	
Thoracic	6 (40.0%)
Thoracolumbar	4 (26.7%)
Lumbar	3 (20.0%)
Double major	2 (13.3%)
Treatment	
Exercise	9 (60.0%)
Brace + exercise	6 (40.0%)

BMI: Body mass index, SD: Standard deviation.

Table 2. Demographic/clinical characteristics of the participants and results of the scales

	Cobb angle		Total (n = 125)
	Mild scoliosis (<25°) (n = 67)	Moderate scoliosis (>25°) (n = 58)	
Age (years) (mean (SD))	13.7 (2.4)	13.8 (1.9)	13.7 (2.2)
Gender			
Female/male	49/18	36/22	85/40
BMI [mean (SD)]	20.6 (3.0)	20.8(3.4)	20.7 (3.2)
Cobb angle [mean (SD)]	16.7 (4.1)	32.2 (5.0)	23.9 (9.0)
Location of the curvature, n (%)			
Thoracic	20 (29.9%)	19 (32.8%)	39 (31.2%)
Thoracolumbar	22 (32.8%)	11 (19.0%)	33 (26.4%)
Lumbar	20 (29.9%)	11 (19.0%)	31 (24.8%)
Double major	5 (7.5%)	17 (29.3%)	22 (17.6%)
Treatment ((n (%))			
Exercise	67 (100%)	19 (32.8%)	86 (68.8%)
Brace + exercise	-	39 (67.2%)	39 (31.2%)
T-QLPSD (mean (SD))			
Psychosocial function	15.3 (6.3)	17.0 (7.4)	16.1 (6.9)
Sleep disturbances	9.5 (4.1)	11.0 (4.4)	10.2 (4.3)
Back pain	7.9 (3.5)	9.3 (3.6)	8.5 (3.6)
Body image	9.5 (3.7)	11.0 (4.7)	10.2 (4.2)
Back flexibility	6.5 (3.1)	8.7 (4.1)	7.5 (3.7)
Total score	48.7 (16.7)	57.0 (19.9)	52.6 (18.6)
SRS-22 (mean (SD))			
Function/activity	15.1 (2.1)	14.6 (2.4)	14.9 (2.3)
Pain	19.1 (2.4)	17.7 (3.1)	18.4 (2.8)
Self-image/appearance	17.2 (3.6)	15.9 (4.5)	16.6 (4.1)
Mental health	15.9 (4.4)	16.6 (5.3)	16.2 (4.8)
Satisfaction	6.9 (2.0)	7.2 (2.0)	7.0 (2.0)
Total score	74.2 (9.0)	72.0 (12.1)	73.2 (10.6)

BMI, body mass index; SRS-22, Scoliosis Research Society patient questionnaire—22 items; SD, standard deviation; T-QLPSD: Turkish version of the Quality of Life Profile for Spinal Deformities.

H I G H L I G H T S

- The subjective assessment of Quality of Life is increasingly popular in scoliosis treatment management. The Quality of Life Profile for Spinal Deformities (QLPSD) was developed for this purpose and has been utilized internationally. However, it has not been adapted for Turkish speakers. This study aims to perform linguistic and transcultural adaptations of the QLPSD into Turkish (T-QLPSD) and to assess its reliability and validity.
- The results showed that the Turkish version of the QLPSD demonstrated excellent reliability (Cronbach’s α from 0.78 to 0.91; ICC from 0.82 to 0.97) and strong validity, with a notable negative correlation with the SRS-22 scales ($r = -0.71, P < .001$) and a satisfactory factorial structure explaining 75.17% of the variance.
- The results indicate that the Turkish version of Quality of Life Profile for Spinal Deformities is a valid and reliable scale for assessing quality of life in patient with scoliosis.

scoliosis-specific exercise treatment (SSE), and 31.2% of them (n = 39) wore a brace in addition to SSE. The demographic and clinical data, as well as the results of the T-QLPSD and SRS-22, are presented in Tables 1 and 2.

Reliability of T-QLPSD

The subscales demonstrated a minimum Cronbach’s α of 0.78, while the total score showed a Cronbach’s α of 0.91. A retest was conducted approximately 6 weeks after the initial test.^{21,22} The ICC values ranged from 0.82 to 0.97 for subscale scores and were 0.94 for the T-QLPSD total score (Table 3). These results indicated excellent reliability for the T-QLPSD. No floor and ceiling effects were observed.

Table 3. The internal consistency and test–retest reliability of the Turkish version of the QLPSD

Turkish version of QLPSD	Cronbach’s α	ICC (95% CI)
Psychosocial function	0.91	0.85* (0.72-0.94)
Sleep disturbances	0.87	0.90* (0.81-0.96)
Back pain	0.95	0.97* (0.93-0.99)
Body image	0.78	0.82* (0.64-0.93)
Back flexibility	0.97	0.93* (0.85-0.97)
Total	0.91	0.94* (0.89-0.98)

ICC, intraclass correlation coefficient; QLPSD, Quality of Life Profile for Spinal Deformities.

