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Systematic Review

Return to sports and recreational activities after patellofemoral arthroplasty: A systematic review☆

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A R T I C L E I N F O

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A B S T R A C T

Importance: Patellofemoral arthroplasty (PFA) is an established treatment for isolated patellofemoral osteoarthritis. However, evidence regarding postoperative activity levels and return to sport (RTS) remains limited.
Objective: The objective of this study was to evaluate RTS and recreational activity rates following PFA, identify factors influencing these outcomes, and report associated complications.
Evidence review: A systematic search was conducted in June 2024 across PubMed, EMBASE, ScienceDirect, and Scopus databases, following Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Search terms included variations of "patellofemoral arthroplasty," "physical activity," and "return to sport." Studies were included if they reported RTS outcomes following PFA. Studies lacking RTS data or isolated PFA results were excluded. From 492 records, 7 studies met the inclusion criteria.
Findings: Seven studies (2 prospective and 5 retrospective) comprising 265 patients (281 knees; 64.6% women; mean age: 48.9 years) were included, with a mean follow-up of up to 5.3 years. RTS definitions varied, with reported rates ranging from 64.7% to 91%. Low-impact sports were more commonly resumed, and 58.6% of patients returned to sport within six months. Among those who returned, 74.8% reached or exceeded their preoperative activity level. Postoperative pain improved (visual analog scale scores decreased from 6.3 to 2.7), although up to 38.6% of patients reported pain limiting activity. Conversion to total knee arthroplasty occurred in 6.3% to 13% of cases, and reoperation rates ranged from 10.4% to 25%. Limitations included inconsistent RTS definitions, heterogeneous outcome reporting, and use of non-standardized questionnaires.
Conclusions: RTS and recreational activity after PFA can be resumed by most patients, especially low-impact activities. Pain management should be actively addressed. High-quality studies with standardized RTS definitions are needed to evaluate the long-term impact of activity on implant survival.
Relevance: RTS after PFA is safe and achievable. A personalized approach is essential to optimize RTS and manage patient expectations.
Evidence level: III.

☆ Investigation was performed at Clinica Alemana de Santiago, Vitacura, Chile.

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What are the new findings?

- Return to sports after patellofemoral arthroplasty ranged between 64.7% and 91%.
- Low-impact sports are safe and achievable in most patients.
- Pain should be actively addressed to optimize return to sports.

What is already known?

- Patellofemoral osteoarthritis is a limiting condition.
- Patellofemoral arthroplasty is indicated in a younger and more active population.
- Return to sports and recreational activities is an under-reported topic.

INTRODUCTION

Patellofemoral osteoarthritis is a condition that impacts daily functionality and sports activities, leading to decreased quality of life [1–3]. It results in pain, stiffness, and limited mobility [4–6]. Managing patellofemoral osteoarthritis is challenging due to complex biomechanics of the patellofemoral joint [7–10]. Patellofemoral arthroplasty (PFA) has emerged as a surgical option that offers pain relief, improved function, and return to an active lifestyle, particularly in younger patients [11,12]. Around 70% of good to excellent outcomes have been reported, and theoretically, the need for total knee arthroplasty (TKA) may be delayed at least 10 years [11,13].

The impact of PFA on the ability to participate in physical activities, particularly sports, is an under-reported topic [14]. Some authors report low short-term complications and even better functional outcomes than TKA [15,16], with the primary cause of failure reported in the literature being the progression of osteoarthritis [17], accounting for 42% of revisions [13]. Other studies project a substantial increase in knee arthroplasty procedures, including PFA, TKA, and unicondylar knee arthroplasty (UKA), as more individuals seek to maintain an active lifestyle despite advanced age and joint degeneration [18–20].

To our knowledge, no systematic review has evaluated sports and recreational activities after PFA. The primary objective of this systematic review was to investigate the rate of sports return following PFA so that clinical practitioners may guide patient counseling with evidence-based data.

METHODOLOGY

Search strategy: Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were followed [21]. In June 2024, a literature search was conducted using PubMed, ScienceDirect, and Scopus databases. Search terms included variations of "patellofemoral arthroplasty," "sport," "activity," and "sports return." The search string for PUBMED was ("patellofemoral arthroplasty" OR "patellofemoral joint replacement" OR "patellofemoral replacement" OR "patellofemoral prosthesis" OR "patellofemoral arthroplasty" [Medical Subject Headings terms]) AND ("sports" OR "sport" OR "return to sport" OR "physical activity" OR "exercise" OR "recreational activity" OR "UCLA" OR "TEGNER").

