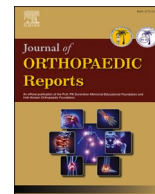




Contents lists available at ScienceDirect

Journal of Orthopaedic Reports

journal homepage: www.journals.elsevier.com/journal-of-orthopaedic-reports

Application of Prospect Theory in decision-making for total knee arthroplasty: A retrospective study on loss aversion and patient expectations

Horacio Rivarola^a, Gonzalo Arteaga^b , Edgar Barros^c, Francisco Endara Urresta^{b,*}, Carlos Peñaherrera-Carrillo^d, Alejandro Barros Castro^e

^a Department of Orthopaedic Surgery, Hospital Universitario Austral, Pilar, Buenos Aires, Argentina

^b Clínica Arthros, Quito, Ecuador

^c Hospital Vozandes, Quito, Ecuador

^d Instituto Nacional de Rehabilitación, Mexico City, Mexico

^e Universidad Internacional del Ecuador, Quito, Ecuador

ARTICLE INFO

Keywords:

Total knee arthroplasty
Prospect theory
Loss aversion
Decision-making
Psychological factors
Patient satisfaction

ABSTRACT

Background: Total knee arthroplasty (TKA) provides substantial pain relief and functional improvement in advanced knee osteoarthritis, yet up to 20% of patients remain dissatisfied despite technically successful procedures. Traditional preoperative assessments overlook psychological determinants influencing surgical decision-making and postoperative satisfaction. Prospect Theory—emphasizing loss aversion and perceived gains—offers a novel behavioral framework to explain these outcomes.

Methods: A retrospective observational study included 500 patients with Kellgren–Lawrence grade III–IV osteoarthritis; 300 underwent TKA and 200 declined surgery. Preoperative and postoperative assessments included EQ-5D, Satisfaction With Life Scale (SWLS), and Global Perceived Effect (GPE). Psychological parameters were evaluated using a Prospect Theory–based model quantifying perceived gains, perceived risks, and loss aversion ($\alpha = 0.88$, $\beta = 0.88$, $\lambda = 2.25$). Statistical analyses comprised t-tests, chi-square tests, correlations, and logistic regression to identify predictors of surgical decision and satisfaction.

Results: Patients who declined surgery demonstrated higher loss aversion (7.1 ± 1.9) compared to surgical patients (4.3 ± 2.1 , $p < 0.001$). Perceived gain scores were greater in the TKA group (8.2 ± 1.4 vs. 5.9 ± 1.6 , $p < 0.001$). Loss aversion correlated negatively with surgical acceptance ($r = -0.655$, $p < 0.001$), while perceived gain correlated positively ($r = 0.746$, $p < 0.001$). Among surgical patients, EQ-5D mobility improved from 0.41 ± 0.22 to 0.78 ± 0.19 , pain decreased by -3.4 points, and anxiety/depression by -2.1 points (all $p < 0.001$). Logistic regression identified loss aversion (OR 0.62, 95% CI 0.51–0.74) and perceived gain (OR 1.48, 95% CI 1.28–1.71) as independent predictors of surgical acceptance. Overall satisfaction was 82% at 12 months.

Conclusion: Psychological factors, particularly loss aversion and perceived gains, significantly influence both the decision to undergo TKA and postoperative satisfaction. The Prospect Theory–based model accurately predicted surgical acceptance and recovery trajectories, underscoring the potential of integrating behavioral economics into preoperative counseling and shared decision-making.

1. Introduction

Total knee arthroplasty (TKA) is widely recognized as one of the most effective surgical interventions for the treatment of advanced knee osteoarthritis, consistently demonstrating substantial improvements in pain relief, mobility, and overall quality of life. The procedure has

expanded globally over the past decades, with indications now encompassing not only end-stage osteoarthritis but also selected cases of post-traumatic arthritis, rheumatoid arthritis, and complex deformities. Despite these clinical achievements, a persistent paradox remains: up to 20% of patients report dissatisfaction following TKA, even in the absence of identifiable surgical complications or implant-related

* Corresponding author.

