



Evaluation of quality of life in children and adolescents during treatment with Rigo – Cheneau type braces using the Russian version of the Brace Questionnaire

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Abstract

Introduction Special questionnaires recommended by SOSORT are used to study the quality of life (QoL) of children and adolescents undergoing brace treatment for scoliosis. One of them is the Brace Questionnaire (BrQ) which has undergone the stage of linguistic and cultural adaptation and validation in the Russian language.

Aim To reveal groups of patients with scoliosis requiring special attention during brace treatment using the BrQ which was validated in Russia.

Methods 405 patients that wore braces were surveyed with the automated BrQ. Changes in the domains and the overall quality of life score were statistically analyzed based on gender, age, duration of brace wear, and daily brace wear time. In 325 individuals, changes were tracked based on the magnitude of the main scoliotic curve.

Results Boys showed statistically significantly higher scores in the "Vitality" ($p = 0.05$) and "Bodily Pain" ($p = 0.03$) domains. A main trend was identified: a decrease in domain scores and the overall QoL score with increasing age, duration of brace wear, and magnitude of the main curve. Statistically significant differences in various domains were found between the study groups for these parameters. The dependence of scores on the daily brace wear time was their growth.

Discussion The identified trends in changes of domain scores and the overall QoL score in regard to increase in age, duration of brace wear, daily wear time, and the magnitude of the main curve are consistent with scientific literature data.

Conclusion Determination of the significance of differences revealed groups of patients requiring special attention during brace treatment for scoliosis. These are girls who have a lower QoL level in the "Emotional Functioning" and "Social Functioning" domains; middle and senior school-age children who show a decrease in the "General Health Perception", "Bodily Pain", "Self-Esteem and Esthetics", and "Social Functioning" domains. These are patients who wore a brace for 4 years or more: the "General Health Perception", "Emotional Functioning", and "Self-Esteem and Esthetics" domains decrease; and for the "Bodily Pain" domain, pain increased already after 2–3 years of brace use. A special group of patients are those who at the initial stage of brace wear had the lowest Quality of Life (QoL) scores. High grades of scoliosis significantly reduce the scores in the domains such as "General Health Perception", "Vitality", and "School Activity", while the "Social Activity" domain score is reduced with a curve more than 50°.

Keywords: spine, idiopathic scoliosis, quality of life, brace

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INTRODUCTION

Idiopathic scoliosis (IS) is a progressive disease associated with psychosocial consequences. Quality of life (QoL) in children and adolescents with IS can be affected by both scoliosis itself and therapeutic interventions, such as brace therapy. However, the impact of brace use on health-related QoL parameters in individuals with IS remains controversial. Some studies suggest that brace fixation does not have adverse effects on health-related QoL parameters in individuals with IS [1–4]. Other authors report that wearing a brace may result in various psychological reactions, such as negative thoughts, stress and anxiety, emotional instability, and impaired self-perception and self-esteem [5–8].

To effectively improve the quality of life of the individuals who wear a brace for a long time, it is necessary to use appropriate questionnaires to identify the factors that most significantly influence it. In 2006, Greek researchers developed a specialized questionnaire to study the quality of life of children and adolescents with scoliosis who are prescribed brace treatment: the Brace Questionnaire (BrQ) [9], which underwent linguistic and cultural adaptation and validation in Russian [10].

The **purpose** of the study was to use the BrQ questionnaire, validated in Russia, to identify groups of patients with scoliosis that require special attention during treatment with Rigaud – Cheneau braces.

MATERIALS AND METHODS

The study included school-age patients with idiopathic scoliosis ($n = 405$) who came for an outpatient appointment as they used Rigaud-Cheneau braces, modeled in the Rodin 4D software environment and manufactured using CAD/CAM technology from thermoplastics in the conditions of the prosthetic and orthopedic center "Scoliologic.ru" and the North-West Scientific and Practical Center for Rehabilitation and Prosthetics "Ortetika".

Their examination survey used the automated Russian-language BrQ questionnaire, integrated into the website of the prosthetic and orthopedic center "Scoliologic.ru". In addition to 34 questions from the BrQ questionnaire, the questionnaire included information on gender, age, total duration of brace use, and duration of daily bracing. Patients completed the questionnaire independently using a tablet in the waiting room before their appointment with an orthopedic specialist.