Study eligibility: The eligibility criteria included clinical research such as randomized controlled trials, prospective and retrospective cohort studies, case-control studies, and case series. Eligible studies were required to report clinical outcomes following PFA and to include information on return to sport (RTS) or activity levels, preferably accompanied by validated scores such as the Tegner or University of California at Los Angeles (UCLA) activity scores [22]. Only articles published in English or Spanish were considered.

Studies were excluded if they were non-clinical in nature, did not report outcomes related to sports return or activity level, or involved multiple simultaneous interventions without providing separate data on PFA outcomes. However, studies describing combined procedures were included if the authors provided specific outcome data for the PFA group.

Screening: Two reviewers independently screened the titles, abstracts, and references. Disagreements were resolved through discussion. A total of 492 results were retrieved from MEDLINE/PUBMED (n = 80), EMBASE (n = 57), ScienceDirect (n = 290), and SCOPUS (n = 65) databases. After removing 111 duplicate records and excluding 151 records deemed ineligible by database-filtering tools, 230 titles and abstracts were screened. Of these, 182 records were excluded, leaving 48 studies for full-text retrieval (Fig. 1) [5–8], [14–17], [23–33], [34–44], [45–61]. Full texts of selected studies were reviewed, and inclusion/exclusion criteria were applied, leading to the selection of 7 studies. The quality of the included studies was evaluated using the methodological index for non-randomized studies (MINORS) tool [62].

Data extraction: Data were extracted using a standardized form with pre-established criteria, including study details (author, year, type, and brand of prosthesis used), the number of surgeries performed, patient demographics, follow-up duration, associated pathology, clinical outcomes, complications, and failures. Additional information extracted included the journal, country of the study, study design, and follow-up period. Study population characteristics such as cohort size, sex, age, and body mass index (BMI) were also collected. Rehabilitation protocols, preoperative and postoperative activity levels, patient-reported outcomes (e.g., Tegner and UCLA scores), percentage and time to sports return, and factors influencing sports return were also recorded (e.g., preoperative sports level, surgeon recommendations, and psychosocial factors).

Statistical analysis: Descriptive statistics were used to summarize study characteristics and clinical outcomes, including means, ranges, and percentages where appropriate. No meta-analysis was conducted due to heterogeneity in study designs, outcome definitions, and reporting methods.

Bias analysis: Using the MINORS evaluation tool, the following scoring system was applied: <14, low quality; 15 to 22, moderate quality; and 23 to 24, high quality for comparative studies. For non-comparative studies, a score of <9 indicates low quality, that of 9 to 14 indicates moderate quality, and a score of 15 to 16 indicates good quality. Three of the seven studies were rated as low quality, while the remaining four were rated as moderate quality.