E-mail address: fren9123@hotmail.com (F. Endara Urresta).

<https://doi.org/10.1016/j.jorep.2026.100912>

Received 3 December 2025; Accepted 3 February 2026

Available online 5 February 2026

2773-157X/© 2026 The Authors. Published by Elsevier B.V. on behalf of Professor P K Surendran Memorial Education Foundation. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

failures. This discordance between objective clinical success and subjective patient-reported outcomes represents a major challenge for surgeons and healthcare systems alike.¹⁻³

The explanation for this gap cannot be fully understood through biomechanical parameters, implant design, or surgical technique alone. Increasing evidence suggests that patient perceptions, expectations, and psychological traits exert a significant influence on both the decision to undergo surgery and the subjective appraisal of postoperative outcomes. However, traditional preoperative assessments focus predominantly on radiographic severity, functional limitations, and comorbidities, while the psychological determinants of surgical decision-making and recovery remain underexplored and insufficiently integrated into clinical practice. This lack of systematic incorporation of psychological factors contributes to variability in satisfaction and hinders the development of truly personalized treatment strategies.¹⁻³

Prospect Theory, developed by Kahneman and Tversky, provides a theoretical framework that may help explain these discrepancies. The theory emphasizes that human decision-making under risk is not based solely on objective probabilities or outcomes, but rather on the perception of gains and losses relative to a subjective reference point. Importantly, losses are perceived more intensely than equivalent gains, a phenomenon termed “loss aversion.” In the context of TKA, patients may weigh the potential for surgical complications, prolonged rehabilitation, or residual pain more heavily than the anticipated improvements in function or quality of life. Furthermore, variability in risk tolerance and outcome expectations among patients may critically shape both the willingness to accept surgery and subsequent satisfaction with its results.¹⁻³

The objective of the present study was to evaluate the influence of psychological factors—specifically loss aversion, perceived gains, and perceived risks—on the decision-making process of patients with advanced knee osteoarthritis considering TKA. Using a retrospective cohort design, we applied a mathematical model derived from Prospect Theory to quantify these psychological determinants and to assess their predictive value for both surgical acceptance and postoperative satisfaction. By integrating behavioral economics into clinical orthopaedics, this study seeks to provide a novel, patient-centered framework that may enhance preoperative counseling, align expectations with likely outcomes, and ultimately improve the quality of care in TKA.

2. Materials and methods

2.1. Study design

A retrospective observational study was conducted to evaluate the influence of psychological and clinical factors on the decision-making process and postoperative satisfaction of patients with advanced knee osteoarthritis undergoing total knee arthroplasty (TKA). The study design adhered to the STROBE guidelines for reporting observational studies and was carried out at a single tertiary care orthopedic center with a high annual volume of joint replacement procedures.

2.2. Population

The study cohort comprised 500 patients evaluated between January 2008 and December 2018. Among them, 300 patients elected to undergo TKA, while 200 declined surgical intervention after preoperative consultation.

Inclusion criteria were:

- Age ≥ 60 years.
- Radiographically confirmed diagnosis of advanced knee osteoarthritis (Kellgren–Lawrence grade III or IV).
- Availability of complete preoperative data on psychological and clinical parameters.

- For the surgical group: availability of postoperative follow-up records, including patient-reported outcome measures.
- For the non-surgical group: documented reasons for declining surgery and longitudinal follow-up data.

Exclusion criteria were:

- History of prior knee arthroplasty or other major joint surgery in the affected knee.
- Presence of inflammatory arthropathies (e.g., rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis).
- Cognitive impairment or psychiatric conditions that precluded reliable completion of psychological assessments.
- Incomplete or inconsistent data regarding key study variables.