Patient groups by age were formed on the basis of pedagogical practice grouping [11]:

- Junior school age (6–10 years old);
- Middle school age (10–15 years old) that was divided into 2 subgroups: 10–13 year-old and 13–15 year-old children;
- Senior school age (15–18 year old).

Groups by duration of bracing:

- one year,
- two–three years,
- four years and more.

Groups by daily period of bracing:

- Fewer than 8 hours,
- 8–14 hours,
- More than 15 hours.

Additionally, a random sample of 325 persons was selected, in whom changes in domain scores and overall QoL scores were monitored based on the grade of the main scoliosis curve. The scoliosis grade based on the main curve was determined in accordance with national clinical guidelines.

Groups of scoliosis grades:

- Grade II: 11–25°;
- Grade III: 26–40°;
- Grade IV: $\geq 41^\circ$ which was divided into 2 subgroups ($< 50^\circ$ and $> 50^\circ$).

The BrQ contains 34 Likert scale items and covers eight domains to measure QoL in patients with adolescent IS who are on brace treatment:

1. General perception of health (questions 1, 2);
2. Physical functioning (questions 3–9);
3. Emotional functioning (questions 10–14);
4. Self-esteem and esthetics (questions 15, 16);
5. Vitality (questions 17, 18);
6. School activity (questions 19–21);
7. Bodily pain (questions 22–27);
8. Social functioning (questions 28–34).

Evaluation BrQ for questions 4, 5, 6, 12, 14, 15, 16 and 17:

- always: 5 points;
- most of the time: 4 points;
- sometimes: 3 points;
- almost never: 2 points;
- never: 1 point.

Evaluation BrQ for questions 1. 2. 3. 7. 8. 9. 10. 11. 13. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33 and 34:

- always: 1 point;
- most of the time: 2 points;
- sometimes: 3 points;
- almost never: 4 points;
- never: 5 points.

Calculation techniques: Each score is multiplied by 20, and the total score is divided by 34. Theoretically, the minimum score is 20 and the maximum is 100. A higher score indicates a better quality of life.

A subscale score can be calculated for each of the eight domains by dividing the total score of each domain by the number of items it comprises [9. 10].

The material was statistically processed to determine the significance of differences between the indicators of the groups.

Publication of the study was approved by the Ethics Committee of the Prosthetic and Orthopedic Center "Scoliologic.ru", based on the principles of the World Medical Declaration of Helsinki (Protocol No. 6 of August 25, 2025). It presents the results of studies without identifying the patients which do not contradict the ethical standards of the World Medical Association Declaration of Helsinki "Ethical Principles for Scientific Research Involving Human Subjects" with the amendments of 2000 and the "Rules of Clinical Practice in the Russian Federation", approved by Order of the Ministry of Health of the Russian Federation dated June 19, 2003; No. 266. Study participants and their legal representatives are informed of the goals, methods, expected benefits of the study, and the risks and inconveniences associated with participation in the study.

RESULTS

The survey yielded data on 405 individuals, including 58 boys (14.3 %) and 347 girls (85.7 %). The subjects were 14.2 ± 1.7 years old, with the main group being middle school age (65.4 %). Spinal bracing started at the age of 11.98 ± 1.90 years for 2.47 ± 1.37 years with a daily brace fixation time of 15.00 ± 3.78 hours.

The domain scores and overall QoL scores by gender are presented in Table 1.

Table 1

Domain scores and overall QoL scores according to the BrQ questionnaire by gender and the significance of the differences

Domains	QoL score. points			<i>p</i> between M and F
	Gender		Means	
	M (<i>n</i> = 58)	F (<i>n</i> = 347)		
General health perception	3.56 ± 0.64	3.54 ± 0.68	3.54 ± 0.68	0.87
Physical functioning	4.00 ± 0.49	4.00 ± 0.49	4.00 ± 0.49	0.99
Emotional functioning	3.76 ± 0.63	3.64 ± 0.61	3.65 ± 0.62	0.30
Self-Esteem and Esthetics	3.53 ± 0.76	3.55 ± 0.75	3.55 ± 0.75	0.92
Vitality	3.67 ± 0.53	3.47 ± 0.71	3.50 ± 0.68	0.05
School activity	4.19 ± 0.59	4.21 ± 0.70	4.2 ± 0.69	0.86
Bodily pain	4.42 ± 0.43	4.24 ± 0.53	4.27 ± 0.52	0.03
Social functioning	3.88 ± 0.47	3.81 ± 0.61	3.82 ± 0.59	0.46
Total score, QoL	79.15 ± 6.55	77.71 ± 8.86	77.91 ± 8.53	0.26