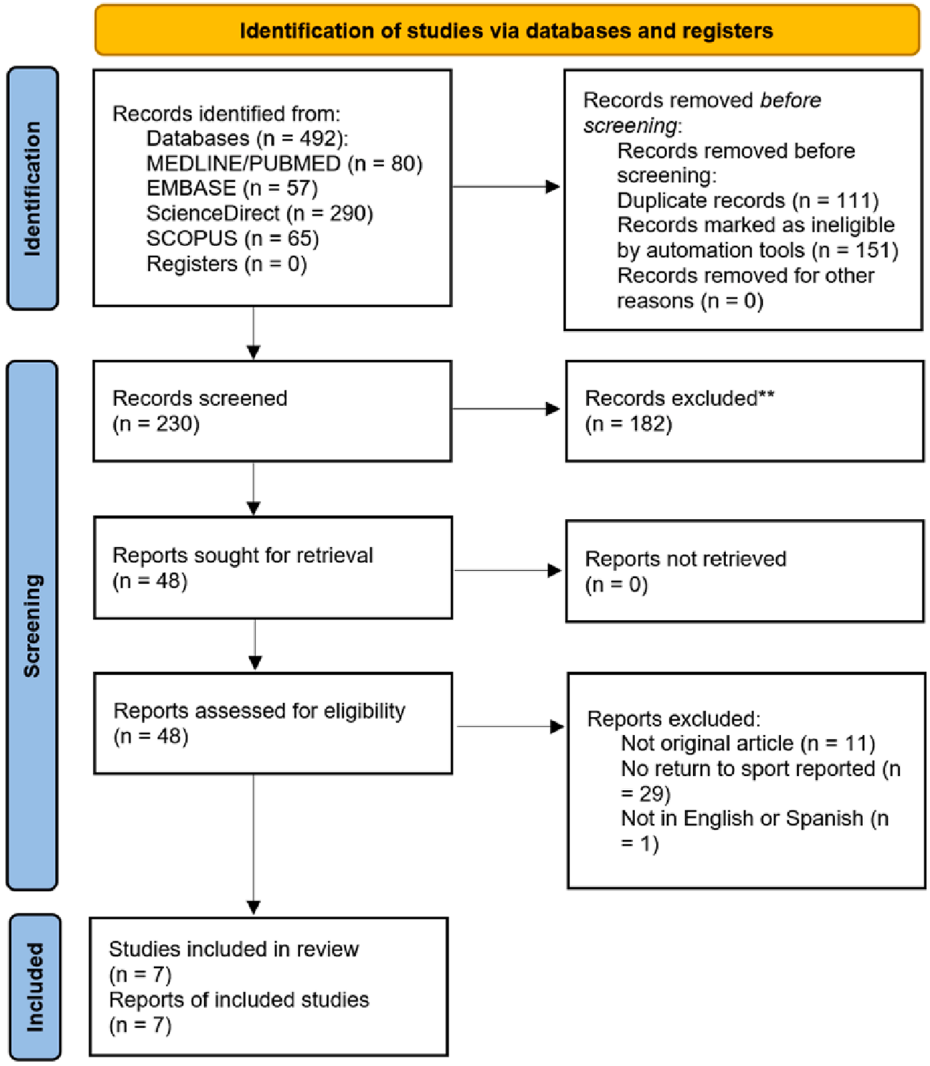

Fig. 1. PRISMA flow diagram. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

RESULTS

All seven included studies were observational; no interventional studies were identified. Two were cross-sectional, two were prospective cohort studies, and three were retrospective cohort studies. Although all studies provided information on post-PFA sports activities, the number, type, and reporting formats of outcomes varied widely. Due to this heterogeneity, data pooling and meta-analysis were not feasible, and a narrative synthesis approach was adopted.

The total number of patients across the studies was 265 (281 knees), with a mean age of 48.9 years (standard deviation [SD]: 10.42), ranging from 32.9 to 73.3 years. The average BMI ranged from 26.3 to 29.2 kg/m^2, with an overall range of 18.1 to 42.3 kg/m^2; however, BMI was clearly reported in only five studies. Among those that reported sex, 64.6% of patients were women (Table 1). Two studies provided information on comorbidities, either directly or via the Charlson Comorbidity Index. Three studies described rehabilitation protocols, generally recommending low-impact activities during the first three months postoperatively, with progression to higher-impact activities based on individual recovery. Definitions of RTS varied and are reported in conjunction with the percentage of RTS achieved by each study (Table 2). One study categorized activity impact levels as low (e.g., swimming, walking, and cycling), medium (e.g., downhill skiing, doubles tennis, and hiking), and high (e.g., soccer, basketball, and baseball).

Preoperative activity

Cozzarelli et al. reported that 77.3% of patients engaged in sports five years before surgery, decreasing to 61.4% in the year prior [24]. Of these, 45%, 20%, and 35% participated in high-, intermediate-, and low-impact activities, respectively. Dahm et al. reported low preoperative activity levels, with a Tegner score of 1.7 [33]. Noyes et al. found that 80% of patients engaged in low-impact sports before surgery [26]. Imhoff et al. reported preoperative sports participation at 58% [60]. Pogorzelski et al. noted that 81% of patients participated in recreational sports, while 18% were limited to daily activities [53]. Schneider et al. recorded a mean preoperative UCLA score of 4.87 (SD: 2.1) and a High-Activity Arthroplasty Score (HAAS) score of 7.9 (SD: 3.68), primarily in low- to moderate-intensity sports (Table 2) [14].

