
An insight into the health-related quality of life of adolescent idiopathic scoliosis patients undergoing bracing, observation and previously braced

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1

2 Introduction

3 Adolescent Idiopathic Scoliosis (AIS) is the commonest type of spinal deformity in the
4 pediatric population and is characterized by a three-dimension rotational deformity of the
5 vertebral column.^{1,2} AIS refers to patients diagnosed with scoliosis between 10 to 18 years,^{3,4}
6 with a reported prevalence of 1.8%.⁵ Several clinical and radiological parameters are crucial
7 for AIS management. These include assessment of skeletal maturity to determine progression
8 risk and timing of intervention,^{6,7} curve flexibility to determine fusion levels and
9 instrumentation strategies, and degree of curvature and rotation for assessment of surgical
10 outcomes.⁸⁻¹¹ However, more importantly, disease severity and treatment success are gauged
11 by health-related quality of life (HRQoL) outcomes. Improvement in HRQoL reflects patient
12 perceived outcomes and is thus a better measure of treatment effects than radiographic
13 measurements. AIS has been shown as a significant risk factor for psychosocial issues due to
14 peer interactions and self-concern over body development.¹² Thus, the quality of life of AIS
15 patients may relate more to psychosocial coping mechanisms as compared to perceived benefits
16 of treatment by health practitioners.¹³ This is particularly the case for brace treatment.¹⁴

17 HRQoL of patients undergoing bracing deserves the largest attention as it may influence
18 their compliance, which *directly* affects the success of treatment. Psychological preparation
19 and intervention have been shown to improve compliance.¹⁵ Hence, this has important clinical
20 implications on treatment outcome. Only limited evidence is available for the HRQoL of
21 patients in and out of brace treatment, as compared to those under observation only. Small scale
22 studies reported contradicting results with the refined Scoliosis Research Society 22-item

1 (SRS-22r) for patients observed or with brace treatment.^{16,17} Moreover, the differences in utility
2 scores like the EuroQol 5-Dimension (EQ-5D) between observed, bracing and previously
3 braced patients is unknown. This information is valuable as it enables cross-disease
4 comparisons and the calculation of quality of life years (QALYs) for cost-utility analysis.¹⁸

5 As such, this study aims to investigate and compare specifically the quality of life of
6 patients under observation compared with those undergoing bracing or have been braced
7 previously. As possible contributing factors, radiological parameters including axial vertebral
8 rotation, coronal and sagittal alignment were also examined as secondary outcomes.

9

10 **Methods**

11 **Subjects and Setting**

12 AIS patients were consecutively recruited from a tertiary referral scoliosis center during
13 the period of December 2016 to June 2017 for this cross-sectional study. Only AIS patients
14 aged 10 to 18 years and of Chinese ethnicity were included in this study. Patients were excluded
15 if their diagnosis of scoliosis was other than AIS, and for those whose parents did not give
16 written consent for participation, or patients who were non-Chinese, illiterate, intellectually
17 disabled or physically-compromised, and who had previous surgery. As a result, there were
18 two patients excluded as they had fusion surgery for their idiopathic scoliosis. Ethics approval
19 was obtained from the institutional review board.

20 All patients were braced according to the standardized brace referral criteria as suggested
21 by the Scoliosis Research Society¹⁹: initial chronological age between 10 and 14 years, major
22 curve magnitude of 25-40 degrees, less than 1 year post-menarche status, Risser stage 0-2, and
23 no prior treatment history.

24

1 *Instrument Administration and Data Collection*

2 Subjects who consented filled in the traditional Chinese version of SRS-22r²⁰ before
3 clinical consultation. At the time of visit, demographic data including age, gender, body height
4 and weight, and body mass index (BMI) was collected. Patients were divided into groups based
5 on their current treatment regimen including initial evaluation, observation, undergoing bracing,
6 and previously braced with current observation. The coronal and sagittal (T5-12) Cobb angle,
7 modified Lenke classification²¹, Risser sign²², and degree of apical vertebral rotation (AVR) by
8 Nash and Moe grading (0-4) were recorded.²³ Cobb angles were grouped into <20, 20-40 and
9 >40 degrees (°) for analyses. For braced patients, whether radiographs were obtained with
10 patients in-brace or out of brace were indicated. All radiological parameters were measured
11 during usual clinic consultations by surgeons who had no prior knowledge of this study.