Scores for the domains "General Health Perception", "Physical Functioning", "Self-Esteem and Esthetics", and "School Activity" were similar for boys and girls. Boys showed a slight predominance of scores for the domains "Emotional Functioning" and "Social Functioning". Boys also had statistically significantly higher scores for the domains "Vitality" ($p = 0.05$) and "Bodily Pain" ($p = 0.03$). These domain scores contributed to a higher overall QoL score in boys than in girls.

The domain scores and the overall QoL score according to the BrQ questionnaire were studied in regard to age (Table 2).

Table 2

Domain scores and overall QoL scores according to the BrQ questionnaire by age and the significance of the differences

Domains	QoL score, points				<i>p</i> between columns			
	Junior school age	Middle school age		Senior school age				
	6–10 years old (<i>n</i> = 16)	10–13 years old (<i>n</i> = 117)	13–15 years old (<i>n</i> = 148)	15–18 years old (<i>n</i> = 124)				
	1	2	3	4	1 & 2	1 & 4	2 & 3	3 & 4
General health perception	3.88 ± 0.59	3.71 ± 0.65	3.52 ± 0.65	3.38 ± 0.73	0.42	0.03	0.07	0.22
Physical functioning	3.71 ± 0.59	3.92 ± 0.50	4.09 ± 0.45	4.00 ± 0.49	0.29	0.15	0.02	0.24
Emotional functioning	3.85 ± 0.54	3.65 ± 0.61	3.64 ± 0.59	3.64 ± 0.66	0.29	0.26	0.91	0.95
Self-Esteem and Esthetics	4.03 ± 0.60	3.53 ± 0.78	3.68 ± 0.69	3.34 ± 0.80	0.02	0.001	0.21	0.001
Vitality	3.75 ± 0.56	3.42 ± 0.74	3.60 ± 0.71	3.42 ± 0.63	0.10	0.09	0.11	0.08
School activity	4.23 ± 0.73	4.20 ± 0.72	4.25 ± 0.59	4.15 ± 0.75	0.89	0.74	0.57	0.32
Bodily pain	4.65 ± 0.28	4.28 ± 0.55	4.31 ± 0.48	4.16 ± 0.53	0.001	0.001	0.72	0.07
Social functioning	4.23 ± 0.56	3.78 ± 0.58	3.83 ± 0.56	3.81 ± 0.62	0.03	0.04	0.56	0.85
Total score, QoL	81.62 ± 7.24	77.51 ± 8.51	78.75 ± 8.06	76.82 ± 8.89	0.11	0.07	0.36	0.18

The following patterns of change in domain scores depending on age were identified.

Scores for the "General Perception of Health" and "Vitality" domains decrease with increasing age. Scores for the "Physical Functioning" domain increase. It is noteworthy that a statistically significant decrease was observed for the "General Perception of Health" domain between junior and senior school-aged children ($p = 0.03$). An increase was observed for the "Physical Functioning" domain between the "10 to 13 Years Old" and "13 to 15 Years Old" groups of middle school-age children ($p = 0.02$).

The "Emotional Functioning" domain scores slightly decrease, indicating an increase in potential experiences and anxieties associated with the brace. More significantly, statistically significantly, the "Bodily Pain" domain scores were observed in the junior and middle school age groups ($p = 0.001$), as well as in the junior and senior school age groups ($p = 0.001$). This should be interpreted as an increase in pain perceptions in IS patients with age.

Similar trends were revealed in the changes in the "Self-esteem and Esthetics" domain scores. A statistically proven decline in scores was observed between children of junior and middle school age ($p = 0.001$), as well as between children of middle and senior school age ($p = 0.001$).

The scores in the "Social Functioning" domain also declined. A significant difference was found between children of junior and middle school age ($p = 0.03$) and junior and senior school age ($p = 0.04$).