Postoperative activity

All studies demonstrated improvement in activity levels following PFA. Cozzarelli et al. reported that 64.7% of those active five years preoperatively resumed sports and that 50% were still active 4.6 years postoperatively [24]. Postoperative participation included 27.8% in high-impact, 33.3% in intermediate-impact, and 38.9% in low-impact sports. Time to RTS varied: 29.5% resumed activity within 1 to 3 months, 27.3% within 4 to 6 months, 11.4% after over a year,

Table-1
Summary of studies included in the revision.

Study	Number of patients (knees)	Type of study	Follow-up	Age	Gender	BMI (SD)	Implant-manufacturer and surgery characteristics	Surgical consideration reported	Rehabilitation protocol	MINORS score
Cozzarelli et al., 2024 [24]	44 (44)	Retrospective	55.2 months	58.55	32 women (72.7%)	32.75 (5.46)	Multiple cemented non-robotic implants. Eleven surgeons in a single institution	NR	NR	14
Dahm et al., 2010 [61]	23 (23)	Retrospective	29 months (24-49)	60 (39-81)	Not reported	NR	Avon patellofemoral prosthesis (Stryker Howmedica Osteonics, Mahwah, New Jersey). A single surgeon performed 21 of 23 PFAs.	Patella alta: 19 of 23 (83%). Dysplasia according to Dejour classification A: 6 (37.5%), B: 4 (25%), C: 5 (31.25%), and D: 1 (6.25%)	NR	17
Imhoff et al., 2015 [60]	29 (30)	Prospective	24 months	42 ± 13	14 women (48.3%)	28 (3)	HemiCAP wave patellofemoral resurfacing prosthesis (Arthrosurface, Franklin, MA, USA). Patellar resurfacing = 3 patients	Twenty isolated cases and 9 combination cases (patellofemoral and tibiofemoral malalignment or instability)	Patients performed partial weight-bearing with 20 kg for 2 weeks, with full range of motion allowed immediately. In cases of additional procedures, such as high tibial osteotomy or distal femoral osteotomy , partial weight-bearing was maintained for 6 weeks. After MPFL reconstruction or tibial tuberosity transfer, knee flexion was restricted to 90° for 6 weeks.	20
Noyes et al., 2024 [26]	45 (51)	Prospective	63.6 months (24-111,6); SD: 45.6	37.2 (21-50); SD: 7.5	32 women (72.7%)	NR	Mako partial knee patellofemoral (Mako Surgical corp; Stryker).	Concomitant soft tissue procedures: 31/51 (61%), Z-plasty lateral retinacular release (n = 28) for contracture, lateral allograft reconstruction for medial subluxation (n = 2), and MPFL reconstruction (n = 1)	Postoperative treatment included early mobilization and strengthening exercises, with a gradual return to activity over 6 to 9 months.	18
Pogorzelski et al., 2021 [53]	62 (62)	Retrospective	60 months; SD: 25	46; SD: 11	36 women (58.1%)	27 (5)	HemiCAP® wave patellofemoral resurfacing prosthesis (Arthrosurface, Franklin, MA, USA) The patella was resurfaced in cases of focal osteonecrosis or osteolysis with subchondral bone defects and severe patellar dysplasia. Patella resurfacing = 20 patients.	A lateral parapatellar approach was used as a standard approach. Concomitant procedures 18/62 (29%). Osteotomy of the tibial tubercle (*n* = 2). Isolated MPFL reconstruction (*n* = 5). Isolated DFO (*n* = 5). Combined osteotomy of the tibial tubercle and MPFL reconstruction (*n* = 4). Combined DFO and MPFL reconstruction (*n* = 1). Combined DFO, MPFL reconstruction, tibial tubercle (*n* = 1)	Partial weight-bearing of 20 kg was prescribed for 2 weeks, followed by a gradual increase in weight-bearing until full weight-bearing was achieved at 6 weeks. Continuous passive mobilization was performed during the first 2 weeks, with full range of motion allowed immediately after surgery.	14
Schneider et al., 2020 [14]	23 (23)	Retrospective	12-24 months	56 ± 9.1	20 women (87.0%)	29.2 (6.3)	NR	NR	A standardized postoperative rehabilitation program was implemented.	13