12

13 *Study Instruments*

14 The refined Scoliosis Research Society 22-item (SRS-22r) Questionnaire

15 The SRS-22r questionnaire is a disease-specific, patient-oriented outcome instrument for
16 capturing patients' self-perceived levels of disease status in various domains.²⁴⁻²⁶ It has been
17 validated in Chinese AIS patients.²⁰ It consists of five domains with 22 items: Function (5
18 items), Pain (5 items), Self-image (5 items), Mental Health (5 items), and Satisfaction with
19 Treatment (Current/Previously performed - 2 items). Individual domain scores are calculated
20 by valued responses of the respective 2 to 5 items, and the total score is the average of all
21 valued SRS-22r items. The domain scores and total score ranged from 0 to 5, with a higher
22 score indicating better HRQoL.

23

24 EuroQol 5-Dimension 5-Level (EQ-5D-5L)

1 The EQ-5D has been validated for its use in the AIS population.²⁷ Its validity, reliability,
2 and responsiveness utility have been confirmed.²⁷⁻²⁹ EQ-5D-5L utility scores in this study were
3 obtained from a mapping algorithm generated by SRS-22r scores.²⁹

4 Both SRS-22r and EQ-5D have been validated for use in the AIS population.²⁷⁻²⁹

6 *Statistical Analysis*

7 Descriptive statistics of the study population, including mean \pm standard deviation (SD)
8 and percentage, were calculated for EQ-5D-5L and SRS-22r scores. The 95% confidence
9 intervals (CIs), and proportion of respondents giving the best possible option and worst
10 possible option were reported. Independent t-test and one-way analysis of variance (ANOVA)
11 with Tukey's Post-hoc test were used to compare the mean differences in EQ-5D-5L score,
12 SRS-22r domain scores and total scores between various socio-demographic and clinical sub-
13 groups, as well as for comparing mean differences in Cobb angles between treatment groups.
14 Spearman's correlation test was also used to assess any relationship between Cobb angles and
15 the utility scores. Age of patients was examined in the following groups for categorical
16 comparison: less than 13, between 13 and less than 16, between 16 and less than 18 and 18 or
17 above. According to the sex-specific BMI-for-age growth chart of the International Obesity
18 Task Force,³⁰ BMI Z-score and percentiles were calculated to classify patients as: underweight
19 (BMI < 5th percentile), normal or healthy weight (BMI \geq 5th percentile, < 85th percentile),
20 overweight (BMI > 85th, < 95th percentile) and obesity (\geq 95th percentile).

21 Data analyses were conducted using SPSS Windows 23.0 (IBM SPSS Inc., Chicago, IL,
22 USA) and STATA version 13.0 (StataCorp LP. College Station, Texas, U.S.).

24 **Results**

1 A total of 652 (71.3% female) AIS patients were studied with mean age of 14.8 ± 1.9 years
2 and mean Cobb angle of $27.7^\circ \pm 10.7^\circ$. Baseline characteristics are detailed in **Table 1**. The mean
3 scores of SRS-22r total score and EQ-5D-5L were 4.45 ± 0.39 and 0.93 ± 0.08 respectively. The
4 respective mean domain scores for Function, Pain, Self-image, Mental Health and Satisfaction
5 with Management of SRS-22r were 4.83 ± 0.35 , 4.70 ± 0.41 , 3.97 ± 0.62 , 4.35 ± 0.61 and 0.87 ± 1.65 .

