

Patient-Perceived Recovery After Posterior Spinal Fusion: Evaluating Minimum Clinically Important Difference (MCID) in Adolescents with Idiopathic Scoliosis

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Background: Adolescent idiopathic scoliosis (AIS) affects 1-3% of children in the United States, with approximately 38,000 patients undergoing posterior spinal fusion (PSF) annually. The relationship between preoperative patient-reported outcomes, postoperative recovery, and long-term clinical significance remains unclear. This study assesses longitudinal changes in Scoliosis Research Society-22r (SRS-22r) scores. It evaluates clinical importance using the Minimum Clinically Important Difference (MCID) in AIS patients undergoing PSF. **Methods:** An IRB-approved retrospective study was conducted using prospectively collected data on AIS patients who underwent PSF at a single academic institution between 2012 and 2022. Patient-reported outcomes were assessed using the SRS-22r questionnaire at preoperative, 6-month, 1-year, and ≥ 2 years postoperative time points. MCID threshold achievements were determined using anchor-based criteria from Bago et al. The percentage of patients achieving MCID and predictors of MCID achievement were analyzed using logistic regression. Sex (male/female), age, and baseline SRS-22r domain scores were included as covariates. **Results:** Of 161 patients (mean age 15.3 ± 2.2 years, 65.8% female), MCID achievement declined from 1-year to ≥ 2 years follow-up, especially in pain (34.6% to 25.9%) and self-image (30.1% to 22.8%) domains. Lower preoperative SRS-22r scores predicted greater MCID achievement. Preoperative mental health scores had a significant impact on postoperative outcomes across multiple domains. Male sex was associated with a lower likelihood of pain MCID achievement at ≥ 2 years. Younger age and lower baseline function were predictive of improved long-term function (Tables 1-2). **Discussion:** This study comprehensively assesses SRS-22r score trajectories following PSF in AIS patients, demonstrating that most patients experience meaningful improvement, but pain and self-image MCID achievement declined beyond 1 year. Mental health, psychosocial resilience, and sex-based differences strongly influence long-term recovery, underscoring the need for multidisciplinary approaches. **Significance/Clinical Relevance:** These findings emphasize that monitoring recovery after PSF requires more than radiographic and surgical success; it must include psychological screening, sex-specific risk stratification, and proactive long-term follow-up to sustain clinically meaningful outcomes and improve quality of life in AIS patients.

Table 1. Spearman Correlation Coefficients for SRS Scores at Preoperative, 6 Months, 1 Year, and ≥ 2 Years Postoperative Time Points

	Function & Activity (Pre-Op)	Pain (Pre-Op)	Self-Image (Pre-Op)	Mental Health (Pre-Op)	Satisfaction with Management (Pre-Op)
Function & Activity (Pre-Op)	1.000	0.496**	0.518**	0.584**	0.154
Pain (Pre-Op)	0.496**	1.000	0.474**	0.520**	0.199*
Self-Image (Pre-Op)	0.518**	0.474**	1.000	0.530**	0.243**
Mental Health (Pre-Op)	0.584**	0.520**	0.530**	1.000	0.247**
Satisfaction with Management (Pre-Op)	0.154	0.199*	0.243**	0.247**	1.000
Function & Activity (6 Months Post-Op)	0.004	-0.020	-0.072	-0.093	-0.063
Pain (6 Months Post-Op)	0.183	0.400**	0.118	0.265**	0.003
Self-Image (6 Months Post-Op)	-0.006	0.107	0.087	0.082	0.180
Mental Health (6 Months Post-Op)	0.138	0.240*	0.220*	0.340**	0.176
Satisfaction with Management (6 Months Post-Op)	0.118	0.038	0.130	0.039	0.172
Function & Activity (1 Year Post-Op)	0.059	0.116	0.038	0.121	0.101
Pain (1 Year Post-Op)	0.243*	0.218*	0.188	0.260*	0.313**
Self-Image (1 Year Post-Op)	-0.037	0.114	0.111	0.207	0.218
Mental Health (1 Year Post-Op)	0.122	0.212	0.213	0.417**	0.279*
Satisfaction with Management (1 Year Post-Op)	-0.017	-0.082	-0.011	0.123	0.294*
Function & Activity (≥ 2 Years Post-Op)	0.253	0.108	0.163	0.261*	-0.084
Pain (≥ 2 Years Post-Op)	0.090	0.236*	0.048	0.228*	0.261*
Self-Image (≥ 2 Years Post-Op)	0.245	0.024	0.258	0.312*	0.097
Mental Health (≥ 2 Years Post-Op)	0.344**	0.268*	0.280*	0.557**	0.160
Satisfaction with Management (≥ 2 Years Post-Op)	0.151	0.033	0.109	0.137	0.040

p < 0.01: Bold with two asterisks (**); p < 0.05: Bold with one asterisk (*)

Table 2. Number and Percentage of Patients Who Did and Did Not Pass Bago et al. 's anchor-based MCID thresholds (Across SRS-22r Domains) (A indicates anchor based)

SRS 22r Domains	MCID Achievement Status n (%)	MCID Threshold
Mental Health (1 Year Post-Op)	No	0.3
	Yes	
Mental Health (≥ 2 Years Post-Op)	No	0.3
	Yes	
Pain (1 Year Post-Op)	No	0.6
	Yes	
Pain (≥ 2 Years Post-Op)	No	0.6
	Yes	
Function & Activity (1 Year Post-Op)	No	0.3
	Yes	
Function & Activity (≥ 2 Years Post-Op)	No	0.3
	Yes	
Self-Image (1 Year Post-Op)	No	1.3
	Yes	
Self-Image (≥ 2 Years Post-Op)	No	1.3
	Yes	