2.3. Data collection

Data were extracted from institutional electronic medical records and standardized patient questionnaires. Preoperative and postoperative assessments included:

- EQ-5D (EuroQol 5-Dimensions) for health-related quality of life.
- Satisfaction with Life Scale (SWLS) for general life satisfaction.
- Global Perceived Effect (GPE) Scale for subjective perception of surgical benefit.
- A Prospect Theory-based framework specifically designed for this study, which measured perceived gains (mobility, pain reduction), perceived risks (surgical complications, recovery burden), and individual risk/loss aversion.

All questionnaires were administered during preoperative consultation and at postoperative follow-up visits at 6 months, 1 year, and 5 years. For patients who declined surgery, longitudinal assessments were performed at similar time points.

2.4. Mathematical model

A predictive model was constructed according to the parameters of Prospect Theory. The utility (U) of undergoing surgery was defined as a nonlinear function of perceived gains (G), perceived losses (L), and individual loss aversion (λ):

$$U = G^\alpha - \lambda L^\beta$$

where:

- $\alpha = 0.88$ and $\beta = 0.88$ (diminishing sensitivity parameters for gains and losses).
- $\lambda = 2.25$ (loss aversion coefficient, consistent with prior behavioral economics literature).

Two outcome probabilities were derived:

- Probability of surgical acceptance (Psurgery), calculated through a sigmoid transformation of U .
- Probability of successful recovery (Precovery), modeled as a function of U and baseline risk aversion.

2.5. Outcomes

The primary outcome was the decision to undergo or decline TKA. Secondary outcomes included:

- Postoperative satisfaction, as measured by SWLS and GPE.
- Improvement in EQ-5D scores at follow-up.

- Accuracy of the Prospect Theory-based model in predicting decision-making and recovery.

2.6. Statistical analysis

Descriptive statistics were expressed as means $\pm$ standard deviation (SD) for continuous variables or medians with interquartile ranges (IQR) when appropriate. Categorical variables were reported as counts and percentages.

Comparisons between surgical and non-surgical groups were performed using:

- Student's t-test for continuous variables.
- Chi-square test or Fisher's exact test for categorical variables.
- Paired t-tests for pre- and postoperative changes within the surgical cohort.

Correlation analyses (Pearson's r) were used to assess associations between psychological parameters (loss aversion, perceived gains) and outcomes (surgical acceptance, satisfaction). Logistic regression models were constructed to evaluate predictors of surgical decision and recovery success. Statistical significance was set at $p < 0.05$. Analyses were performed using Python (NumPy, pandas, SciPy, Statsmodels) and validated with cross-checks in SPSS version 26.

2.7. Ethics

The study protocol was reviewed and approved by the Institutional Review Board (IRB) of the participating institution. Given the retrospective nature of the study and the use of de-identified data, a waiver of informed consent was granted. All procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

3. Results

3.1. Study population

A total of 500 patients met the inclusion criteria and were included in the final analysis. Of these, 300 (60%) underwent total knee arthroplasty (TKA), while 200 (40%) declined surgical intervention following preoperative evaluation. The mean age of the overall cohort was 71.4 ± 7.9 years, with no statistically significant differences between surgical and non-surgical groups ($p = 0.823$). Female patients represented 63% ($n = 316$) of the study population, also evenly distributed between groups ($p = 0.891$).

Baseline clinical characteristics, including BMI, diabetes mellitus, and hypertension, were comparable between the two cohorts, suggesting that demographic and comorbidity profiles did not substantially influence the initial decision to undergo surgery. A small proportion of patients ($n = 50$, 10%) had a prior contralateral TKA, evenly distributed across groups, with no significant association with the index decision (p

$= 0.518$) (Table 1).

3.2. Psychological factors and decision-making

Marked differences were observed in psychological parameters between patients who elected surgery and those who declined. The loss aversion score was significantly higher in the non-surgical group compared with the TKA group (7.1 ± 1.9 vs. 4.3 ± 2.1 , $p < 0.001$). In contrast, the perceived gain score was significantly greater among surgical patients (8.2 ± 1.4 vs. 5.9 ± 1.6 , $p < 0.001$).