6 The respective mean coronal Cobb angle for bracing (only out of brace radiographs),
7 observation and previously braced groups were $35.3^\circ \pm 10.9^\circ$, $26.0^\circ \pm 9.4^\circ$ and $38.0^\circ \pm 9.8^\circ$. There
8 was significant difference between the coronal Cobb angle of treatment groups ($p < 0.001$) with
9 pairwise difference between bracing and observation (mean difference: 9.2° , $p < 0.001$), and
10 between previously braced and observation (mean difference: 12.0° , $p < 0.001$) groups. **Table 2**
11 reveals the mean SRS-22r total scores for bracing, observation and previously braced groups
12 being 4.20, 4.54 and 4.42 respectively, and their EQ-5D-5L scores were 0.87, 0.95 and 0.92
13 respectively. SRS-22r and EQ-5D-5L scores were higher for the observation than bracing and
14 previously braced groups ($p < 0.001$). Significant correlations were found between EQ-5D-5L
15 and SRS-22r total and domain (except Satisfaction with Management) scores with coronal
16 Cobb angle ($p < 0.001$). Both bracing groups had significantly larger coronal Cobb angle than
17 observation ($p < 0.001$), whereas previously braced patients had larger coronal Cobb angle than
18 those currently under bracing ($p < 0.001$) and also under observation ($p < 0.001$). The sagittal
19 Cobb angle correlated with only EQ-5D-5L scores ($p < 0.001$) and was significantly smaller for
20 the bracing group than the observation group ($p < 0.001$). Post-hoc analysis with pairwise
21 comparison in **Table 3** reveals curves $>40^\circ$ had worse HRQoL ($p < 0.001$). Subjects with neutral
22 sagittal Cobb angle (20° - 40°) had higher EQ-5D-5L scores than hypokyphotic ($<20^\circ$) subjects
23 ($p < 0.01$). As for self-image perception, patients with coronal curves $<20^\circ$ were specifically
24 better than those with 20° to 40° ($p < 0.05$), who had better self-appearance perception than curves
25 $>40^\circ$. ($p < 0.001$)

1 **Table 4** presents post-hoc analysis concerning the significant differences of SRS-22r and
2 EQ-5D-5L scores among patients undergoing bracing, previously braced and observation only.
3 Currently braced patients had significantly *worse* HRQoL than those under observation, as
4 indicated by their lower EQ-5D-5L (0.08) and SRS-22r total (0.35) scores ($p<0.001$). Lower
5 scores ($p<0.001$ to $p<0.05$) were also observed in *all* SRS-22r domains (Function, Pain, Self-
6 image, Mental Health), except Satisfaction with Management, of which bracing patients had a
7 3.01 higher domain score. Similarly, previously braced patients had *better* HRQoL than
8 currently braced patients, with a 0.05 higher EQ-5D-5L score ($p<0.001$) and 0.23 higher SRS-
9 22r total score ($p<0.001$). Previously braced patients perceived themselves having significantly
10 better appearance (0.31 mean difference, $p<0.05$), function (0.31 mean difference, $p<0.001$)
11 and less pain (0.22 mean difference, $p<0.001$). However, currently braced patients were more
12 satisfied with treatment (1.94 higher, $p<0.001$) than previously braced patients. When
13 comparing previously braced versus observation patients, there was no other significant
14 difference except a 0.12 higher SRS-22r total score for the observation group ($p<0.05$), whereas
15 previously braced patients were more satisfied with management (1.04 higher, $p<0.001$).

16 Despite not reaching statistical significance, different SRS-22r and EQ-5D-5L scores
17 were observed at different bracing durations (**Table 5**). There were trends of higher scores at
18 6-12 months as compared to the initial 6 months of bracing and those being braced for 1-2
19 years. Pain domain scores, however, remained unchanged throughout the bracing period
20 (**Figure 1**).

21

22 **Discussion**

23 Based on a robust dataset, this study focuses particularly on the HRQoL of AIS patients
24 undergoing bracing, observation only and those previously braced. A valid comparison was
25 possible since there were no significant differences in EQ-5D-5L and SRS-22r scores based on

1 gender, BMI, curve types and age at presentation, but differences were detected between
2 various current treatment modalities and different curve magnitude.

