Evidence in focus

Compendium of peer-reviewed clinical evidence

JOURNEY◊ II
Total Knee Arthroplasty

June 2022

Smith+Nephew

JOURNEY◊ II TKA Compendium of Evidence

What are the issues with conventional TKA?

Kinematics and satisfaction – how do they relate?

Why choose JOURNEY II TKA for your patients?

Key evidence

Di Benedetto, et al. 2019
JOURNEY II CR vs Attune™ CR

Grieco, et al. 2018
JOURNEY II BCS Kinematics

Iriuchishima, et al. 2018
JOURNEY II BCS vs UKA

Nodzo, et al. 2018
JOURNEY II BCS vs LEGION® PS

Smith, et al. 2021
JOURNEY II CR/XR◊ Kinematics

Snyder, et al. 2019
JOURNEY II BCS vs THA

Key outcomes

Function

Recovery

Patient satisfaction

Survivorship

All studies

View all

51 studies

6,910 knees

PDF navigation tips

Interactivity has been included throughout the compendium to aid navigation

will take you to this slide

will take you to a summary of each outcome

will take you to a grid summary of the 51 peer-reviewed studies highlighted in this compendium. Key evidence is represented in **blue** and supporting evidence in **turquoise**.

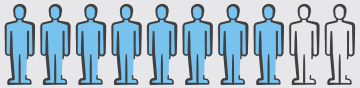
Full summary — will take you to the Evidence in Focus full summary of the relevant study

Published paper — will take you to the official online journal website on which the original paper is published

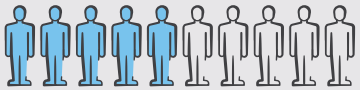
Arrows at the bottom of each page will take you to previous or subsequent pages, as indicated

What are the issues with conventional TKA?

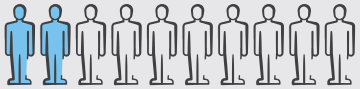
A “Forgotten Joint” is the desired goal for both patients and surgeons following TKA. However, the majority of patients do not obtain a normal feeling knee post-TKA with high numbers of patients experiencing reduced function and dissatisfaction:



80% patients feel that their joint is artificial[1]



>50% patients report a degree of functional limitation[1,2]

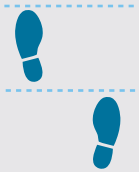


20% patients are dissatisfied[3]

Studies show that following conventional TKA, patients demonstrate abnormalities in their gait and functional kinematics of the knee:[4–8]

Velocity

Stride length



Flexion during walking

Quadricep muscle strength following conventional TKA fails to recover to the same level as those of healthy subjects, resulting in reduced physical functioning of the knee[9,10]

Conventional TKAs have been successful in their aim to relieve pain and provide long term survivorship.[11,12] However, conventional TKAs do not live up to all patients functional expectations,[2] leaving a high percentage feeling dissatisfied.[3]

Kinematics and patient satisfaction - how do they relate? →

Kinematics and patient satisfaction — how do they relate?

Fluoroscopic analysis of weight-bearing motion has led to a better understanding of TKA kinematics. During flexion, TKA kinematic patterns can vary considerably from the normal knee.[13]

Paradoxical motion (Figure), where there is a sudden anterior translation of the femur relative to the tibia, has been observed in many studies and is related to reduced knee flexion and quadriceps efficiency.[13]

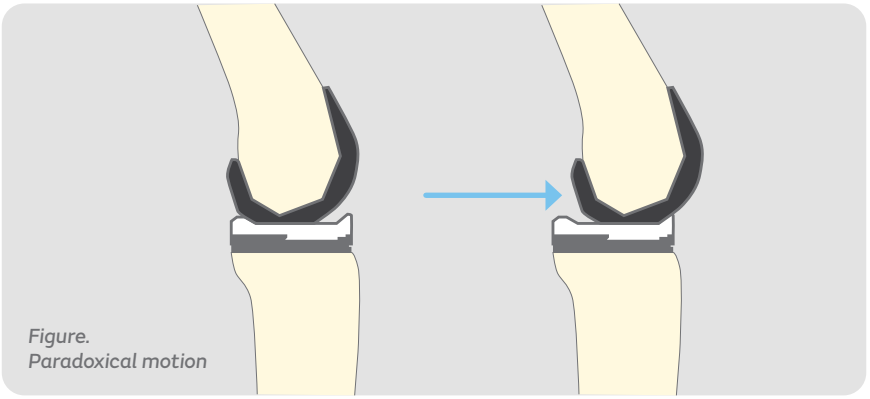


Figure.
Paradoxical motion

An implant designed to better replicate the shape and position of the normal knee could improve knee function and subsequently patient satisfaction.

