

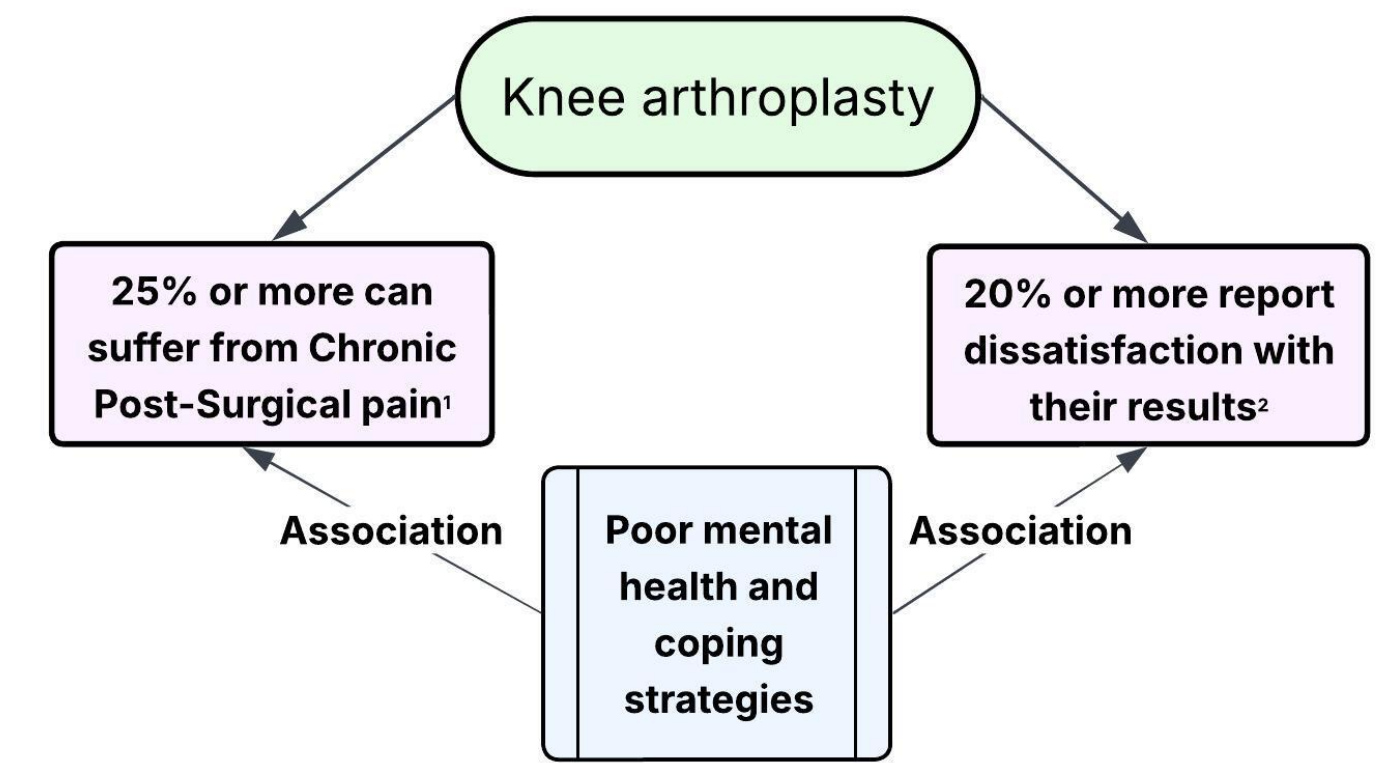
Factors Associated with Persistent Pain and Poor Satisfaction after Knee Arthroplasty: A Multicenter Prospective Cohort Study

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Introduction



Chronic Post-Surgical Pain and Poor Satisfaction after knee arthroplasties are important health problems.