3 The disease severity based on radiological parameters was found to correlate with
4 different HRQoL. Patients with smaller curvature, which may require observation only, had
5 better quality of life than those with larger Cobb angles. Patients with $<20^\circ$ and 20° - 40° had
6 significantly better HRQoL than those $>40^\circ$. Worse Function, Pain, Self-image domain scores
7 were with Cobb angle of 20° - 40° than $<20^\circ$. Our findings coincide with existing findings of
8 curve magnitude correlated with the Pain, Self-image and Function domains of SRS-22 in the
9 United States,³¹ and Self-image scores correlated with Cobb angle in other studies,^{32,33}
10 suggesting that scoliotic curvature can be most responsible for its resultant effect on function
11 and aesthetics. However, it is necessary to consider that we had some patients' Cobb angles
12 measured with in-brace radiographs, hence our analysis focused only on patients with out of
13 brace radiographs. The false presentation of a smaller Cobb angle has two possible effects.
14 Firstly, this may reduce to actual HRQoL differences when studying the average Cobb angle
15 differences between groups due to the underestimation of curve magnitude of the braced group.
16 Secondly, patients may incorrectly perceive their curve to have improved as a result of the
17 smaller in-brace Cobb angle. Interestingly the latter did not result in a better HRQoL. The
18 effects of in or out of brace radiographs should be addressed in a separate study.

19 Patients undergoing bracing had *worse* HRQoL than those undergoing observation. This
20 is accounted by patients' perception of worse function (lower domain score by 0.38), pain
21 (0.22), appearance (0.48) and mental health (0.20). The largest drop is observed in the Self-
22 image scores as compared to the other domains. Interestingly, despite the overall lower scores
23 whilst in brace, patients reported more favorable scores with satisfaction with management
24 suggesting that patients trust our bracing regimen. Despite this, overall individual SRS-22r
25 domain score differences between the two groups were less than the previously defined

1 minimal clinical important difference (MCID).^{34,35} This may suggest the limitation of the SRS-
2 22r in measuring HRQoL for all AIS patients undergoing bracing.³⁶ Previous MCID values
3 may be influenced by cultural or ethnic factors and without establishment of MCID values for
4 the Chinese population, the score differences generated in this study may not be as meaningful.
5 There is a need as such to establish the MCID for the local AIS cohort in the future. By
6 comparison, the 0.076 lower EQ-5D-5L score exceeded the minimally important difference
7 (MID) of 0.058.³⁷ Reaching the published MID threshold is clinically meaningful since the
8 values are specific to the Chinese population by use of the China value set. Furthermore, EQ-
9 5D-5L scores have the benefit of being a generic composite score and thus more applicable for
10 inter-disease HRQoL comparisons.

11 Interestingly, previously braced patients were found to have *comparable* HRQoL with
12 those under observation. This provides an insight of any negative effects of previous bracing
13 on current HRQoL being temporary. Our results suggest that the low HRQoL scores are only
14 transient and will likely restore to near baseline levels after the brace is weaned. This indicates
15 that poor perception of own appearance is temporary during the bracing period without any
16 long-term effects, and those patients who needed brace intervention and were previously braced
17 can still achieve the same aesthetic perception as those whose curve magnitude does not
18 warrant any bracing. This poses an important question of whether through completion of
19 bracing, the discrepancy between HRQoL of different disease severity has been minimized. It
20 is important to note that despite no significant differences in the EQ-5D-5L scores between
21 groups, there was a 0.12 higher SRS-22r total score in the observation group. However, this
22 significance is unknown as no known MCID for the total score of SRS-22r was previously
23 defined in the AIS population.^{34,38}

24 For the head-to-head comparison between currently and previously braced patients,
25 currently braced patients depicted worse function, pain and self-image perception. Moreover,