For the first time, a relationship between kinematic patterns of TKA and patient satisfaction has been demonstrated.[14,15]

Kinematic patterns for one weight-bearing and one non-weight-bearing motion were analysed for JOURNEY II BCS and two posterior-stabilised TKAs. Whilst no differences were observed during non-weight bearing activity, during weight-bearing motion, poor patient-reported outcomes were associated with:[14]

- Pronounced paradoxical anterior motion (medial side)
- Less stable medial compartment in midflexion
- Less posterior translation in deep flexion (lateral side)

"Reproduction of optimal kinematic patterns during TKA could be instrumental in improving patient satisfaction."[14]

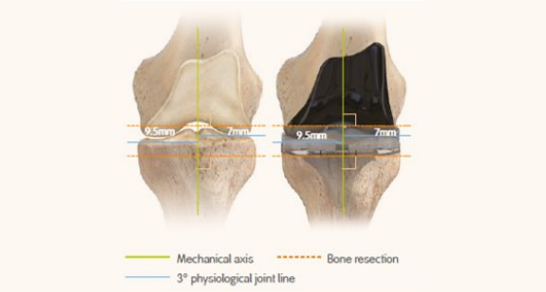
Why choose JOURNEY II TKA for your patients?

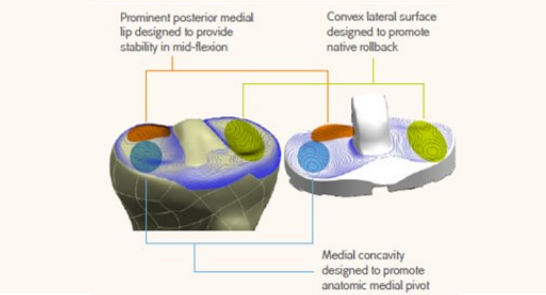
Shape | **Position** | **Motion**

Unlike conventional TKA design, the shape and position of the JOURNEY II TKA have been designed to replicate the normal knee

Shape[16–19]

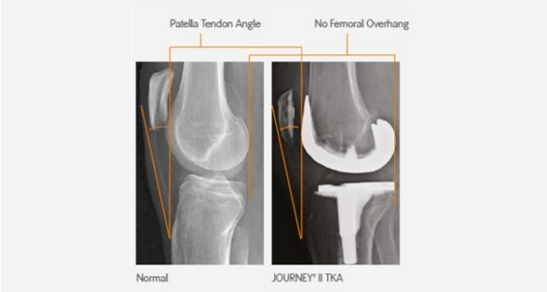
Replication of anatomic asymmetric femoral and tibial profiles





Position[16,19,20]

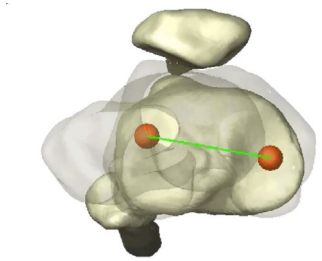
Restoration of native anterior/posterior (A/P) starting position and the anatomic 3˚ varus joint line



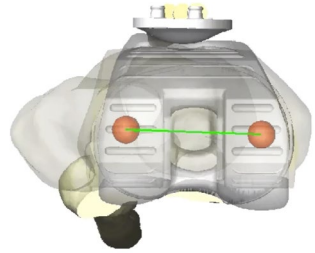
Motion[16–18,20–23]

Replication of native femoral rollback and axial rotation

Normal knee



JOURNEY II TKA knee



Why choose JOURNEY II TKA for your patients?

Improved function

JOURNEY II TKA has demonstrated better kinematics,[16,17,24,25] ROM[26–29] and gait[24,30] compared to conventional TKAs.