The scores of "School Activity" domain remain unchanged.

The highest overall QoL score is observed in junior school age children — (81.62 ± 7.24). In the group of children aged 10 to 13 years, the QoL level declines to (77.51 ± 8.51) points and in senior school age children it is (76.82 ± 8.89) points.

The domains and the overall QoL score were analyzed in regard to the overall duration of brace use (Table 3).

Table 3

Domain scores and overall QOL scores according to the BrQ questionnaire by duration of brace wear and the significance of the differences

Domains	QoL scores, points			<i>p</i> between columns		
	1 year ($n = 159$)	2–3 years ($n = 162$)	$\geq$ years ($n = 84$)			
	1	2	3	1 & 2	1 & 3	2 & 3
General health perception	3.75 ± 0.63	3.44 ± 0.70	3.36 ± 0.73	0.001	0.001	0.51
Physical functioning	4.03 ± 0.49	4.01 ± 0.49	3.94 ± 0.50	0.79	0.29	0.41
Emotional functioning	3.79 ± 0.51	3.62 ± 0.68	3.45 ± 0.64	0.06	0.001	0.12
Self-Esteem and Esthetics	3.70 ± 0.77	3.55 ± 0.75	3.23 ± 0.68	0.16	0.001	0.01
Vitality	3.54 ± 0.69	3.51 ± 0.69	3.40 ± 0.65	0.80	0.24	0.36
School activity	4.24 ± 0.66	4.13 ± 0.72	4.27 ± 0.65	0.27	0.76	0.22
Bodily pain	4.34 ± 0.47	4.17 ± 0.58	4.31 ± 0.47	0.03	0.68	0.12
Social functioning	3.88 ± 0.54	3.77 ± 0.64	3.81 ± 0.57	0.21	0.51	0.69
Total score, QoL	79.45 ± 7.67	77.08 ± 9.46	76.60 ± 7.97	0.06	0.04	0.75

The scores for the "General Health Perception", "Emotional Functioning", and "Self-Esteem and Aesthetics" domains decrease with longer duration of bracing. It is noteworthy that a highly significant difference in scores for the "General Health Perception" domain was observed between the "one year" and "more than four years" brace use groups ($p = 0.001$), as well as between the "one year" and "two to three years" groups ($p = 0.001$).

Similar significance of differences was revealed in the parameter "Emotional functioning" domain between the "one year" and "more than four years" groups ($p = 0.001$).

In the domain "Self-Esteem and Aesthetics", a high level of significance of differences was found between the "one year" and "more than four years" groups ($p = 0.001$) and a less significant difference between the "one year" and "two to three years" groups ($p = 0.01$)

No significant differences were found in the domain scores for "Physical Functioning", "Vitality", "Social Functioning", and "School Activity" based on the duration of brace use.

The scores of the "Bodily pain" domain significantly show that patients who used a brace for two to three years give more affirmative answers about feeling pain than patients who wore a brace for one year ($p = 0.03$). And the QoL scores of patients who used a brace for four years or more are practically comparable with the patients who wore braces for one year. The highest overall QoL score (79.45 ± 7.67) is observed in use period of one year. If the period of use was two to three years the score decreased by two units or more (77.08 ± 9.46). The lowest QoL score (76.60 ± 7.97) was noted in the period of four years or more. Moreover, significant differences were found between the "one year" and "four years or more" groups ($p = 0.04$).

The domain scores and the overall QoL score according to the BrQ questionnaire based on the daily time of brace fixation and the significance of differences are presented in Table 4.

Table 4

Domain scores and the overall QoL score according to the BrQ questionnaire based on the daily time of brace fixation and the significance of differences