1 currently braced patients had the highest satisfaction with their treatment (3.01 higher domain
2 score than observation). On the other hand, previously braced patients had less satisfaction yet
3 still better appreciation of their treatment received than those under observation. There was no
4 significant difference in mental health between the two bracing groups. This may be due to the
5 effect of various brace duration among patients in the currently bracing group. Most of the
6 findings as discussed above are in stark contrast with the results reported by Schwieger *et al.*³⁹
7 They observed no differences in body image or quality of life between braced and observed
8 patients, nor were there significant effects by curve progression or brace compliance. In
9 contrast, our findings suggest that patients undergoing bracing had worse quality of life than
10 those under observation, which effects are only temporary. Although both studies are not
11 directly comparable due to variability in the HRQoL measures adopted, findings suggest that
12 additional external factors may influence study measures. In addition to ethnicity differences,
13 their patient group is aware of an ongoing trial which may affect their responses as compared
14 to our cohort who were only following routine consultation follow-up. The effects of patients'
15 knowledge, background and education on responses of outcome questionnaires should be
16 explored in future studies.

17 In fact, HRQoL was found to vary among patients braced for different durations. The
18 worst function score was within the first 6 months of bracing. For HRQoL and peculiarly for
19 the self-perceived appearance and mental health, despite a higher mean score at 6 to 12 months
20 of bracing, at >1-2 years of bracing duration they were as bad or worse than the initial 6 months.
21 This contributes further to previous findings of initial bracing period being stressful as
22 described by 84% of parents, and bracing was found associated with lower level of self-
23 esteem.⁴⁰ This worse HRQoL at a later stage of bracing can possibly be explained by a
24 psychological factor. Patients' perceived benefits of brace towards improvement of their
25 curvature is likely more significant at the earlier stage of bracing period, but their enthusiasm

1 tapers off and may result in lower HRQoL with prolonged brace wear. Given the lack of
2 multiple time-points per individual patient in this study, the results are interpreted with caution
3 and further studies are necessary. However, this variable pattern of HRQoL scores may provide
4 some insight into possible effects of deteriorating brace compliance with treatment duration.
5 This further validates the importance of avoiding indiscriminate use of bracing and trying to
6 shorten the bracing period to only the period where curve progression risk is highest.^{6,41}

7 The main limitation is the lack of prospective assessment to determine the actual changes
8 in HRQoL at separate stages of bracing. This helps to mark the threshold of brace duration at
9 which HRQoL changes and whether it coincides with changes in brace compliance. The similar
10 effect can be studied for the timing of HRQoL changes after brace weaning. In addition,
11 providing the HRQoL scores of the “during bracing” period of patients who have previously
12 been braced will also be useful to properly gauge the differences that have occurred. There is
13 also a substantial influence by patients’ prior exposure to comments about scoliosis and
14 knowledge of the disease on their HRQoL responses. Although our standardized method of
15 interviewing patients prior to the consultation helps to reduce these influences, we are unable
16 to control for individual patients’ prior exposure to scoliosis from other healthcare workers,
17 patients or media. Future studies should aim to control for these possible confounders.

18

19

20 **Conclusion**

21 By using SRS-22r and EQ-5D-5L scores in the AIS population, the negative impact of
22 bracing intervention on HRQoL is found to be transient, and is likely to be restored after
23 bracing is completed. EQ-5D-5L scores seems to be more sensitive to sagittal Cobb angle
24 changes. The initial period of bracing appears to have better HRQoL and scores deteriorate

- 1 with treatment duration. These changes may be used as a marker for identifying variances in
- 2 brace compliance but requires further study for verification.