(continued on next page)

Table-1 (*continued*)

Study	Number of patients (knees)	Type of study	Follow-up	Age	Gender	BMI (SD)	Implant-manufacturer and surgery characteristics	Surgical consideration reported	Rehabilitation protocol	MINORS score
Shubin Stein et al., 2017 [23]	39 (48)	Retrospective	26 months	51.6; SD: 10.3	32 women (82.1%)	26.3 (6.3)	Two orthopedic surgeons (specialists in treating patellofemoral pathology) performed all surgeries	Primary osteoarthritis 36 (76.6%) Secondary to instability 11 (23.4%)	Progressive weight-bearing was initiated the day after surgery. Both passive and active mobilization were started within 24 h after surgery. Patients were discharged on postoperative day 2 after demonstrating the ability to ambulate with crutches and flex the knee to at least 90°.	12

Abbreviations: BMI = body mass index, SD = standard deviation, NR = not reported, MPFL = medial patellofemoral ligament.

and 25% did not return. In contrast, Noyes et al. found that 80% resumed low-impact sports and that 7% returned to high-intensity activities.

Dahm et al. reported significant improvements in Tegner scores (1.7-4.3) and UCLA scores (3.1– 6.6), with 87% participating in walking and 30% in cycling or swimming [33]. Pogorzelski et al. found that 94% of patients without surgical failure returned to the same or higher level of activity, with 74% reporting improved sports participation [53]. The average Tegner score was 4 (±1), and participation frequency increased to 2 (±1) sessions per week. Common sports included cycling (53%), fitness training (24%), hiking (16%), and swimming (15%).

Imhoff et al. observed an increase in the number of sports practiced per week from 1.0 (±0.7) to 1.9 (±1.5) and in session frequency from 1.6 to 2.9 [60]. At 24 months postoperatively, 89% of patients engaged in sports, up from 58% preoperatively. Schneider et al. and Shubin Stein et al. found that 56.5% and 72.2% of patients, respectively, returned to the same or higher level of impact [14,23]. RTS at equal or higher levels ranged from 52.8% to 76%, and overall RTS rates ranged from 64.7% to 91%.

Pain and functional outcomes

All included studies reported significant reductions in postoperative pain. Visual analog scale scores decreased from 6.3 to 2.7. One study analyzed limiting factors to RTS, and it reported that 38.6% of patients were limited by pain. Functional scores improved postoperatively, with consistent increases in Tegner, UCLA, and HAAS scales (Table 2).

Complications, reoperation, and TKA conversion rates

Only 3 studies reported the rate of conversion to TKA. Noyes et al. reported a 10% rate, Pogorzelski et al. reported 13%, and Shubin Stein et al. reported 6.3% (Table 1) [23,26,53]. Reoperation rates were reported between 10.4% and 25%, primarily due to mechanical complications.

DISCUSSION

Main findings

This systematic review underscores the potential of PFA to support RTS, particularly in low-impact activities. Reported RTS rates ranged from 64.7% to 91%, with most patients resuming non-strenuous sports. Participation in high-impact activities such as running or pivoting sports remained limited (7%-27.8%), and approximately one-quarter of patients did not return to their previous level of sport. Comparatively, a systematic review by Witjes et al. reported broader RTS ranges after total and unicompartmental knee arthroplasty (36%-100%), suggesting that PFA performs similarly within this spectrum [63]. Recent studies examining total hip and knee arthroplasties have shown no significant difference in implant survival at five years across varying activity levels, indicating a paradigm shift toward more permissive postoperative activity recommendations—even if these findings cannot yet be fully extrapolated to PFA [64].

The timeline for returning to sport following PFA is independent to each patient. While some patients (29.5%) resumed activity within 1 to 3 months, others required more than a year, and approximately 25% did not return to their prior sports. Low-impact activities remain a consistent and attainable goal for most patients, whereas high-demand sports are more difficult to achieve. Dagneaux et al. emphasize the importance of achieving specific functional milestones—such as full range of motion, adequate muscle strength, and restored proprioception—before attempting to RTS [65]. These recovery targets are generally attained between three and six months postoperatively, reinforcing the need for individualized rehabilitation timelines.