Read more →

Higher patient satisfaction*

JOURNEY II TKA has demonstrated improvements in patient-reported outcome measures post-TKA,[26,29,33–37] compared to pre-TKA.

Read more →

Smoother recovery*†

JOURNEY II TKA has been shown to result in speedier recovery[29,31,32] and improved muscle activation and muscle strength in the early recovery period,[24,30] compared to conventional implants.

Read more →

High survivorship

JOURNEY II TKA has shown favourable survivorship outcomes, with high early[35,38] and mid-term[39,40] survivorship.

Read more →

*Compared to non-JOURNEY II knees. †As observed in JOURNEY II BCS and JOURNEY II CR.

Key outcome: **Improved function**

43 studies

Postoperative ROM is one of the most important factors influencing patient satisfaction following TKA, as a full ROM is critical for a patient to perform daily activities.[41]

JOURNEY II TKA has demonstrated better kinematics,[17,24,25] ROM[26–29] and gait[24,30] compared to conventional TKAs.

Improved knee flexion[24,27–29]

Post-TKA:

3 months

Significantly improved knee flexion during walking (p<0.01) with JOURNEY II CR compared to Attune™ CR*.[24]

A significantly increased mean ROM with JOURNEY II BCS compared to conventional PS TKAs:

1 year

- +6° (p=0.04)[27]
- +6° (p=0.002)[28]
- +23° (p<0.001)[29]

Improved gait[24,30] and stair climbing[42]

Post-TKA:

3 months

Significantly greater increase in external rotation whilst walking with JOURNEY II CR compared to Attune™ CR* TKA (p<0.01).[24]

6 months

Significant improvements in gait with JOURNEY II BCS compared to LEGION◊ PS TKA (p=0.03).[30]

1 year

Significantly more patients able to climb stairs with JOURNEY II BCS compared to LEGION PS TKA (p<0.05).[42]

Better kinematic outcomes[16,17]

*Compared to the **normal knee** after* 1 year *post-TKA:*

A similar axial rotation in early and late flexion with JOURNEY II BCS[16]

A similar AP translation and axial rotation in mid flexion with JOURNEY II XR◊[17]

*Manufactured by DePuy Synthes Orthopaedics, Warsaw, IN, USA.

Key outcome: **Smoother recovery**

16 studies

Pain relief, function and return to activities are some of the most common patient expectations post-TKA.[2]

JOURNEY II TKA* has been shown to result in speedier recovery[29,31,32] and improved muscle activation and muscle strength in the early recovery period,[24,30] compared to conventional implants.

Improved quadricep activation and strength[24,30]

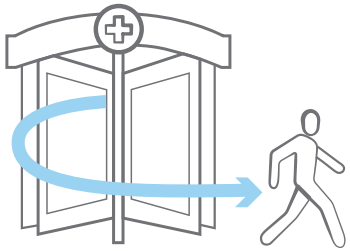
Improved muscle activation and **muscle strength** in the early recovery period with JOURNEY II BCS and JOURNEY II CR, compared to LEGION◊ PS TKA and Attune™† CR, respectively.[24,30]

Improving quadriceps function is important for limiting post-TKA functional deficits[9]

Speedier recovery[31,32]

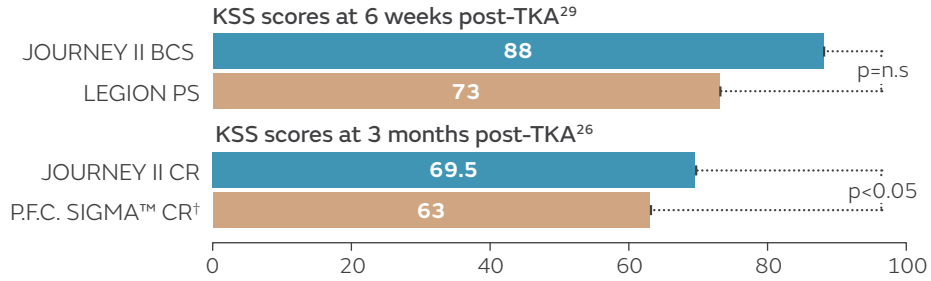
Compared with patients receiving conventional TKA, JOURNEY II TKA patients are:

- More likely to be discharged home (p<0.001)[31]
- Discharged from hospital sooner (p<0.0001)[32]



Higher function outcome measures[26,29]

Compared to conventional TKA patients, JOURNEY II TKA patients have demonstrated **higher scores** in functional outcome measures at 6 and 12 weeks post-TKA:[26,29]



Similar levels of patient satisfaction and patient-reported outcomes between JOURNEY II BCS and THA patients at 3 months post-op[33]

*As observed in JOURNEY II BCS and JOURNEY II CR. †Manufactured by DePuy Synthes Orthopaedics, Warsaw, IN, USA.