* $P < .001$

Table 4. Exploratory factor analysis

Factor	Eigenvalue	Variance (%)	Cumulative variance (%)
1	10.277	48.94	48.94
2	1.927	9.17	58.11
3	1.695	8.07	66.18
4	0.982	4.67	70.86
5	0.905	4.31	75.17

Kaiser–Meyer–Olkin measure of sampling adequacy: 0.906.

Bartlett’s test of sphericity significance: $<.001$.

Validity

Exploratory factor analysis (EFA)²³ was used to test the factorial validity of the T-QLPSD. The value of the Kaiser–Meyer–Olkin measure was 0.91, and this value was indicated highly suitable for factor analysis.²⁴ Bartlett’s test of sphericity was significant ($P < .001$). The EFA set the 5 factors, which explained 75.17% of the cumulative variance (Table 4). One item (item number 4) from the psychosocial function scale showed multiple loadings, and 1 item (item number 8) from the sleep disturbances scale showed no loading on the intended subscale. The remaining T-QLPSD items presented loadings between 0.67 and 0.99 on the relevant factors (shown in Appendix 1). According to the correlation analysis results of the T-QLPSD subscales, the correlation ranged between $r=0.42$ (body image with back flexibility) and $r=0.69$ (sleep disturbances with psychosocial functioning) (Table 5).

The correlation between SRS-22 and T-QLPSD was examined for convergent validity, resulting in an r -value of -0.71 ($P < .001$). A negative very good correlation was generally determined between the 2 scales. Particularly, the T-QLPSD back pain subscale had a good correlation with the SRS-22 pain subscale ($r = -0.51$), the T-QLPSD body image subscale had a good correlation with the SRS-22 self image/appearance subscale ($r = -0.54$), and the T-QLPSD psychosocial function subscale had a good correlation with the SRS-22 function/activity subscale ($r = -0.52$) (Table 6).

Based on the evaluation of known-group construct validity, the participants were divided into 2 groups based on curve magnitude: “mild scoliosis” for Cobb angle $<25^\circ$ and “moderate scoliosis” for Cobb angle $\geq 25^\circ$.²⁰ According to the independent t -test results, the participants with mild scoliosis reported less back pain ($P = .038$), better back flexibility ($P = .001$), and body image ($P = .044$) compared to those with moderate scoliosis (Table 7).

Table 5. Correlation analysis of the Turkish version of the Quality of Life Profile for Spinal Deformities subscales

No	Domains	1	2	3	4	5	Total
1	Psychosocial function	1					
2	Sleep disturbances	0.69*	1				
3	Back pain	0.54*	0.63*	1			
4	Body image	0.54*	0.56*	0.63*	1		
5	Back flexibility	0.54*	0.63*	0.56*	0.42*	1	
	Total	0.86*	0.87*	0.79*	0.76*	0.75*	1

* $P < .001$.

Table 6. Pearson correlation coefficient of the T-QLPSD with the SRS-22

	SRS-22 total	Function/activity	Pain	Self-image/ appearance	Mental health	Satisfaction
T-QLPSD total						
r	-0.71	-0.57	-0.60	-0.59	-0.38	-0.11
P	$<.00^*$	$<.001^*$	$<.00^*$	$<.001^*$	$<.001^*$.212
Psychosocial function						
r	-0.64	-0.52	-0.54	-0.55	-0.34	-0.08
P	$<.00^*$	$<.001^*$	$<.00^*$	$<.001^*$	$<.001^*$.378
Sleep disturbances						
r	-0.58	-0.45	-0.49	-0.44	-0.37	-0.09
P	$<.001^*$	$<.001^*$	$<.001^*$	$<.001^*$	$<.001^*$.280
Back pain						
r	-0.55	-0.44	-0.51	-0.42	-0.28	-0.12
P	$<0.001^*$	$<0.001^*$	$<0.001^*$	$<0.001^*$	0.001*	0.195
Body image						
r	-0.59	-0.43	-0.43	-0.54	-0.31	-0.17
P	$<.001^*$	$<.001^*$	$<.001^*$	$<.001^*$	$<.001^*$.054
Back flexibility						
r	-0.46	-0.44	-0.45	-0.40	-0.19	0.01
P	$<.001^*$	$<.001^*$	$<.001^*$	$<.001^*$.031*	.948

SRS-22, Scoliosis Research Society patient questionnaire–22 items; T-QLPSD, Turkish version of the Quality of Life Profile for Spinal Deformities.

Table 7. QLPSD scores by Cobb angle among participants with idiopathic scoliosis

	QLPSD dimensions					QLPSD total score [mean (SD)]
	Psychosocial functioning [mean (SD)]	Sleep disturbances [mean (SD)]	Back pain [mean (SD)]	Body image [mean (SD)]	Back flexibility [mean (SD)]	
Cobb ≤ 25° (n=67)	15.3 (6.3)	9.5 (4.1)	7.9 (3.5)	9.5 (3.7)	6.5 (3.1)	48.7 (16.7)
Cobb > 25° (n=58)	17.0 (7.4)	11.0 (4.4)	9.3 (3.6)	11.0 (4.7)	8.7 (4.1)	57.0 (19.9)
P	NS	NS	.038*	.044*	.001*	.013*

NS, not significant; QLPSD, Quality of Life Profile for Spinal Deformities; SD, standard deviation.
P < .05 is considered significant (independent t-test).