Functional outcomes

Postoperative improvements in functional capacity are consistently reflected in validated scales such as the Tegner Activity Scale, UCLA, and HAAS. While the degree of change varied, the overall trend supports enhanced physical performance following PFA—consistent with findings in prior literature [25,37,41,46–48,50,58,61,71].

None of the included studies used standardized testing to authorize RTS. Instead, decisions were based on clinical judgment and individualized progression. Rehabilitation protocols generally emphasized a staged approach, favoring low-impact activities (e.g., cycling and swimming) during the initial months, with cautious reintroduction of higher-impact sports around six months postoperatively—provided adequate strength, mobility, and pain control were achieved [36,42,56].

Pain, complications and reoperation rates

PFA is associated with significant reductions in postoperative pain, but a subset of patients continues to report pain-related limitations [24,39]. Persistent discomfort—affecting up to one-third of patients—may stem from multifactorial causes such as component malalignment, overstuffing, residual quadriceps weakness, or progression of tibiofemoral osteoarthritis and psychosocial factors. The etiology must be carefully addressed during patient selection and postoperative follow-up [66].

Table-2
Preoperative and postoperative activity levels.

Author	Definition on RTS	Preoperative activity	Postoperative activity	Outcomes	Complications
Cozzarelli et al. [24]	Patient engaging in sports or recreational activities that performed sports 5 years ago, RTS: 64.70%	77.3% (34/44) participated in sports 5 years before surgery, of them: 45% in high-impact sports. 20% in intermediate activities. 35% in low-impact activities.	64.7% (22/34) of patients who exercised 5 years before surgery returned to sports, with 50% practicing sports 4.6 years after surgery; of them: 27.8% in high-impact sports. 33.3% in intermediate activities. 38.9% in low-impact sports. The reported return to sport time is: Less than 1 month: (0) 0%, 1-3 months: (13) 29.5%, 4-6 months: (12) 27.3%, 7-12 months: (3) 6.8%. More than 1 year: (5) 11.4%. Unable to return: (11) 25%	KOOS-JR postop: 66.8 (55.05). SF-12 preop to postop: Mental: 38.75-53.05; physical 36.5-55.85.	None reported.
Dahm et al. [61]	Patients participate in sports or recreational activity levels at any level. RTS: 91%	Low scores on the Tegner scale, with an average of 1.7 for patients with PFA, indicating low participation in sports (walking, cycling, and swimming).	Significant improvements, with an increase in the Tegner scale to 4.3 and the UCLA scale to 6.6. The most common sports were walking, cycling, swimming, and hiking. Most common postoperative sports activities: 87% (20/23) take walks 30% (7/23) swim or do water aerobics 13% (3/23) running 30% (7/23) ride a bicycle. 13% (3/23) practice hiking 4% (1/23) practice dance 4% (1/23) camping	Tegner preop to postop: 1.7–4.3 (3-6). UCLA preop to postop: 3.1–6.6 (5–9). KSS preop to postop: 58-89 (range: 69-100). Functional KSS preop to postop: 42-84 (range: 51-100). Pain: preop: mild (4%), moderate (74%), and severe (22%); postop: none (35%), mild (43%), and moderate (22%).	No revision surgeries. 6 (32%) narcotic use. One transfusion.
Imhoff et al. [60]	Patients resume participation in sports or recreational activities. RTS: 89%	58% of patients participated in preoperative sports, with an average of 1.0 ± 0,7 sports practiced per week and frequency of 1.6 times per week. About 40% of patients did not participate in sports activities 1 year before surgery. About 20% participated in nordic walking, physical exercise, and cycling.	89% of patients participated in sports 24 months after surgery, with an increase in sports practiced to 1.9 ± 1.5 types per week, and frequency of 2.9 sessions per week. Patients who did not do sports decreased to 11% at 24 months of follow-up and over 40% did physical exercise and cycling.	Tegner preop to postop: 2 (1-3) to 3 (2-5). Postop WOMAC: 60.6 ± 17.9. IKDC preop to postop: 41.1 ± 12.9-58.4 ± 14.9. VAS preop to postop: 6.2 ± 2.0-3.1 ± 2.4.	None reported.
Noyes et al. [26]	Postoperative ability to engage in low-impact recreational sports or higher. RTS: 87%	78% (35/45 knees) of patients were symptomatic and unable to perform sports. 20% of patients (9/45 knees) practice low-impact sports.	80% (36/45 knees) of patients returned to low-impact sports postoperatively, while only 7% participated in more intense sports such as jumping or pivoting.	CKRS sports activity and symptom rating scales: 5.44 (1.21). SCB achieved in 87% of knees. PASS: 89% patients 'pleased'; 93% would have surgery again. Preop to postop VAS: 6.80-1.87. SF-12: physical: 44.04; mental: 53.08.	Conversion to TKA: 10% (5 cases). One infection (removal + PTR); 5 knees mobilized under anesthesia; 5 CRPS cases.
Pogorzelski et al. [53]	Achieved either the same or a higher level of sports activity compared with preoperative levels, considers patients that failed as not achieving RTS. RTS: 76%	81% (50/62) participated in sports before surgery, with 18% (12/62) participating in daily activities only. The most common sports were cycling (53%), fitness (24%), hiking (16%), and swimming (15%).	94% (58/62) of patients without surgical failures returned to the same or higher level of sports, with an improvement on the Tegner scale to 4 ± 1 and a frequency of 2 ± 1 sessions per week. If the patients who failed [14] are included, the overall return to sport is 76%. 74% (46/62) of patients reported a subjective improvement in their activity from participating in sports activities.	Tegner preop to postop: 3-4 (SD: 1). Postop WOMAC: 77 ± 19. Preop to postop VAS: 6 (SD: 2) to 3 (SD: 2). CKRS sports activity and symptom scales: NR.	Conversion to TKA: 13.04%.
Schneider et al. [14]	Patient's return to the same or higher level of performance RTS: 69.50%	The preoperative UCLA scale was 4.87 and HAAS was 7.9 for patients with PFA. The number of low impact	56.5% (13/23) returned to sports at the same or greater level of impact; 69.5% (16/23) resumed similar or higher levels of performance.	UCLA preop to postop: 4.87 ± 2.1-6.52 ± 2.4. HAAS preop to postop: 7.9 ± 3.68-11,00 ± 3.7. NRS	None reported.