Domains	Qol scores, points			<i>p</i> between columns		
	< 8 hours per day (<i>n</i> = 14)	8–14 hours per day (<i>n</i> = 122)	≥15 hours per day (<i>n</i> = 269)			
	1	2	3	1 & 2	1 & 3	2 & 3
General health perception	3.61 ± 0.54	3.48 ± 0.63	3.57 ± 0.71	0.58	0.86	0.36
Physical functioning	3.72 ± 0.48	3.98 ± 0.49	4.03 ± 0.49	0.13	0.07	0.44
Emotional functioning	3.31 ± 0.56	3.65 ± 0.61	3.67 ± 0.62	0.11	0.08	0.78
Self-Esteem and Esthetics	3.11 ± 0.77	3.32 ± 0.81	3.67 ± 0.72	0.46	0.05	0.001
Vitality	3.21 ± 0.53	3.50 ± 0.57	3.52 ± 0.73	0.16	0.13	0.82
School activity	3.90 ± 0.82	4.26 ± 0.70	4.20 ± 0.67	0.24	0.32	0.52
Bodily pain	3.95 ± 0.70	4.26 ± 0.44	4.29 ± 0.54	0.22	0.18	0.70
Social functioning	3.65 ± 0.75	3.85 ± 0.60	3.82 ± 0.57	0.44	0.52	0.67
Total score, QoL	72.65 ± 9.58	77.65 ± 8.18	78.31 ± 8.53	0.15	0.10	0.59

The lowest scores in the domains "Physical Functioning", "Emotional Functioning", "Self-Esteem and Esthetics", "Vitality", and "School Activity" were observed with a daily bracing period of less than eight hours. This group primarily includes patients who adapt to brace wear. With longer corset use, these scores grow. Significant differences were found between the "less than eight hours" and "more than 15 hours" groups ($p = 0.03$) and between the "8–14 hours" and "more than 15 hours" groups ($p = 0.001$).

The scores for the General Health Perception and Social Functioning domains remain almost unchanged.

The "Bodily Pain" domain score increased slightly, indicating a decrease in pain as the patient adapts to the brace.

The lowest overall QoL score is observed with a daily bracing period of less than eight hours (72.65 ± 9.58). During other periods, the QoL score increases. The highest score (78.31 ± 8.53) is noted with a brace fixation duration of 15 hours or more per day.

The results of a survey of 325 children and adolescents were compared with data from a medical database on the magnitude of the Cobb angle of the main deformity curve (Table 5).

Table 5

Domain scores and the overall QoL score according to the BrQ questionnaire based on scoliosis grade and the significance of differences

Domains	QoL scores, points				<i>p</i> between columns				
	Grade II Main curve 11–25° (<i>n</i> = 89)	Grade III Main curve 26–40° (<i>n</i> = 121)	Grade IV Main curve 41° and more						
			< 50° (<i>n</i> = 46)	> 50° (<i>n</i> = 69)					
	1	2	3	4	1 & 2	1 & 4	2 & 3	2 & 4	3 & 4
General health perception	3.78 ± 0.57	3.55 ± 0.75	3.61 ± 0.70	3.30 ± 0.61	0.05	0.001	0.69	0.07	0.06
Physical functioning	4.09 ± 0.39	4.07 ± 0.49	3.97 ± 0.51	3.97 ± 0.52	0.76	0.20	0.35	0.30	0.99
Emotional functioning	3.80 ± 0.57	3.68 ± 0.61	3.52 ± 0.64	3.66 ± 0.56	0.22	0.23	0.25	0.87	0.36
Self-Esteem and Esthetics	3.61 ± 0.75	3.50 ± 0.76	3.59 ± 0.75	3.51 ± 0.71	0.44	0.53	0.63	0.94	0.69
Vitality	3.66 ± 0.57	3.42 ± 0.74	3.40 ± 0.67	3.59 ± 0.67	0.04	0.55	0.90	0.22	0.26
School activity	4.40 ± 0.56	4.14 ± 0.73	4.17 ± 0.74	4.22 ± 0.64	0.02	0.12	0.83	0.53	0.80
Bodily pain	4.37 ± 0.43	4.26 ± 0.52	4.25 ± 0.55	4.22 ± 0.54	0.22	0.15	0.94	0.68	0.80
Social functioning	3.92 ± 0.52	3.82 ± 0.59	3.61 ± 0.68	3.95 ± 0.58	0.32	0.79	0.15	0.26	0.03
Total score, QoL	80.36 ± 6.91	77.97 ± 8.82	76.41 ± 9.32	77.94 ± 8.35	0.10	0.15	0.47	0.98	0.51

No statistically significant changes were found in the domains "Physical Functioning", "Emotional Functioning", and "Self-Esteem and Esthetics".