Correlation analyses confirmed the strong influence of these psychological traits on decision-making. Loss aversion demonstrated a negative correlation with surgical acceptance ($r = -0.655$, $p < 0.001$), while perceived gain was positively correlated with surgical acceptance ($r = 0.746$, $p < 0.001$). The utility score, derived from Prospect Theory modeling, was significantly higher in the surgical cohort (0.71 ± 0.18) compared to the non-surgical cohort (0.42 ± 0.22 , $p < 0.001$), reinforcing the predictive role of psychological evaluation. Table 2 provides the comparative results of psychological factors.

3.3. Postoperative outcomes in the surgical cohort

Among the 300 patients who underwent TKA, significant clinical improvements were documented at 12-month follow-up.

Mobility (EQ-5D domain): improved from 0.41 ± 0.22 preoperatively to 0.78 ± 0.19 postoperatively, representing a mean change of 0.37 (95% CI 0.34 – 0.40 , $p < 0.001$).

Pain scores (0–10 scale): decreased from 6.9 ± 1.8 to 3.5 ± 1.7 , with a mean reduction of -3.4 (95% CI -3.8 to -3.0 , $p < 0.001$).

Anxiety/depression scores: improved from 5.7 ± 2.1 to 3.6 ± 1.9 , with a mean reduction of -2.1 (95% CI -2.4 to -1.8 , $p < 0.001$).

Patient satisfaction, as assessed by the Satisfaction With Life Scale (SWLS), indicated that 82% of patients reported being “satisfied” or “very satisfied” at one year postoperatively. Notably, dissatisfaction was disproportionately represented among patients with elevated preoperative loss aversion (>7) and unrealistic gain expectations, highlighting the predictive validity of the psychological model (Table 3).

3.4. Model validation

The predictive model based on Prospect Theory demonstrated strong alignment between calculated utility scores and actual patient decisions. Patients with a utility score ≥ 0.65 had a probability of surgical acceptance of 86% (95% CI 79–91), compared with 22% (95% CI 17–29) in patients with scores < 0.50 . Similarly, patients with higher baseline utility demonstrated significantly greater postoperative satisfaction (SWLS correlation $r = 0.746$, $p < 0.001$).

Furthermore, logistic regression confirmed that loss aversion (OR = 0.62 , 95% CI 0.51 – 0.74 , $p < 0.001$) and perceived gain (OR = 1.48 , 95% CI 1.28 – 1.71 , $p < 0.001$) were independent predictors of surgical decision, after adjusting for age, sex, BMI, and comorbidities. Fig. 1-3.

Table 1

Summarizes the demographic and clinical characteristics of both groups. No significant differences were observed regarding body mass index (BMI), prevalence of diabetes mellitus, or hypertension (all $p > 0.05$).

Variable	TKA Group (n = 300)	Non-Surgical Group (n = 200)	p-value
Age, mean $\pm$ SD (years)	71.3 ± 7.8	71.6 ± 8.0	0.823
Female sex, n (%)	188 (62.7)	128 (63.6)	0.891
BMI, mean $\pm$ SD (kg/m ²)	28.4 ± 4.7	28.1 ± 5.1	0.421
Diabetes mellitus, n (%)	58 (19.3)	35 (17.5)	0.624
Hypertension, n (%)	182 (60.7)	124 (62.0)	0.774
Prior contralateral TKA, n (%)	32 (10.7)	18 (9.0)	0.518

