

Relationship of Kinesiophobia and Pain Catastrophizing with Physical Performance in Patients Following Total Knee Replacement Surgery on Post-operative Days 14–17

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KEYWORDS

Total knee replacement;
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Abstract

Background: Total knee replacement is a commonly performed surgical procedure for patients with advanced knee joint pathology, especially osteoarthritis. Although surgery helps reduce pain and improve joint function, early post-operative recovery may be influenced by both physical and psychological factors. Kinesiophobia (fear of movement) and pain catastrophizing may reduce participation in rehabilitation and negatively affect physical performance during the early recovery phase.

Objective: To assess the relationship of kinesiophobia and pain catastrophizing with physical performance in patients following total knee replacement surgery on post-operative days 14 to 17.

Methods: Sixty-two subjects who had undergone total knee replacement surgery and were on post-operative days 14 to 17 were included in this cross-sectional study. Subjects were selected according to inclusion and exclusion criteria using purposive sampling. Kinesiophobia was assessed using the Tampa Scale of Kinesiophobia, pain catastrophizing using the Pain Catastrophizing Scale, pain intensity using the Visual Analogue Scale, and physical performance using the Timed Up and Go test. Descriptive statistics were used to summarize demographic and outcome variables. Normality was assessed using the Shapiro–Wilk test, and the Spearman rank correlation was used to determine the relationships between variables.

Results: Higher levels of kinesiophobia and pain catastrophizing were associated with poorer physical performance, indicating that psychological factors may influence early functional recovery. Pain intensity also showed an association with physical performance during the post-operative period.

Conclusion: Kinesiophobia and pain catastrophizing are important psychological factors associated with physical performance in patients following total knee replacement on post-operative days 14 to 17. Early identification of these factors may help physiotherapists plan individualized rehabilitation strategies, improve patient confidence, enhance participation in exercises, and promote better functional recovery.

1. INTRODUCTION

Total knee arthroplasty (TKA), commonly known as total knee replacement, is one of the most widely performed and effective surgical procedures for patients with advanced knee osteoarthritis. Osteoarthritis is a chronic degenerative joint disorder characterized by progressive cartilage loss, pain, stiffness, deformity, and limitation of daily activities. When conservative management such as medication, physiotherapy, lifestyle modification, and intra-articular injections fails to provide adequate relief, total knee replacement becomes an important treatment option. The primary goals of TKA are to relieve

pain, correct deformity, improve joint alignment, restore mobility, and enhance overall quality of life.

Although TKA provides marked improvement in pain and function for many patients, the post-operative recovery period is complex and influenced by several physical, psychological, and social factors. Surgical success alone does not guarantee complete functional recovery. Patients must actively participate in rehabilitation, perform prescribed exercises, regain knee range of motion, improve muscle strength, and gradually return to functional

activities such as walking, standing from a chair, stair climbing, and balance-related tasks.

The early post-operative period is especially important because it lays the foundation for long-term recovery. During this phase, patients commonly experience pain, swelling, stiffness, muscle inhibition, reduced confidence, and fear when initiating movement. These factors may limit participation in physiotherapy and delay the restoration of functional independence. Therefore, understanding the determinants of early physical performance after TKA is essential for planning effective rehabilitation strategies.

- The number of TKA procedures is increasing due to an aging population, obesity, lifestyle changes, and the rising prevalence of osteoarthritis.
- Recovery of physical function is an important outcome after TKA and can be measured through patient-reported outcomes and performance-based outcomes.
- Patient-reported outcomes may not fully reflect actual physical performance, because pain, fear, and psychological responses can influence the patient's perception of recovery.

Physical performance after TKA can be affected by pain intensity, quadriceps weakness, reduced knee flexion and extension, poor balance, altered gait pattern, and decreased endurance. Performance-based tests such as the Timed Up and Go test provide useful information about actual mobility and functional capacity. Unlike self-reported measures, performance-based assessment reflects how efficiently the patient can perform real-life movement tasks.

2. NEED FOR THE STUDY

Total knee replacement is commonly performed to reduce pain and improve mobility in patients with advanced knee osteoarthritis. However, successful surgery alone does not

ensure complete functional recovery. During the early post-operative period, patients may experience pain, swelling, stiffness, reduced muscle strength, and fear while performing movements such as walking, standing, turning, and climbing stairs.