In the "General Health Perception" domain, a significant reduction in scores was observed between the groups with grades II and III scoliosis ($p = 0.05$). The most significant reduction was between the groups with grade II and grade IV scoliosis with an angle greater than 50° ($p = 0.001$).

The scores of "Viability" and "School Activity" domains also reduced with increasing curve magnitude, with a significant decrease between the groups with grades II and III scoliosis ($p = 0.04$ and $p = 0.02$, respectively).

A similar tendency was identified for "Social Activity" domain; significant differences were found between the scores of the "less than 50°" and "more than 50°" degree scoliosis subgroups IV ($p = 0.03$).

The "Bodily Pain" domain scores decrease with increasing curve, indicating an increase in pain as the severity of the deformity increases. However, this was not statistically confirmed.

The overall quality of life score also decreased statistically insignificantly.

Thus, the main trend is a decrease in domain scores and the overall QoL score as age, duration of brace use, and the main curve grow.

An increase in the domain score and the overall quality of life score was revealed as the duration of daily brace fixation grew.

DISCUSSION

International scientific societies that study scoliosis (SOSORT, SRS) place considerable emphasis on patient-subjective assessment of QoL conducted with various questionnaires. The most informative of these, in terms of brace treatment, are the specific Greek BrQ questionnaire, validated in Russia, and the Italian ISYQOL questionnaire, which has not yet undergone language adaptation and validation in Russia.

Our findings on higher QoL in boys with IS are confirmed by a study of Italian scientists [12]. Moradi et al. noted that for girls with IS undergoing brace treatment, body appearance and shape are of great importance and may affect their social relationships [13]. Our data indicate that boys show a slight predominance of scores in the domains of "Emotional Functioning" and "Social Functioning". However, statistically significantly higher scores in boys are found in the domains of "Viability" ($p = 0.05$) and "Bodily Pain" ($p = 0.03$).

The data on the domain scores and the overall QoL score based on age were confirmed by the study by Koroivessis et al. [6], who showed that compliance with bracing is higher in junior school-age children than in senior school-age adolescents. Indeed, the scores of the domains "General Perception of Health", "Emotional Functioning", "Vitality", "Self-Esteem and Esthetics", and "Social Functioning" decrease as age increases. However, the significance of differences in the indicators of the "Physical Functioning" domain increases between the groups of middle school-age children: from 10 to 13 years old and from 13 to 15 years old ($p = 0.02$). It should be noted that with age, a reduction in the scores of the "Bodily Pain" domain is observed. This is especially significant in the groups of junior and middle school age ($p = 0.001$), as well as junior and senior school age ($p = 0.001$) which indicates an increase in pain sensations with age. The highest overall quality of life indicator is observed in junior school age — (81.62 ± 7.24).

According to Moradi et al., the scores of school activity and social functioning according to the BrQ questionnaire were better in the participants aged 13 years than in the participants over 13 years old [13]. Our data on the "School Activity" domain do not support this statement. The scores of the "Social Functioning" domain significantly decrease in the groups of children of junior and middle school age ($p = 0.03$) and junior and senior school age ($p = 0.04$) what confirms the data obtained earlier.

The study by Babaee et al. on the effect of the brace fixation duration on QoL showed that at the early stage of wearing a brace, adolescents with IS may experience emotional stress and psychological reactions that affect their self-esteem [5]. However, after the initial shock caused by its use, children adapt to it, and the problems cease. In support of these data, we found that the scores in the "Bodily Pain" domain significantly show that patients who used a brace for two to three years give more affirmative answers about feeling pain than patients who wore a brace for one year ($p = 0.03$). And the group of patients who used a brace for four years or more is practically comparable in scores with the group who used it for one year. However, we found that the scores in the "General Perception of Health", "Emotional Functioning", and "Self-Esteem and Aesthetics" domains decrease as brace fixation duration increases. The highest overall QoL score (79.45 ± 7.67) was found in a period of one year use. If the fixation period was two to three years, the score lowers by two units or more: (77.08 ± 9.46). The lowest QoL scorer (76.60 ± 7.97) was found if the brace use period was four years or more. Moreover, significant differences were found between the "one year" and "four years or more" groups ($p = 0.04$).