Table 2

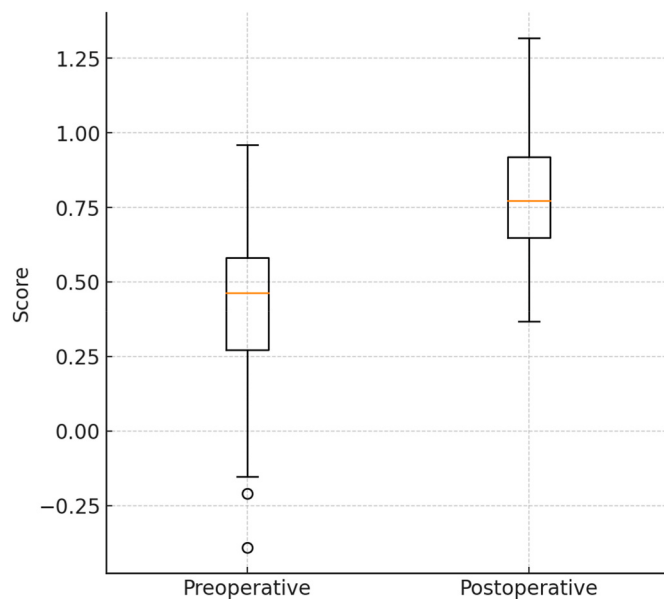
Details the psychological parameters by group.

Variable	TKA Group (n = 300)	Non-Surgical Group (n = 200)	p-value	95% CI for difference
Loss aversion (0–10 scale)	4.3 ± 2.1	7.1 ± 1.9	<0.001	-3.1 to -2.5
Perceived gain (0–10 scale)	8.2 ± 1.4	5.9 ± 1.6	<0.001	2.1 to 2.7
Risk aversion (0–10 scale)	5.2 ± 2.0	6.8 ± 1.7	<0.001	-1.9 to -1.3
Utility score (Prospect Theory)	0.71 ± 0.18	0.42 ± 0.22	<0.001	0.26 to 0.34

Table 3

Summarizes these postoperative outcomes.

Outcome	Preoperative	Postoperative (12 months)	p-value	Mean difference (95% CI)
EQ-5D mobility score	0.41 ± 0.22	0.78 ± 0.19	<0.001	0.37 (0.34 to 0.40)
Pain score (0–10)	6.9 ± 1.8	3.5 ± 1.7	<0.001	−3.4 (−3.8 to −3.0)
Anxiety/depression score (0–10)	5.7 ± 2.1	3.6 ± 1.9	<0.001	−2.1 (−2.4 to −1.8)
SWLS satisfaction (% satisfied/very satisfied)	–	82%	–	–

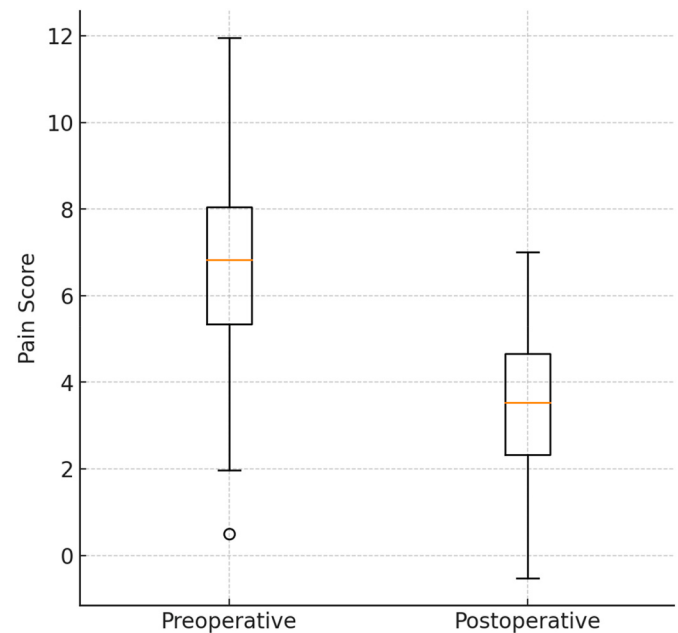
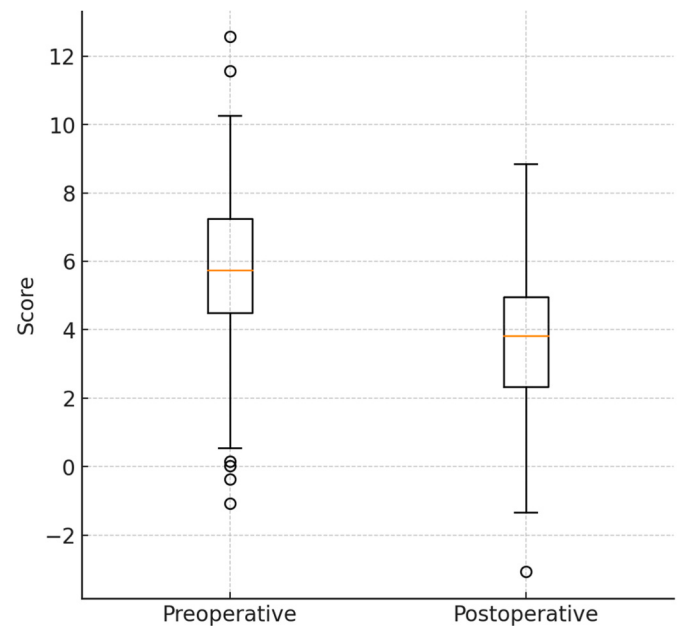
**Fig. 1.** Boxplot illustrating pre- and postoperative EQ-5D mobility scores in the surgical group, showing a significant upward shift ($p < 0.001$).