Figure 1. Self-image and Mental Health domain scores of SRS-22r peaked at 6 to 12 months of bracing

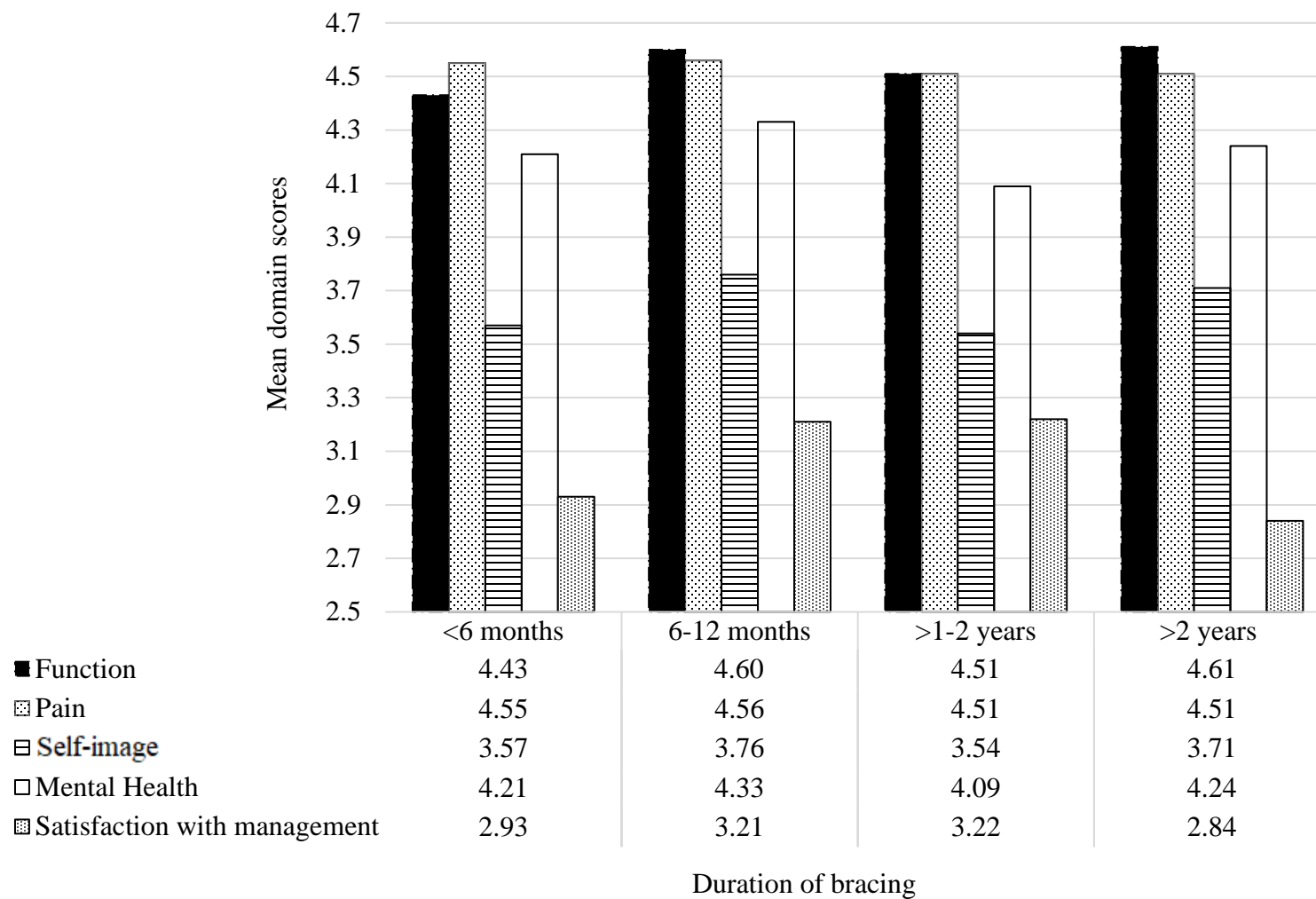


Table 1. Demographic and data characteristics of patients

	Mean	SD
Age (Years)	14.8	1.9
Body Height (cm)	161.1	8.4
Weight (kg)	49.6	9.5
BMI	19.0	2.8
Sagittal (T5-12) Cobb angle (degrees)	18.6	10.0
Coronal cobb angle (degrees) - major curve	27.7	10.7
- minor curve	23.0	9.2
Bracing patients		
in-brace major curve Cobb angle (degrees)	17.6	9.1
Out-of-brace major curve Cobb angle (degrees)	35.3	10.9
Age (Years)	% (n)	
Less than 13	17.5% (114)	
Between 13 and less than 16	54.6% (356)	
Between 16 and less than 18	22.2% (145)	
18 or above	5.5% (36)	
Gender		
Female	71.3% (465)	
Male	28.7% (187)	
BMI category		
Underweight (BMI <5 th percentile)	5.2% (26)	
Normal (5 th percentile ≤ BMI <85 th percentile)	86.0% (431)	
Overweight (BMI between 85 th and 95 th percentile)	7.6% (38)	
Obese (BMI ≥ 95 th percentile)	1.2% (6)	
Current treatment status		
Initial evaluation	24.7% (161)	
Observation	45.9% (299)	
Bracing	21.6% (141)	
Previously braced	7.8% (51)	
Degree of apical vertebral rotation		
0	3.7% (24)	
1	82.0% (527)	
2	11.5% (74)	
3	2.8% (18)	
Lenke (Type)		
1	17.0% (111)	
2	74% (48)	
3	23.2% (151)	
4	6.1% (40)	
5	21.9% (143)	
6	24.2% (158)	

Risser sign % (n)	
0	10.1% (66)
1	4.0% (26)
2	12.4% (81)
3	17.9% (117)
4	31.4% (205)
5	24.1% (157)
Sagittal (T5-12) Cobb angle (degree, Mean \pm SD)	
Initial evaluation	20.6 \pm 9.5
Observation	19.6 \pm 9.5
Bracing	15.5 \pm 10.1