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Table-2 (*continued*)

Author	Definition on RTS	Preoperative activity	Postoperative activity	Outcomes	Complications
		sports reported is 1.74 ± 1.5, moderate impact 0.69 ± 0.8 and high impact 0.56 ± 0.9.	The number of low impact sports reported is 1.91 ± 1.6, moderate impact 0.48 ± 0.7 and high impact 0.17 ± 0.5.	preop to postop: 66.59 ± 18.6-20.17 ± 21.1.	
Shubin Stein et al. [23]	Return to their previous preferred activity. RTS: 72.20%	Not reported	72.2% returned to their preferred sports activities, and 52.8% met or exceeded their presurgery physical activity level.	IKDC preop to postop: 36.5 [15,5] to 60.0 (19.1). Lysholm preop to postop: 44.8 (17.8) to 73.7 (14.7). Kujala preop to postop: 51.3 (18.3) to 70.8 (16.2). VAS preop to postop: 6.3-2.8.	Conversion to TKA: 6.3%. One pulmonary thromboembolism; 5 reoperations; 3 TKA conversions; 2 irrigation/debridement for suspected infection or hematoma.

Abbreviations: CI = confidence interval, PFA = patellofemoral arthroplasty, RTS = return to sports, TKA = total knee arthroplasty, ULCA = University of California at Los Angeles, BMI = body mass index, KOOS-Jr = Knee Injury and Osteoarthritis Outcome Score for Joint Replacement, HAAS = High-Activity Arthroplasty Score, VAS = visual analog scale, IKDC = International Knee Documentation Committee, WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index, SD = standard deviation, NR = not reported, NRS = Numeric rating scale, CKRS = Cincinnati Knee Rating System, SCB = substantial clinical benefit, SF-12 = short form 12, PASS = Patient Acceptable Symptom State, KSS = Knee Society Score, CRPS = complex regional pain syndrome.
This study was not prospectively registered.