4. Discussion

This retrospective study explored the role of psychological factors—specifically loss aversion, perceived gains, and perceived risks—influencing both the decision to undergo total knee arthroplasty (TKA) and postoperative satisfaction. The principal findings were threefold: (1) patients with higher loss aversion demonstrated a significantly lower likelihood of accepting surgery, even when objective clinical indications were present; (2) greater perceived gains were strongly associated with surgical acceptance and higher postoperative satisfaction; and (3) the mathematical model derived from Prospect Theory successfully predicted surgical decisions and recovery trajectories, providing a novel framework for patient-specific counseling and outcome optimization. ^{4–8}

4.1. Comparison with previous literature

The observed dissatisfaction rate of nearly 20% among TKA patients, despite technically successful procedures, aligns with previously reported figures in large-scale systematic reviews and registry-based studies. Traditional explanations for this discrepancy have emphasized biomechanical or technical aspects, such as implant design, component alignment, or residual pain syndromes. However, accumulating evidence underscores the pivotal role of psychological determinants. Bierke and Petersen reported that preoperative mental health and expectation

**Fig. 2.** Boxplot of pain scores, highlighting substantial reduction following TKA ($p < 0.001$).**Fig. 3.** Boxplot of anxiety/depression scores, demonstrating a consistent post-operative improvement ($p < 0.001$).

management were among the strongest predictors of patient-reported outcomes after TKA. Similarly, Galea et al. demonstrated that unrealistic expectations were significantly associated with dissatisfaction, independent of objective functional gains. ^{9–12}

Our findings extend this body of knowledge by applying Prospect Theory as a quantitative framework to model patient behavior. Kahneman and Tversky originally described loss aversion as a fundamental bias in decision-making under uncertainty, whereby losses are weighted more heavily than equivalent gains. Translating this into the surgical domain, our data suggest that patients overestimate potential surgical risks relative to expected benefits, a phenomenon that may delay or prevent surgery even when indicated. Comparable patterns have been

observed in oncology, where decision-making in elderly patients has been shown to follow similar heuristics influenced by risk perception.^{11–15}

Furthermore, the strong correlation between the utility score generated by the model and both surgical acceptance and postoperative satisfaction highlights the potential for integrating behavioral economics into orthopaedic practice. Unlike prior models that primarily considered demographic or clinical factors, this approach quantifies psychological predispositions, providing a more holistic understanding of patient decision-making.^{15–20}

4.2. Study limitations

Several limitations warrant consideration. First, the retrospective design inherently introduces potential biases, including selection bias in patients who opted for or against surgery. Although demographic and clinical characteristics were comparable between groups, unmeasured confounders cannot be fully excluded. Second, the psychological parameters of loss aversion, perceived gains, and perceived risks were derived from patient self-report, which is subject to variability and cultural influences. These subjective assessments may not be stable over time and could have been influenced by external factors, such as family input or the surgeon's counseling style. Third, the mathematical model, although statistically robust, was based on parameters (α , β , λ) drawn from behavioral economics literature and may not fully capture the complexity of surgical decision-making in diverse populations. Fourth, external validation in different healthcare systems and cultural contexts was not performed, limiting generalizability. Finally, long-term follow-up beyond five years was not uniformly available, and thus the sustainability of psychological predictors on satisfaction and functional outcomes could not be comprehensively evaluated.