Previously braced	16.9 \pm 11.1
Coronal Cobb angle (degrees, Mean \pm SD)	
Initial evaluation	23.5 \pm 9.1
Observation	26.0 \pm 9.4
Bracing	35.3 \pm 10.9
Previously braced	38.0 \pm 9.8

BMI: body mass index, SD: standard deviation

**Cobb Angle
(Degrees)**

Sagittal (n=636)			0.009		0.575
<20	0.92	(0.91, 0.93)		4.46	(4.42, 4.50)
20-40	0.94	(0.93, 0.95)		4.45	(4.41, 4.50)
>40	0.92	(0.80, 1.04)		4.35	(3.96, 4.73)
Coronal (n=652)			<0.001		<0.001
<20	0.95	(0.94, 0.95)		4.54	(4.50, 4.59)
20-40	0.93	(0.92, 0.94)		4.44	(4.40, 4.48)
>40	0.87	(0.84, 0.90)		4.16	(4.04, 4.29)

P: p-value (by analysis of variance); C.I.: confidence interval; SRS22r: refined Scoliosis Research Society 22-item questionnaire; EQ-5D-5L: EuroQol 5-dimension 5-level questionnaire; BMI: Body mass index

Table 3. Post-hoc Tukey-HSD tests for Cobb angle for pairwise comparison

Curve Magnitude				SRS-22r Total score		SRS-22r Domain*						EQ-5D-5L score			
				Mean diff	p-value	Mean diff	p-value	Mean diff	p-value	Mean diff	p-value	Mean diff	p-value	Mean diff	p-value
Coronal Cobb						Function		Pain		Self-image		Mental health			
	< 20°	>	> 40°	0.27	<0.001	0.27	<0.001	0.27	<0.001	0.44	<0.001	0.34	<0.001	0.07	<0.001
	20° - 40°	>	> 40°	0.22	<0.001	0.22	<0.001	0.21	<0.001	0.31	<0.001	0.29	0.001	0.06	<0.001
	< 20°	>	20° - 40°							0.14	<0.05				
Sagittal Cobb	< 20°	<	20° - 40°											0.02	<0.01

Note: only those with statistical significance are listed

* No significant difference for domain of satisfaction with management of SRS-22r