Results

Summary of Results

Outcome analysis	• 258 out of 302 patients.
Moderate-to-severe CPSP prevalence	• 17% (95% CI 13, 22) at 6 months, and 13% (95% CI 9, 18) at 12 months (Table 1).
Preop pain and CPSP:	• CPSP patients consistently reported significantly higher pain intensities at all time points (p< 0.001) (Figure 2).
Self-reported opioid use:	• 6% (15/256) at 6 months and 4% (10/249) at 12 months.
Dissatisfaction prevalence:	• 6% at 6 months (95% CI 4, 10), 9% at 12 months (95% CI 6, 13) (Table 1).
Preoperative pain and CPSP:	• Positively association with CPSP at 6 months (OR: 1.38, 95% CI 1.09, 1.73) and 12 months (OR: 1.44, 95% CI 1.11, 1.87) (Table 2).
Depression scores and Satisfaction:	• Negative association at 6 months (β slope = −0.85, 95% CI −1.56, −0.14, p=0.020).
SPOC scores and satisfaction:	• Higher SPOC scores (poor coping) were associated with dissatisfaction at 6 and 12 months (Table 3).

CI: Confidence Interval; CPSP: Chronic Post-surgical Pain; OR: Odds Ratio

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Methodology

DESIGN
• Multicenter Prospective Cohort Study (2 large-volume centers)
SAMPLE SIZE
• N=302
PATIENTS
• Patients of >50 years having elective knee arthroplasty
• Systemic arthritis, bilateral surgery, revision surgery were excluded
OUTCOMES
• Primary: CPSP at 6 months
• Secondary: Dissatisfaction, Opioid use, Association of Satisfaction and Psychological factors and Somatic Preoccupation and Coping
OUTCOME MEASURES
• CPSP: Persisting pain or new pain >3/10 NRS at 6 months
• Satisfaction: Self Administered Satisfaction Scale (4 questions)

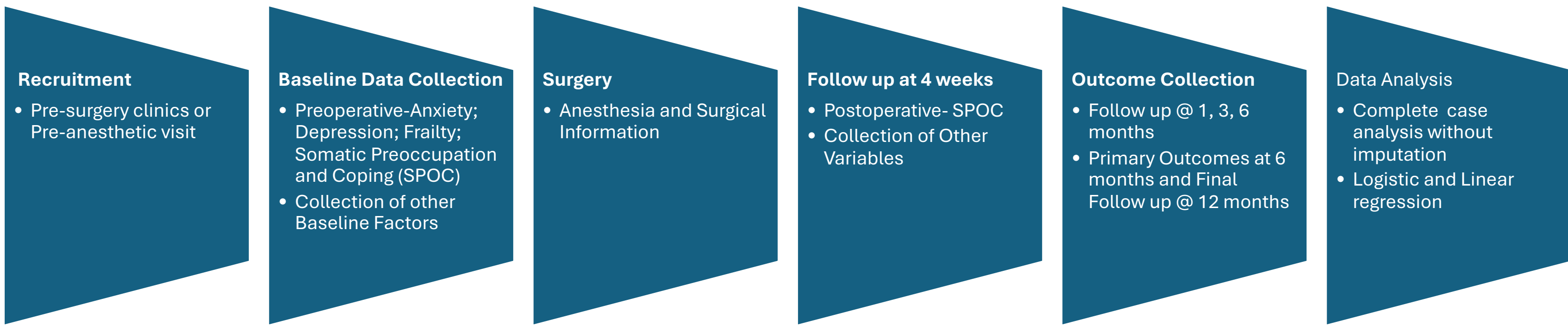


Table 1: Summary of outcomes for Chronic Post-surgical Pain, Dissatisfaction and Opioid use

Outcome	Overall (95% CI)	Male (95% CI)	Female (95% CI)
CPSP at 6 months	17.% (13%, 22%)	11% (5%, 18)	22% (15%, 30%)
CPSP at 12 months	13% (9%, 17%)	9% (4%, 16%)	15% (10%, 22%)
Opioid use 6 months	6% (3%, 9%)	6% (2%, 12%)	6% (3%, 11%)
Opioid use 12 months	4.% (2%, 7%)	3% (1%, 8%),	5% (2%, 10%)
Dissatisfaction at 6 months	6% (4%, 10%)	8% (3%, 14%)	5% (2%, 10%)
Dissatisfaction at 12 months	9% (6%, 13%)	9% (4%, 16%)	9% (5%, 15%)