Key outcome: Higher patient satisfaction

17 studies

The primary determinant of patient satisfaction is the fulfilment of patient expectations, of which pain relief, improved knee function and return to sports are the most common.[2]

JOURNEY II TKA has demonstrated improvements in patient-reported outcome measures post-TKA,[26,29,33–37] compared to pre-TKA.

Improved WOMAC scores[26]

Significant reductions in WOMAC scores with JOURNEY II CR compared to P.F.C. Sigma™ CR* at 6 (p=0.018) and 12 months (p=0.008) post-TKA.[26]

WOMAC scores[43], KSS[75], and KOOS[76] directly correlate to patient satisfaction

Quality of life[33]

Patients receiving JOURNEY II BCS have reported **similar levels of satisfaction as those receiving THA** at 3 months and 1 year post-op, with no significant differences in patient quality of life.[33]

Return to work and sports[33]

One study reported a **2 month** **median time to return to work, activities of daily living and sporting activities[33]**

Better KSS[25,26,29,36] and KOOS[35]

Significantly better KSS outcomes with:

- JOURNEY II CR compared to P.F.C. Sigma™ CR* at 3, 6, and 24 months post-TKA (p<0.05) and at 12 months post-TKA (p<0.001)[26]
- JOURNEY II BCS compared to Persona™† PS TKA (p<0.05)[25] and to LEGION◊ PS TKA (p<0.001)[29] at 12 months post-TKA
- JOURNEY II BCS at 24 months post-TKA compared to pre-TKA (p<0.01)[36]

Significantly higher KOOS with JOURNEY II XR◊ compared to pre-TKA scores at 6 weeks, 3 months, 6 months and 12-months post-TKA (p<0.05).[35]

Improving patient satisfaction is important for maintaining quality of care and patient loyalty which is linked to reimbursement to payors and healthcare providers[44,45]

*Manufactured by DePuy Synthes Orthopaedics, Warsaw, IN, USA. †Manufactured by Zimmer Biomet, Warsaw, Indiana, USA.

Key outcome: **High survivorship**

6 studies

Revision TKA is a technically challenging procedure and is associated with a high risk of complications.[46]

Studies on survivorship of JOURNEY II BCS, JOURNEY II CR and JOURNEY II XR◊ have shown favourable survivorship outcomes, with high early[35,38] and mid-term[39,40] survivorship.

High early survivorship

Early results from prospective studies on both JOURNEY II CR (n=174)[38] and JOURNEY II XR (n=165)[35] have demonstrated a low risk of revision:

<1.2% Risk of revision at 1 year[35,38]

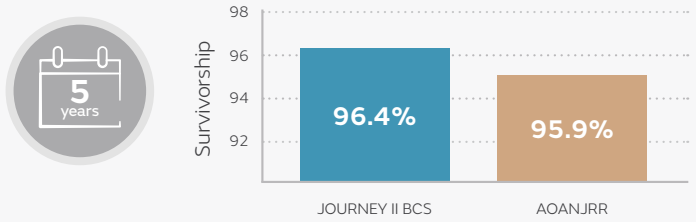
Revision TKA poses significant economic costs to the healthcare industry.[46]

$75,000
Average estimated US cost of revision TKA[47]

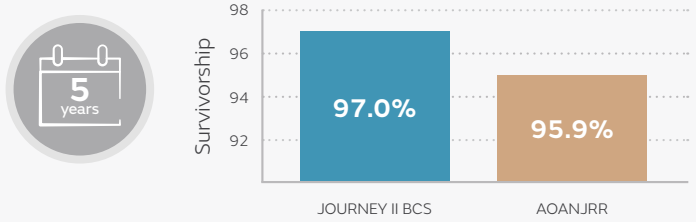
High mid-term survivorship

JOURNEY II BCS has demonstrated high mid-term survivorship*, comparable to AOANJRR cemented PS TKA control:[39,40]