Moradi et al. noted that there is a significant relationship between the BrQ domain "Emotional Functioning" and compliance with the brace treatment regimen [13]. Patients with a higher compliance with the brace fixation regimen had worse emotional functioning scores. The present study did not confirm these findings. On the contrary, the lowest scores of the domains "Physical Functioning", "Emotional Functioning", "Self-esteem and Esthetics", "Vitality", "School Activity" and the overall QoL scores (72.65 ± 9.58) were noted with a duration of daily brace fixation of less than eight hours. This group mainly includes patients who are at the stage of adapting to the brace. This is consistent with the data of MacLean et al. [14], who described the initial period of wearing braces as stressful in 84 % of patients, and with the data of Chan et al. who showed that the overall QoL score on the BrQ scale in the group with daily brace fixation for 0–8 hours was 16.28 lower than in the group with daily fixation for 17–23 hours [15]. The scores for the "General Perception of Health" and "Social Functioning" domains remained unchanged while the "Bodily Pain" score increased slightly, indicating a relief in pain as patients got used to the brace.

We have determined that as the main curve increases, the overall QoL score decreases. However, the statistical significance of these changes could not be proven. This result is confirmed by the study of Aulisa et al., in which QoL indicators correlate with the severity of curvature [12]. In their works, Kaya et al. and Asher et al. also show that the severity of scoliosis affects the QoL of IS patients [16, 17]. In the present study, it was found that the most pronounced changes are in the parameters of the "Viability" and "School Activity" domains. As the magnitude of the curve increases, they decrease. Moreover, the difference is significant between the groups with scoliosis

grades II and III ($p = 0.04$ and $p = 0.02$, respectively). A similar trend was revealed for the "Social Activity" domain. Moreover, significant differences were found between the subgroups of grade IV scoliosis (less than 50° and more than 50° , $p = 0.03$).

We compared the number of affirmative responses to several BrQ questions in the Spanish language in the sample published by Piantoni et al. [18] with our own data. Table 6 presents questions with significant differences in the number of affirmative responses.

Table 6

The number of affirmative answers of respondents to BrQ questions in the Argentinean and Russian samples

N of question	Questions	Affirmative answers, %	
		Piantoni et al. [18]	Our data
Emotional functioning			
12.	You felt happy?	24	64.7
14.	You believed that brace treatment was beneficial?	39	87.4
15.	You felt proud of yourself?	18	52.1
16.	You were satisfied with you body?	27	53.4
Physical functioning			
5.	You managed the brace without any help?	50	86.4
6.	You managed to take off the brace without any help?	50	94.4
Social functioning			
31.	You ad problems with your family?	42	26.2
32.	You believed that your relationship with your family or your friends would be better if you were not on brace?	50	30.4
33.	You stayed at home because yiu were ashamed?	42	25.7
Bodily pain			
23.	You had pain during the night?	55	20.8
24.	You had pain when walking?	47	27.4
25.	You had pain when sitting?	58	38.5
26.	You had pain when climbing stairs?	43	16.3
School activity			
19.	You had difficulties with your lessons?	48	27.4
20.	You were absent from schoool?	35	16.3
21.	You found it hard to pay attention in the classroom?	36	27.4

The table shows that Russian children and adolescents undergoing conservative treatment with braces feel more confident in emotional functioning. It is noteworthy that 87.4 % of the children we surveyed responded affirmatively to the question, "Did you think that brace treatment helped you?", which can be considered a success of teamwork. The survey on the "Physical Functioning" domain showed that fewer affirmative answers were given in the Russian population to the questions, "Did you feel tired while walking?" and "Were you unable to eat or breathe well?" To questions related to problems of putting on and taking off a brace, the patients of the prosthetic and orthopedic centers "Skoliologic. ru" and "Ortetika" also overwhelmingly responded that they did not experience such problems.

Training in brace putting on and taking off is a priority for our specialists. In the "Social Functioning" domain, responses from Russian children and adolescents indicate that they feel more confident in social settings. However, the questions "Did you feel different from your peers?" and "Did you wear bulky clothing that concealed your brace?" yielded identical responses in both studies. A lower percentage of affirmative responses was also given by Russian children and adolescents to the questions related to the "Bodily Pain" domain. However, the responses to the question "Did you feel tingling in your arms and legs?" were identical. Regarding questions related to the "School Activity" domain, the trend persists. Our own data demonstrate a lower number of affirmative responses. Thus, the overall QoL score in the present study is 77.9 points, compared to 63.7 points in the Argentinean study.