Psychological factors such as kinesiophobia and pain catastrophizing may negatively influence rehabilitation participation. Patients who are afraid of movement may avoid exercises and weight-bearing activities, while patients with catastrophic thoughts about pain may perceive movement as harmful or unsafe. These responses can delay recovery and reduce physical performance even when surgical healing is satisfactory.

Research Question

What is the relationship between pain catastrophizing, kinesiophobia, and physical performance in patients who have undergone total knee replacement surgery on post-operative days 14 to 17?

3. HYPOTHESIS

Null hypothesis (H_0): There is no significant relationship between kinesiophobia, pain catastrophizing, and physical performance in patients with total knee replacement on post-operative days 14 to 17.

Alternative hypothesis (H_1): There is a significant relationship between kinesiophobia, pain catastrophizing, and physical performance in patients with total knee replacement on post-operative days 14 to 17.

4. OBJECTIVES

- To assess the relationship between kinesiophobia and physical performance.
- To assess the relationship between pain catastrophizing and physical performance.
- To determine the correlation between kinesiophobia and pain catastrophizing.
- To determine the prevalence of kinesiophobia and pain catastrophizing.

5. MATERIALS AND METHODOLOGY

Research design: Cross-sectional study.

Sampling method: Purposive sampling.

Study population: Patients following total knee replacement on post-operative days 14 to 17.

Sample size: Sixty-two subjects (n = 62).

Sample selection: Samples were chosen by applying the inclusion and exclusion criteria.

Inclusion Criteria

- Age group 55 to 75 years.
- Patients who had undergone total knee replacement.
- Patients who were advised to walk after surgery.
- Post-surgical period of post-operative days 14 to 17.

Exclusion Criteria

- Cognitive impairment.
- Malignancy.
- Neurological disorder.
- Recent fracture.
- Pre-existing psychological disorder.

Outcome Measures

- **Tampa Scale of Kinesiophobia (TSK):** a 17-item scale. Each item is scored from 1

(strongly disagree) to 4 (strongly agree), giving a total score ranging from 17 to 68; higher scores reflect a greater fear of movement. It is a valid, reliable, and readily available scale for evaluating fear of movement.

- **Pain Catastrophizing Scale (PCS):** a 13-item scale. Each item is scored from 0 (not at all) to 3 (all the time), giving a total score ranging from 0 to 52. It is a valid and readily available scale.
- **Timed Up and Go (TUG) test:** a performance-based outcome measure. The subject sits on a chair with armrests, stands up, walks 3 metres, turns around, walks back to the chair, and sits down. The time taken to complete the entire task is recorded; a shorter time indicates better physical performance.

Procedure

After obtaining written informed consent and selecting patients according to the inclusion and exclusion criteria, each subject was assessed once during post-operative days 14 to 17. Each assessment lasted approximately 20 to 30 minutes and used the three instruments described above: the Tampa Scale of Kinesiophobia, the Pain Catastrophizing Scale, and the Timed Up and Go test. Pain intensity was additionally recorded using the Visual Analogue Scale.

6. DATA ANALYSIS AND RESULTS

Table 1. Summary of numerical parameters.

Parameter	Minimum	Maximum	Mean	Std. Dev.	Median	Quartile
Age	50.00	74.00	57.73	6.73	55.50	6.00
POD	14.00	17.00	15.34	1.02	15.00	1.00
VAS	1.00	9.00	4.60	2.12	4.50	1.50
Kinesiophobia	15.00	52.00	31.31	8.80	30.50	7.00
PCS	0.00	37.00	14.37	11.12	11.00	9.50
TUG	7.50	17.50	11.34	2.85	10.10	2.15

The study cohort comprised patients with a mean age of 57.73 ± 6.73 years, all assessed at a uniform post-operative period of 15.34 ± 1.02 days. On average, patients reported moderate pain levels (VAS: 4.60 ± 2.12) and a moderate fear of movement (kinesiophobia: 31.31 ± 8.80), indicating that while pain and

psychological barriers were present, they were not extreme in most cases. However, the Pain Catastrophizing Scale (PCS: 14.37 ± 11.12) showed the greatest variability, suggesting that while most patients had low catastrophizing scores, a distinct subset exhibited markedly higher negative pain-related thinking.

Table 2. Normality of VAS, kinesiophobia, PCS, and TUG scores (Shapiro–Wilk test).