The conversion rate to TKA reported in these studies ranged from 6.3% to 13%, with the progression of tibiofemoral osteoarthritis being the primary cause, as found in other studies [27,28,30,31,35,67]. The overall reoperation rates are higher, ranging from 10.4% to 25%, with common indications including persistent pain, instability, malalignment, or postoperative complications such as infections or mechanical issues with implants, like mentioned in previous reports, [49,56,57,68]. Assessing the relationship between PFA survival or revision rates and the level of physical activity performed remains challenging as there is no consistent stratification of outcomes and complications. Future research with standardized activity metrics and prospective designs is necessary to clarify this subject.

A meta-analysis of PFA complications identified mechanical issues—such as loosening and instability—as the most frequent cause of failure, with a reported reoperation rate of 21%, significantly higher than the 2% seen after primary TKA [69]. Another meta-analysis found that progression of osteoarthritis was the leading cause of PFA failure (42%), followed by persistent pain (16%), both of which may limit return to higher levels of activity [13,70]. Registry data further suggest that patients undergoing primary TKA following failed PFA face an increased risk of re-revision compared to those undergoing revision of a primary TKA [71] These findings must be interpreted cautiously due to the presence of confounding factors and the under-reporting of key surgical variables. Failures involving the extensor mechanism are associated with worse outcomes and should not be underestimated [72]. Additionally, revision of partial knee arthroplasty is generally less technically demanding than revision of TKA, which introduces a degree of selection bias that may affect the interpretation of comparative revision outcomes [73,74].

LIMITATIONS

Studies included in the review were of low to moderate quality, which affects the systematic review's strength. Many studies did not adequately adjust for key variables such as preoperative fitness, adherence to rehabilitation, and comorbidities, which could significantly affect the outcomes in sports participation.

There was notable variability in how postoperative sports activity was measured across studies, with no clear definition or separation from sports and recreational activities, or impact level. Different scales or non-standardized questionnaires were used, and follow-up was heterogenous, making comparison difficult. The included studies lacked objective criteria for allowing RTS and had small sample sizes or short follow-up durations.

These limitations hinder the ability to compare and determine the true impact of PFA on sports reintegration. Additionally, studies were mostly conducted in developed countries, limiting applicability to other populations. This study was not prospectively registered.

Clinical implications

Historically, patients undergoing arthroplasty were advised to engage only in low-demand activities, while high-impact sports were discouraged [75]. Current literature and the findings of this review suggest that such restrictive recommendations may lack a strong evidence base. Many patients can resume sports activities after PFA, with outcomes comparable to those reported following unicompartmental knee arthroplasty and TKA [76–80]. Variability in reported outcomes and the absence of standardized measures for physical activity complicate cross-study comparisons, highlighting the need for a more personalized approach to postoperative activity recommendations.

Several studies indicate that patients commonly return to low-impact activities such as walking, cycling, and swimming, whereas return to high-impact sports remains less frequent. As described in the literature, RTS following joint arthroplasty is influenced by multiple individual factors, including preoperative lifestyle, motivation, and personal goals [63,81]. These elements should be considered by orthopedic surgeons during both preoperative counseling and postoperative guidance as meeting patient expectations is closely tied to satisfaction [82].

PFA is a viable option for patients with isolated patellofemoral osteoarthritis who wish to maintain an active lifestyle postoperatively. This is particularly relevant for individuals who meet appropriate surgical criteria and prefer PFA over TKA, which may offer similar outcomes [25] The role and validity of sport-specific return-to-activity assessments in this subgroup remain uncertain and warrant further investigation [83].

CONCLUSIONS

After PFA, patients can expect return to sports or recreational activities rates ranging from 64.7% to 91% with a decrease in pain, which should be actively addressed to improve outcomes. Sports return should be personalized, and managing postoperative expectations is key to achieving success. Nevertheless, there is lacking high-quality evidence regarding the impact of activity on PFA survival and standardized RTS definition for outcome reporting is required.

ARTICLE SUMMARY

Patellofemoral arthroplasty shows heterogenous results with return to sports ranging from 64.7% to 91%, with a vast majority able to return to low-impact sports; it reduces pain, but some patients still experience it, and it limits them; reoperation and revision rates remain notable. #Orthopaedics #PFA.

Author contributions

J.A., D.F., and G.D. contributed to the conception and design of the study. J.A., E.P., and F.M. contributed to the acquisition of data, or analysis and interpretation of data. All authors contributed to drafting the article or revising it critically for important intellectual content. All authors gave approval for submission.

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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.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jisako.2025.100925.

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