Figure 1 presents our own data on the average values of domain scores in comparison with data from the scientific literature presented in the works of Aulisa et al. [19], Deceuninck et al. [20], Kinel et al. [21] and Peeters et al. [22]. The diagram shows that: that the values do not differ significantly from each other. The same can be said about the overall quality of life: Russia — 77.9 points; Poland — 77.1 b.; Italy — 78.8 b.; France — 76.0 b.; Denmark — 75.9 b.

CONCLUSION

The results of our study show that children and adolescents rate their quality of life at 77.9 points out of a possible 100 when they are treated with bracing for idiopathic scoliosis.

The following trend was identified: at the beginning of brace treatment, as the duration of daily brace use increases, QoL

scores grow as the patient becomes accustomed to the brace, suggesting a reduction in initial stress at the initial stage of treatment. However, after prolonged treatment over many years, QoL scores decrease due to psychological fatigue from the treatment.

The study showed that girls require special attention from the specialist team during brace treatment, as their quality of life declines more significantly, particularly in the "Emotional Functioning" and "Social Functioning" domains.

More attention should be paid to middle school age and senior school age children, who show significantly lower scores in the domains "General Perception of Health", "Bodily Pain", "Self-Esteem and Esthetics", and "Social Functioning".

Patients who wear a brace for four years or more should be the focus of specialists' attention due to significantly declining scores in the domains "General Health Perception", "Emotional Functioning", and "Self-Esteem and Esthetics". In the "Bodily Pain" domain, pain sensations are increased after two to three years of brace use.

Patients at the initial stage of brace corset use should be specially cared as they have the lowest QoL scores.

High grades of scoliosis significantly reduce scores in the "General Perception of Health", "Vitality", and "School Activity" domains. Scoliosis scores in the "Social Activity" domain decrease significantly at curves greater than 50°.

Conflict of interest The authors declare no potential conflicts of interest related to the this study.

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Ethical approval Publication of the study was approved by the Ethics Committee of the Prosthetic and Orthopedic Center "Scolilogic.ru" (Protocol No. 6 dated August 25, 2025). The study results are presented without identifying the patients. Study participants and/or their legal representatives signed informed consent for publication of the results.

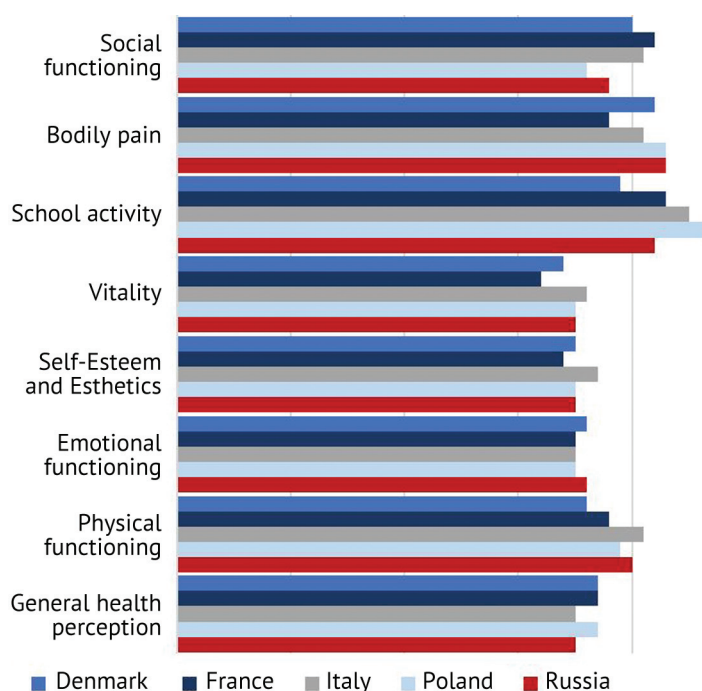


Fig. 1 Comparison of our own data (Russia) on average values of domain indicators with data from scientific literature

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