Parameter	Shapiro–Wilk	df	p-value
VAS	0.9560	62	0.0260*
Kinesiophobia	0.9640	62	0.0640
PCS	0.9090	62	0.0001*
TUG	0.9040	62	0.0001*

* Statistically significant ($p < 0.05$). Because VAS, PCS, and TUG scores were not normally distributed, the non-parametric Spearman rank correlation was used for the analysis.

7. DISCUSSION

Demographic Profile and Functional Performance

The mean pain score measured by the VAS was 4.60 ± 2.12 , indicating moderate pain levels in the early post-operative phase. Similarly, the mean kinesiophobia score was 31.31 ± 8.80 , reflecting a moderate level of fear of movement among participants. The Pain Catastrophizing

Scale mean score of 14.37 ± 11.12 showed notable variability, indicating that while some patients had low levels of catastrophic thinking, others experienced considerably higher psychological distress. Functional performance measured by the Timed Up and Go test showed a mean value of 11.34 ± 2.85 seconds, suggesting relatively acceptable mobility with considerable variation among individuals.

Correlation Findings

Table 3. Spearman rank correlations between study variables.

Relationship	r	p-value
Pain intensity vs. kinesiophobia	0.4986	< 0.0001
Pain intensity vs. pain catastrophizing	0.5505	< 0.0001
Kinesiophobia vs. TUG	0.7734	< 0.0001
Pain catastrophizing (PCS) vs. TUG	0.5792	< 0.0001

- **Pain intensity and kinesiophobia:** A statistically significant positive correlation was found between pain intensity and kinesiophobia ($r = 0.4986$, $p < 0.0001$), suggesting that higher pain perception is associated with a greater fear of movement. This finding supports the

fear-avoidance model, in which pain may lead to movement avoidance and further functional limitation. Similar findings were reported by Brown et al. (2016), who observed that kinesiophobia predicts reduced range of motion after total knee arthroplasty.

- **Pain intensity and pain catastrophizing:** A significant positive correlation was also found between pain intensity and pain catastrophizing ($r = 0.5505$, $p < 0.0001$), indicating that patients experiencing greater pain tend to magnify and ruminate more about their pain. This is in agreement with Burns et al. (2015), who identified pain catastrophizing as an important predictor of chronic post-operative pain.
- **Kinesiophobia, PCS, and TUG:** The strongest correlation was observed between kinesiophobia and TUG ($r = 0.7734$, $p < 0.0001$), suggesting that fear of movement has a direct negative impact on physical performance; patients with a higher fear of movement required more time to complete the TUG test, indicating poorer functional mobility. The PCS also showed a significant positive correlation with TUG ($r = 0.5792$, $p < 0.0001$), highlighting that catastrophizing thoughts may contribute to delayed mobility and poorer rehabilitation outcomes.

Clinical Implication

The study emphasizes that psychological factors such as kinesiophobia and pain catastrophizing are strongly linked with pain intensity and physical performance after total knee replacement. Early identification of these factors, along with targeted psychological support and physiotherapy rehabilitation, may help improve functional outcomes and enhance recovery in these patients.

8. LIMITATIONS

- The study was conducted on a limited sample size of 62 patients, which may limit the generalizability of the findings to a larger population.
- The study included patients only during post-operative days 14 to 17; therefore, long-term changes in kinesiophobia, pain catastrophizing, and physical performance were not assessed.
- The study was limited to patients following total knee replacement from a single clinical setting, which may affect the wider applicability of the results.
- Psychological factors were assessed using self-reported questionnaires, so responses may have been influenced by patient understanding, mood, pain level, and willingness to report symptoms accurately.
- Other factors such as muscle strength, range of motion, analgesic use, social support, and rehabilitation adherence were not studied in detail.

9. RECOMMENDATIONS

- Future studies should be conducted with a larger sample size to improve the reliability and generalizability of the findings.
- Longitudinal studies are recommended to assess changes in kinesiophobia, pain catastrophizing, and physical performance at different stages of recovery after total knee replacement.
- Multicentre studies may be useful to include patients from different hospitals and rehabilitation settings.
- Routine screening for kinesiophobia and pain catastrophizing should be considered during early post-operative physiotherapy assessment.
- Patient education, reassurance, graded exposure to movement, confidence-building exercises, and counselling strategies should be integrated with conventional physiotherapy rehabilitation.
- Further research may include additional physical parameters such as knee range of motion, quadriceps strength, gait pattern, balance, and rehabilitation adherence to understand recovery more comprehensively.