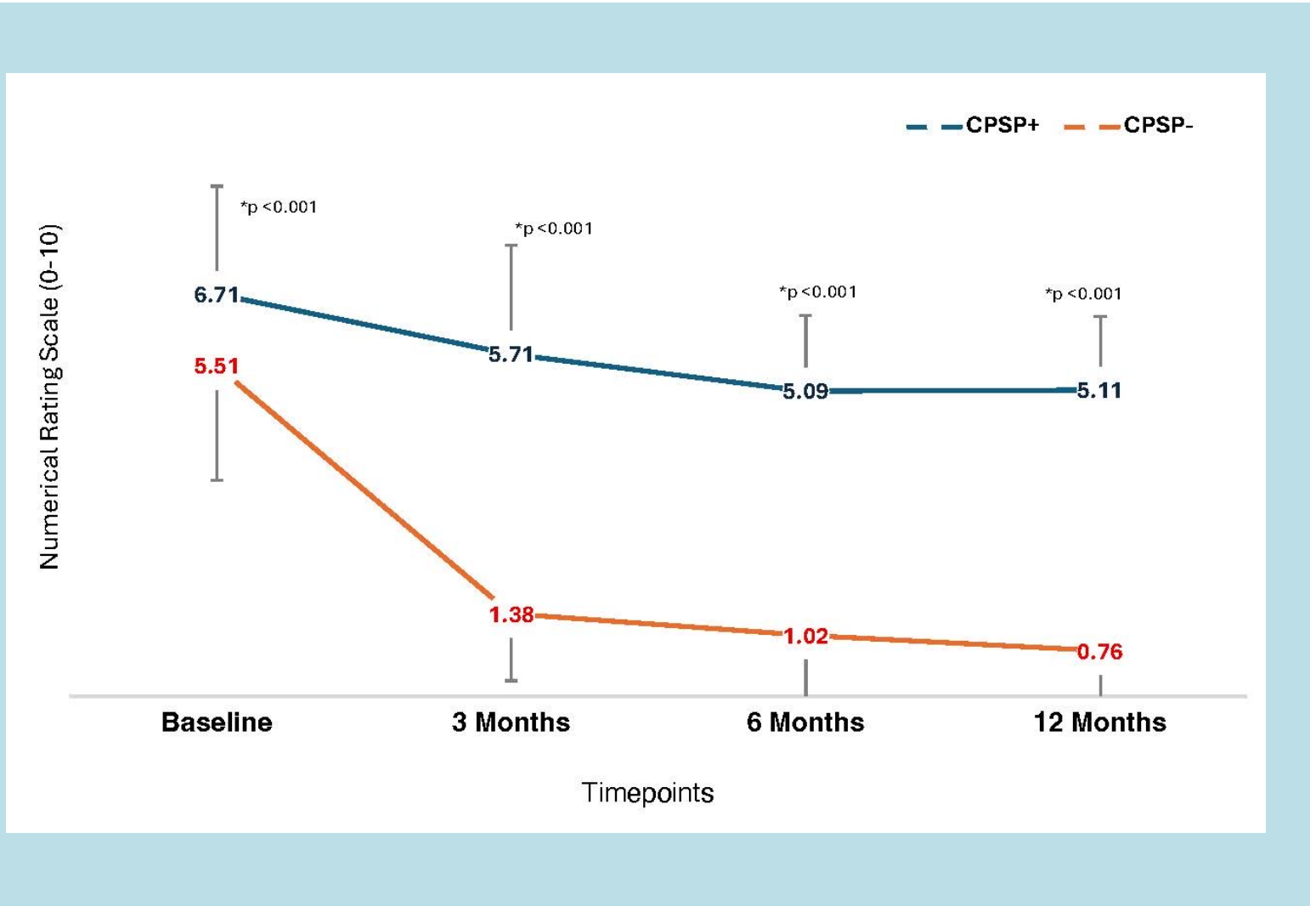
CI: confidence interval; Patient dissatisfaction was determined by collapsing the options of somewhat dissatisfied and very dissatisfied" for the domain of "overall satisfaction with surgery" within the Self-Administered Patient Satisfaction (SAPS) scale; Opioid use represents self-reported medication use; Denominators vary by timepoint due to missing follow-up data (258 at 6 months; 252 at 12 months).