Mean diff : mean difference; SRS22r: refined Scoliosis Research Society 22-item questionnaire; EQ-5D-5L: EuroQol 5-dimension 5-level questionnaire; HSD: honestly significant difference

Table 4. Post-hoc Tukey-HSD tests for pairwise comparison

Scores	Post-hoc pair-wise comparison	Mean difference	p-value
Currently Braced and Observation			
EQ-5D-5L	} Currently Braced < Observation	0.08	<0.001
SRS-22r Total score		0.35	<0.001
Domain - Function		0.38	<0.001
- Pain		0.22	<0.001
- Self-image		0.48	<0.001
- Mental health		0.20	0.014
- Satisfaction with Management	Bracing > Observation	3.01	<0.001
Previously braced and Currently Braced			
EQ-5D-5L	} Previously braced > Currently Braced	0.05	<0.001
SRS-22r Total score		0.23	<0.001
Domain - Function		0.31	<0.001
- Pain		0.22	<0.001
- Self-image		0.31	0.012
- Mental health		-	
- Satisfaction with Management	Previously braced < Bracing	1.94	<0.001
Previously braced and Observation			
EQ-5D-5L	} Previously braced < Observation	-	
SRS-22r Total score		0.12	0.032
Domain - Function		-	
- Pain		-	
- Self-image		-	
- Mental health		-	
- Satisfaction with Management	Previously braced > Observation	1.04	<0.001

Note: only those with statistical significance between currently braced, previously brace, and observation groups are listed

SRS22r: refined Scoliosis Research Society 22-item questionnaire; EQ-5D-5L: EuroQol 5-dimension 5-level questionnaire; HSD: honestly significant difference

Table 5. Descriptive statistics of ANOVA (p-value) of patients with different duration of bracing since commencement

Group	SRS- 22r Total Score					EQ-5D-5L Score					
	Mean	SD	Max	Min	ANOVA	Mean	SD	Max	Min	ANOVA	
<6 months	30	4.15	0.61	4.90	2.05	0.403	0.86	0.16	0.99	0.15	0.715
6-12 months	29	4.30	0.46	5.00	3.32		0.89	0.10	1.00	0.68	
>1-2 years	47	4.12	0.49	5.00	2.60		0.86	0.11	1.00	0.54	
>2 years	35	4.25	0.44	5.00	3.25		0.88	0.09	1.00	0.69	
SRS-22r Domain Scores											
<i>Function</i>											
<6 months		4.43	0.67	5.00	1.80	0.454					
6-12 months		4.60	0.45	5.00	3.80						
>1-2 years		4.51	0.51	5.00	3.20						
>2 years		4.61	0.43	5.00	3.80						
<i>Pain</i>											
<6 months		4.55	0.62	5.00	2.60	0.965					
6-12 months		4.56	0.50	5.00	3.20						
>1-2 years		4.51	0.47	5.00	3.00						
>2 years		4.51	0.46	5.00	3.20						
<i>Self-image</i>											
<6 months		3.57	0.84	5.00	1.00	0.500					
6-12 months		3.76	0.67	5.00	2.80						
>1-2 years		3.54	0.67	5.00	2.00						
>2 years		3.71	0.66	5.00	2.40						
<i>Mental Health</i>											
<6 months		4.21	0.79	5.00	2.00	0.533					
6-12 months		4.33	0.63	5.00	2.80						
>1-2 years		4.09	0.76	5.00	2.20						
>2 years		4.24	0.62	5.00	3.00						
<i>Satisfaction with management</i>											
<6 months		2.93	1.63	5.00	0.00	0.712					
6-12 months		3.21	1.93	5.00	0.00						
>1-2 years		3.22	1.43	5.00	0.00						
>2 years		2.84	1.92	5.00	0.00						

*: Significant comparison exists

SRS22r: refined Scoliosis Research Society 22-item questionnaire; EQ-5D-5L: EuroQol 5 dimension 5-level questionnaire; ANOVA: analysis of variance; SD: standard deviation