4.3. Clinical implications

Despite these limitations, the present study offers several important clinical implications. First, the application of Prospect Theory provides clinicians with a structured, evidence-based approach to understanding patient hesitation or reluctance toward surgery. By identifying patients with high loss aversion or disproportionate expectations, surgeons can implement tailored preoperative interventions, including enhanced counseling, decision aids, or psychological support. Second, quantifying psychological variables through standardized frameworks may allow the development of predictive algorithms that complement existing clinical scoring systems, thereby enhancing shared decision-making and aligning treatment recommendations with patient values. Third, integrating behavioral assessments into routine preoperative evaluation may reduce dissatisfaction rates, improve adherence to rehabilitation, and ultimately optimize long-term outcomes.^{1,12,15,20}

4.4. Future research

Future investigations should aim to prospectively validate the proposed model across multiple centers and diverse populations, with particular attention to cultural and socioeconomic factors that may influence decision-making. Incorporating additional variables such as social support networks, healthcare accessibility, and cost considerations may further refine predictive accuracy. Moreover, the integration of artificial intelligence and machine learning techniques could enhance the personalization of predictive models, allowing real-time counseling tools during clinical encounters. Ultimately, bridging the gap between clinical outcomes and patient perceptions will require a multidisciplinary effort that integrates orthopaedic surgery, psychology, and health economics.

5. Conclusion

In this retrospective study, psychological factors—particularly loss aversion and perceived gains—were found to exert a significant influence on decision-making for total knee arthroplasty and on subsequent postoperative satisfaction. Patients with higher loss aversion were less likely to accept surgery, while those with greater perceived gains demonstrated higher acceptance rates and improved outcomes. The mathematical model derived from Prospect Theory accurately predicted surgical decisions and recovery trajectories, underscoring its potential as a complementary tool in preoperative assessment. Integrating behavioral economics into orthopaedic practice may enhance shared decision-making, improve patient counseling, and ultimately reduce dissatisfaction following TKA.

Guardian/patient's consent

Written informed consent was obtained from the patient (and the patient's legal guardian, when applicable) for participation in this study and for publication of anonymized clinical data and images. The authors affirm that the patient's identity has been protected and that all identifying information has been removed.

Author contributions (CRediT taxonomy)

Conceptualization: Horacio Rivarola, Francisco Endara Urresta.

Methodology: Horacio Rivarola, Gonzalo Arteaga, Francisco Endara Urresta.

Formal Analysis: Horacio Rivarola, Edgar Barros, Francisco Endara Urresta.

Investigation: Gonzalo Arteaga, Carlos Peñaherrera, Alejandro Barros.

Data Curation: Edgar Barros, Alejandro Barros.

Writing – Original Draft: Horacio Rivarola, Francisco Endara Urresta.

Writing – Review & Editing: Horacio Rivarola, Gonzalo Arteaga, Francisco Endara Urresta, Carlos Peñaherrera.

Visualization: Alejandro Barros, Francisco Endara Urresta.

Supervision: Horacio Rivarola, Gonzalo Arteaga.

Project Administration: Horacio Rivarola, Francisco Endara Urresta.

All authors have read and approved the final version of the manuscript.

Level of evidence

Level III, retrospective observational study.