10. CONCLUSION

The present study concludes that pain catastrophizing, kinesiophobia, and physical performance are significantly related in patients following total knee replacement on post-operative days 14 to 17. The results indicate that recovery after total knee replacement is influenced not only by surgical healing and physical rehabilitation, but also by the patient's psychological response to pain and movement. Fear of movement and negative pain-related thoughts can reduce confidence, limit participation in physiotherapy, and affect functional mobility during the early post-operative phase.

The findings showed that higher pain intensity was associated with greater kinesiophobia and pain catastrophizing. This suggests that patients who experience more pain may develop an increased fear of movement and may also tend to think more negatively about their pain. These psychological responses may further increase avoidance behaviour, reduce exercise performance, and slow functional recovery.

A strong positive relationship was observed between kinesiophobia and Timed Up and Go test scores, indicating that patients with a higher fear of movement required more time to complete the functional mobility task. This reflects poorer physical performance and highlights the importance of addressing fear of movement during the early rehabilitation period. Similarly, pain catastrophizing was significantly associated with delayed mobility, showing that negative pain-related thinking can influence functional outcomes after surgery.

Key Conclusions

- Higher pain intensity was associated with an increased fear of movement and greater pain catastrophizing.
- A strong positive correlation was observed between kinesiophobia and Timed Up and Go (TUG) scores, indicating that patients with a greater fear

of movement demonstrated poorer physical performance.

- Pain catastrophizing was significantly associated with delayed mobility, suggesting that psychological distress may act as a barrier to effective rehabilitation.

Overall Interpretation

Overall, the study demonstrates that psychological factors are important contributors to early post-operative recovery after total knee replacement. Patients who show higher levels of fear, worry, and catastrophic thinking may be more likely to avoid movement, delay weight-bearing activities, and perform poorly in functional mobility tasks. Therefore, psychological screening should be considered an important part of post-operative physiotherapy assessment.

The study also supports the need for patient education during the early post-operative period. Patients should be reassured that controlled and guided movement is safe, necessary, and beneficial for recovery. Education regarding pain, healing, the importance of exercise, and the expected recovery pattern may help reduce fear, improve confidence, and encourage active participation in rehabilitation.

Clinical Relevance

The results highlight the importance of addressing both physical pain and psychological factors during the early post-operative phase. Early assessment of kinesiophobia and pain catastrophizing can help identify patients at risk of delayed recovery. Incorporating psychological counselling, reassurance, and cognitive-behavioural strategies along with conventional physiotherapy may improve patient confidence, enhance mobility, and promote better functional outcomes.

Implications for Physiotherapy Practice

Physiotherapists should not focus only on pain reduction, range of motion, strengthening, and gait training, but should also identify psychological barriers such as fear of movement and pain catastrophizing. A rehabilitation programme that includes graded exposure to movement, functional task practice, reassurance, goal setting, and patient motivation may help improve physical performance in patients after total knee replacement.

Early recognition of patients with high kinesiophobia or pain catastrophizing can help in planning individualized treatment strategies. Such patients may benefit from additional counselling, repeated explanation of exercise safety, gradual progression of activities, and close monitoring of functional improvement. This approach can help prevent delayed recovery and improve independence in daily activities.

Final Conclusion: The present study highlights that kinesiophobia and pain catastrophizing are important psychological factors associated with poorer physical performance in patients following total knee replacement on post-operative days 14 to 17. A multidisciplinary rehabilitation approach focusing on pain control, physical recovery, patient education, confidence building, and psychological support is essential for optimizing recovery, improving functional mobility, reducing fear of movement, and enhancing quality of life after total knee replacement.