Discussion

Quality of Life Profile for Spinal Deformities is the first comprehensive tool to evaluate the QoL of patients with spinal deformities.¹² In the current study, the T-QLPSD was found to be a valid and reliable questionnaire for evaluating Turkish patients with idiopathic scoliosis. The reliability levels of this instrument were similar to original scale and other versions.^{4,6,7,10} In the current study, the Cronbach's α was 0.91 for psychosocial functioning, 0.87 for sleep disturbances, 0.95 for back pain, 0.78 for body image, 0.97 for back flexibility subscale, and 0.91 for the T-QLPSD total score. Climent et al⁴ reported a Cronbach's α of 0.88 for the QLPSD total score. Additionally, in the original study, it was reported that Cronbach's α was 0.84 for sleep disturbances, 0.81 for psychosocial function, 0.75 for back pain, 0.70 for body image, and 0.70 for back flexibility. Schulte et al⁷ adapted the German version of the scale, and they reported the Cronbach's α was 0.93 for total score, 0.89 for back flexibility, 0.88 for body image, 0.87 for back pain, 0.86 for psychosocial function, 0.85 for sleep disturbances. Similar results were observed in other versions of the scale as well.^{6,10,12}

Test-retest reliability was defined as 0.95 for the total score in the current study. This result was similar to the original version (0.91),⁴ German version (0.84),⁷ Korean version (0.81),¹⁰ Persian version (0.88),⁶ and Chinese version (0.91).¹² In addition, when comparing the ICCs of the subscales in the T-QLPSD with the other versions, similar results were observed.^{6,10,12} Based on these data, the T-QLPSD has proven to have strong reliability in the evaluation of idiopathic scoliotic patients.

Exploratory factor analysis was used to measure factor loading, and it was found that most items exhibited strong factor loading, with very few exceptions (items 4 and 8). Based on the item-total analysis, all items had an item-total score correlation >0.30; therefore, no item was found to be redundant. Good to very good correlations were found between the subscales of T-QLPSD. Schulte et al⁷ reported weak to high correlations. They reported a strong correlation between back pain and sleep disturbance ($r = 0.70$), whereas, in the current study, a very good correlation was found between psychosocial function and sleep disturbance in T-QLPSD ($r = 0.656$).

Convergent validity analysis showed that the T-QLPSD subscales and total score were correlated with the SRS-22 subscales and total score, except for the satisfaction subscale. These result can be explained by the fact that QLPSD does not evaluate satisfaction with management. Park et al reported a stronger relation between the back pain dimension of the QLPSD and the pain dimension of the SRS-22 ($r = -0.751$), and between the body image dimension of the QLPSD and the self-image/appearance dimension of the SRS-22 ($r = -0.764$).¹⁰ Hu et al¹² revealed a good correlation between SRS-22 and QLPSD body image and pain subscales ($r = -0.484$ and $r = -0.586$, respectively). The current study's results showed a good correlation between the pain

($r = -0.514$) and body image subscales ($r = -0.544$) of SRS-22 and T-QLPSD. Additionally, a very good correlation was found between the total scores of both scales ($r = -0.71$). This result also supported the original version of the QLPSD.⁴

In this study, participants with mild scoliosis reported less back pain, better back flexibility, and body image compared to moderate scoliosis. According to Rezaei Motlagh's study, it was shown that participants with adolescent idiopathic scoliosis with a <40° Cobb angle had better psychosocial functioning, and similar to the current study, a better body image, and less back pain.⁶ In addition, several studies have also supported the association between higher scoliosis severity and lower QoL.^{7,25}

There are some limitations of the study. Firstly, according to some authors, the sample size is small.⁷ However, there are also studies showing that the sample size is sufficient.^{6,12} Second, none of the participants were treated surgically. In the future, the T-QLPSD can be used for evaluating the QoL of operatively treated patients with idiopathic scoliosis or other spinal deformities.

In conclusion, this study emphasizes that the T-QLPSD is a cross-culturally adapted, valid, and reliable instrument for assessing the QoL in idiopathic scoliotic patients in Türkiye.

Ethics Committee Approval: This study was approved by the Ethics Committee of Istanbul Kanuni Sultan Süleyman Training and Research Hospital (Approval Number: KAEK/2021.04.121; Date: April 8, 2021).

Informed Consent: Informed consent was obtained from the all participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

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Appendix 1. Pattern matrix

	Component				
	1	2	3	4	5
c1	.776				
c2	.668				
c3	.883				
c4	.446		.381		
c5	.974				
c6	.730				
c7	.832				
c8	.396				
c9			.882		
c10			.965		
c11			.761		
c12					.999
c13					.676
c14					.930
c15		.791			
c16		.864			
c17		.785			
c18		.895			
c19				.789	
c20				.811	
c21				.914	

Extraction method: principal component analysis; rotation method: Promax with Kaiser normalization.