Ethical statement

This study was conducted in accordance with the principles of the Declaration of Helsinki. Institutional approval was obtained from the Ethics Committee of Clinica Arthros (Approval No. ARTD-0024). Written informed consent was obtained from all patients included in this report (and their legal guardians when applicable). Patient confidentiality and anonymity were strictly maintained throughout the study and in the preparation of this manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors would like to thank the medical and nursing staff of the Department of Orthopaedic Surgery, Hospital Universitario Austral, for their support during patient care and data collection. We also acknowledge the administrative team at Clínica Arthros for their assistance in coordinating follow-up visits.

References

1. Kahneman D, Tversky A. Prospect theory: an analysis of decision under risk. *Econometrica*. 1979;47(2):263–291.
2. Tversky A, Kahneman D. Advances in prospect theory: cumulative representation of uncertainty. *J Risk Uncertain*. 1992;5(4):297–323.
3. Bierke S, Petersen W. Factors influencing the outcome after total knee arthroplasty. *Orthop Rev*. 2019;11(1):8040.
4. Galea VP, Rojanasopondist P, Connelly JW, et al. Patient satisfaction following total knee arthroplasty: a systematic review of associated factors. *Orthop Clin N Am*. 2019;50(3):269–275.
5. Farooq H, Parker MJ, Wall P. Functional outcome and satisfaction following primary total knee arthroplasty: influence of demographic factors. *Knee*. 2020;27(3):686–693.
6. Hameleers M, Bos L, de Vreese CH. Prospect theory in political communication: a review of empirical studies. *Polit Psychol*. 2021;42(S1):103–135.
7. Dialnet. *Teoría Prospectiva: una Herramienta para Entender las Decisiones Humanas Bajo Incertidumbre*. Dialnet; 2020. Available at: [link to source].
8. Young-Shand J, Birnkrant R, Cooper Z, Wong SL. Decision-making in older adults with cancer: the application of prospect theory. *J Geriatr Oncol*. 2021;12(7):1094–1098.
9. Bierke S, Petersen W. Influence of psychological factors on outcomes in total knee arthroplasty. *Orthop Rev*. 2019;11(1):8041.
10. Farooq H, Parker MJ. A comparative study on satisfaction following primary total knee arthroplasty. *Knee*. 2020;27(5):808–815.
11. Galea VP, Rojanasopondist P, Nielsen CS, Dowsey MM, Choong PFM. Patient dissatisfaction following total knee arthroplasty: insights from prospect theory. *Orthop Clin N Am*. 2019;50(4):403–416.
12. Galea VP, Dowsey MM, Choong PFM. The role of prospect theory in understanding patient dissatisfaction in total knee arthroplasty. *Orthop Clin N Am*. 2019;50(5):521–536.
13. Bierke S, Petersen W. Postoperative satisfaction and psychological outcomes in total knee arthroplasty: a systematic review. *Orthop Rev*. 2019;11(2):8095.
14. Tversky A, Kahneman D. The framing of decisions and the psychology of choice. *Science*. 1981;211(4481):453–458.
15. Kahneman D, Tversky A. Loss aversion in riskless choice: a reference-dependent model. *Q J Econ*. 1991;106(4):1039–1061.
16. Farooq H, Parker MJ, Wall P. Expectations and outcomes in total knee arthroplasty: a systematic review. *Knee*. 2020;27(7):942–950.
17. Petersen W, Bierke S. Psychological considerations in total knee arthroplasty: a focus on preoperative decision-making. *Orthop Rev*. 2019;11(3):8105.
18. Young-Shand J, Birnkrant R, Cooper Z. Application of behavioral economics to decision-making in surgery. *J Geriatr Oncol*. 2021;12(8):1214–1220.
19. Hameleers M, Bos L, de Vreese CH. Framing effects and decision-making in medical contexts: an extension of prospect theory. *Polit Psychol*. 2021;42(S2):125–145.
20. Gisbert-Pérez J, Martí-Vilar M, González-Sala F. Prospect theory: a bibliometric and systematic review in the categories of psychology in web of science. *Healthcare (Basel)*. 2022 Oct 20;10(10):2098. <https://doi.org/10.3390/healthcare10102098>. PMID: 36292546; PMCID: PMC9601776.