REFERENCES

- Weinstein AM, Rome BN, Reichmann WM. Estimating the burden of total knee replacement in the United States. *J Bone Joint Surg Am.* 2013;95(5):385. doi:10.2106/JBJS.L.00206.
- Williams SN, Wolford ML, Bercovitz A. Hospitalization for total knee replacement among inpatients aged 45 and over: United States, 2000–2010. NCHS Data Brief, no. 210. Hyattsville, MD: National Center for Health Statistics; 2015.
- Inacio MCS, Paxton EW, Graves SE, Namba RS, Nemes S. Projected increase in total knee arthroplasty in the United States: an alternative projection model. *Osteoarthritis Cartilage.* 2017;25(11):1797. doi:10.1016/j.joca.2017.07.022.
- Wilson NA, Schneller ES, Montgomery K, Bozic KJ. Hip and knee implants: current trends and policy considerations. *Health Aff (Millwood).* 2008;27(6):1587–1598.
- Birch S, Stilling M, Mechlenburg I, Hansen TB. The association between pain catastrophizing, physical function and pain in a cohort of patients undergoing knee arthroplasty. *BMC Musculoskelet Disord.* 2019;20:421.
- Brander V, Gondek S, Martin E, Stulberg SD. Pain and depression influence outcome 5 years after knee replacement surgery. *Clin Orthop Relat Res.* 2007;464:21–26.
- Brown ML, Plate JF, Von Thae S, Fino NF, Smith BP, Seyler TM, Lang JE. Decreased range of motion after total knee arthroplasty is predicted by the Tampa Scale of Kinesiophobia. *J Arthroplasty.* 2016;31(4):793–797.
- Gupta A, Sethi J. Comparative Effects of Kinetic Chain Training Modalities and BFR Therapy on Athletic Hamstring Injuries: A Review. *Bull. Health Sphere* 2026;1(1):27-36. doi: 10.63150/bhs.2026.04
- Edwards RR, Haythornthwaite JA, Smith MT, et al. Catastrophizing and depressive symptoms as prospective predictors of outcomes following total knee replacement. *Pain Res Manag.* 2009;14:307–311.

10. Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine (Phila Pa 1976)*. 2002;27:E109–E120.
11. Rayahin JE, et al. Factors associated with pain experience outcome in knee osteoarthritis. *Arthritis Care Res (Hoboken)*. 2014;66:1828–1835.
12. Zhou Y, Gao W, Gao S, Guo X, Liu M, Cao C. Pain catastrophizing, kinesiophobia and exercise adherence in patients after total knee arthroplasty: the mediating role of exercise self-efficacy. *J Pain Res*. 2023;16:3993–4004. doi:10.2147/JPR.S432106.
13. Hayashi K, Kako M, Suzuki K, Hattori K, Fukuyasu S, Sato K, Kadono I, Sakai T, Hasegawa Y, Nishida Y. Associations among pain catastrophizing, muscle strength, and physical performance after total knee and hip arthroplasty. *World J Orthop*. 2017;8(4):336–341. doi:10.5312/wjo.v8.i4.336.
14. Yao Y, Zhang Q, Cui S, Guo X. Study on the impact of kinesiophobia after total knee arthroplasty on the rehabilitation of patients during hospitalization: a pilot study. *PLoS One*. 2025;20(1):e0317774. doi:10.1371/journal.pone.0317774.
15. Filardo G, Merli G, Roffi A, Marcacci T, Berti Ceroni F, Raboni D, Kon E, Marcacci M. Kinesiophobia and depression affect total knee arthroplasty outcome in a multivariate analysis of psychological and physical factors on 200 patients. *Knee Surg Sports Traumatol Arthrosc*. 2017;25:3417–3423.
16. Doménech J, Sanchis-Alfonso V, López L, Espejo B. Influence of kinesiophobia and catastrophizing on pain and disability in anterior knee pain patients. *Knee Surg Sports Traumatol Arthrosc*. 2013;21:1562–1568.
17. Sullivan MJL, Bishop SR, Pivik J. The Pain Catastrophizing Scale: development and validation. *Psychol Assess*. 1995;7(4):524–532. doi:10.1037/1040-3590.7.4.524.
18. Kori SH, Miller RP, Todd DD. Kinesiophobia: a new view of chronic pain behavior. *Pain Manag*. 1990;3:35–43.
19. Vlaeyen JWS, Kole-Snijders AMJ, Boeren RGB, van Eek H. Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. *Pain*. 1995;62(3):363–372.
20. Podsiadlo D, Richardson S. The Timed Up & Go: a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc*. 1991;39(2):142–148. doi:10.1111/j.1532-5415.1991.tb01616.x.
21. Naylor JM, Harmer AR, Heard RC, Harris IA. Patterns of recovery following knee and hip replacement in an Australian cohort. *Aust Health Rev*. 2009;33(1):124–135.
22. Patel RM, Anderson BL, Bartholomew JB. Interventions to manage pain catastrophizing following total knee replacement: a systematic review. *J Pain Res*. 2022;15:1679–1689. doi:10.2147/JPR.S353385.