Table 2: Association of factors with Chronic Post-surgical Pain at 6 and 12 months using logistic regression

Factors	6 Months (n=257)		12 Months (n=252)	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age	1.01 (0.97-1.05)	0.756	0.97 (0.92-1.01)	0.136
Sex (Female)	1.50 (0.67-3.33)	0.324	1.60 (0.67-3.83)	0.290
Preoperative NRS score	1.38 (1.09-1.73)	0.007	1.44 (1.11-1.87)	0.006
Preoperative SPOC Score	0.99 (0.96-1.01)	0.299	1.01 (0.98-1.04)	0.504
Anxiety score	1.09 (0.97-1.23)	0.165	0.97 (0.84-1.12)	0.674
Depression score	1.10 (0.98-1.24)	0.098	1.00 (0.87-1.15)	0.992
Frailty (Frail)	0.44 (0.12, 1.62)	0.218	0.35 (0.09, 1.38)	0.135

OR: odds ratio; CI: confidence interval; NRS: numerical rating scale; SPOC: somatic preoccupation and coping questionnaire³; Frailty was recorded using the FRAIL scale; Preoperative NRS score was defined as average pain over the last week; Analyses were performed using complete-case data. Patients with missing predictor or outcome data were excluded

Figure 2. Comparison of pain scores in patients with and without Chronic Post Surgical Pain.



Patients with CPSP consistently reported significantly higher pain intensities compared to those without CPSP at all time points

Table 3: Association of factors with the patient satisfaction scores at 6 and 12 months using linear regression

Factors	6 Months (n=256)		12 Months (n=248)	
	β (95% CI)	P-value	β (95% CI)	P-value
Age	-0.82 (-0.31, 0.14)	0.477	0.03 (-2.18, 0.28)	0.815
Sex (Female)	-1.82 (-5.91, 2.27)	0.381	-1.00 (-5.56, 3.56)	0.665
Preoperative NRS score	-0.17 (-1.34, 1.00)	0.775	-0.48 (-1.76, 0.80)	0.459
Preoperative SPOC Score	-0.16 (-0.15, 0.12)	0.817	-0.11 (-0.25, 0.04)	0.142
Anxiety score	-0.14 (-0.85, 0.56)	0.686	0.05 (-0.73, 0.83)	0.896
Depression score	-0.85 (-1.56, -0.14)	0.020	-0.56 (-1.36, 0.24)	0.172
Frailty (Frail)	-3.56 (-8.32, 1.19)	0.141	1.94 (-3.31, 7.19)	0.468
Sensitivity Analysis				
Postoperative SPOC score	-0.20 (-0.30, -0.09)	<0.001	-0.182 (-2.93, -0.07)	0.002

β: indicates regression slope; CI: confidence interval; NRS: numerical rating scale; SPOC: somatic preoccupation and coping questionnaire³; Frailty was recorded using FRAIL scale; Preoperative NRS score was defined as average pain over the last week; Satisfaction scores were recorded using the Self-Administered Patient Satisfaction (SAPS) scale⁴ (range 25–100), with higher scores indicating greater satisfaction; Analyses were performed using complete-case data. Patients with missing predictor or outcome data were excluded

Discussion

- 17% of patients experience moderate-to-severe CPSP at 6 months and 13% at 12 months.
- CPSP was associated with higher preoperative pain severity.
- About 1 in 15 patients were dissatisfied at 6-months post-surgery.
- Higher depression and postoperative SPOC scores were associated with greater dissatisfaction at 6 months.
- Interventions targeting preoperative pain, depression and patient coping and expectations should be explored in randomized trials to improve prognosis among high-risk patients scheduled for knee arthroplasty⁵.

References

1. Olsen U et al. Factors correlated with pain after total knee arthroplasty: A systematic review and meta-analysis. PLoS One. 2023 Mar24;18(3):e0283446.
2. DeFrance MJ, Scuderi GR. Are 20% of Patients Actually Dissatisfied Following Total Knee Arthroplasty? A Systematic Review of the Literature. J Arthroplasty. 2023 Mar;38(3):594-599.
3. Busse JW et al. Development and validation of an instrument to predict functional recovery in tibial fracture patients: the Somatic Pre-Occupation and Coping (SPOC) questionnaire. J Orthop Trauma. 2012 Jun;26(6):370-8.
4. Mahomed N et al. The self-administered patient satisfaction scale for primary hip and knee arthroplasty. Arthritis. 2011;2011:591253.
5. Madden, K et al. Opioid reduction and enhanced recovery in orthopaedic surgery (OREOS): a protocol for a feasibility randomised controlled trial in patients undergoing total knee arthroplasty. Pilot Feasibility Stud. 2024 Feb 15;10(1):30.