Retrospective, international study of **2,059** JOURNEY II BCS TKAs[39]



Prospective, multicentre, US study of **209** JOURNEY II BCS TKAs[40]



JOURNEY II BCS resulted in:

<1% major revisions, lower than registry control[39,40] and a lower revision rate in <55 year olds compared to registry control (3 vs 7%)[39]

*Kaplan-Meier (K-M) approach was used to obtain estimates of implant survival.

Pre-operative and post-operative kinematic analysis in total knee arthroplasty. A pilot study[24]

Di Benedetto P, Vidi D, Colombo A, Buttironi MM, Cainero V, Causero A. *Acta Biomed.* 2019;90:91–97

Independent pilot study of:

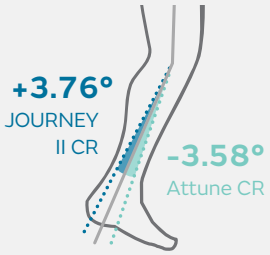
12 JOURNEY II CR	14 Attune™ CR*
Mean age: 70.3 years	Mean age: 71.8 years
Follow up: **3 months**	

Assessed:

Kinematics were assessed at flexion-extension internal-external rotation and abduction-adduction	✓
Muscle strength and activation using electromyography	✓
KSS	✓
KOOS	✓

Results

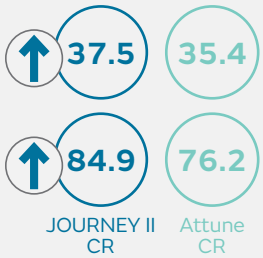
Compared to Attune™ CR* at 3 months post-TKA, JOURNEY II CR patients demonstrated:



Significantly improved knee flexion during walking compared to pre-TKA (p<0.01)

Significantly improved external rotation during walking compared to pre-TKA (p<0.01)

Better muscle activation timing, comparable to the physiological knee



A numerically higher KSS satisfaction score (maximum score: 40)

A numerically higher KOOS quality of life score (maximum score: 100)

Conclusion

JOURNEY II CR patients experienced significantly better flexion, external rotation and muscle strength during walking at 3 months post-TKA compared to Attune™ CR* TKA. In addition, JOURNEY II CR patients demonstrated physiological activation timing of most muscles.

*Manufactured by DePuy Synthes Orthopaedics, Warsaw, IN, USA.

Full summary | Published paper

BCS

In vivo kinematic comparison of a bicruciate stabilized total knee arthroplasty and the normal knee using fluoroscopy[16]

Grieco TF, Sharma A, Dessinger GM, Cates HE, Komistek RD. *J Arthroplasty.* 2018;33:565–571

Retrospective, single-surgeon study of:

40 JOURNEY II BCS	10 normal knees
Mean age: 69.8 years	Mean age: 57.4 years

Mean follow up: **14.3 months**

Assessed:

Kinematics assessed during a weight-bearing deep knee bend at 30° increments from full extension to 120° of knee flexion to determine whether the dual cam-post mechanism is able to replicate the cruciate ligament (ACL and PCL) function ✓

Results

0–30°

JOURNEY II BCS subjects exhibited similar patterns of femoral rollback and axial rotation compared with normal knee subjects

30–60°

JOURNEY II BCS subjects experienced minimal anterior-posterior motions and axial rotation, whereas normal knees continued to roll back and externally rotate

60–90°

JOURNEY II BCS resumed posterior motion with axial rotation increasing in a normal-like fashion after 90˚

Conclusion

JOURNEY II BCS exhibited normal-like kinematic patterns and moved as designed under in vivo observation. Similarities in early and late kinematic patterns between the two groups suggest the dual cam-post design and asymmetric articular geometries of the JOURNEY II BCS adequately replicate ACL and PCL function of the normal knee.

Full summary | Published paper

BCS

A comparison of rollback ratio between bicruciate substituting total knee arthroplasty and Oxford unicompartmental knee arthroplasty[21]

Iriuchishima T and Ryu K. *J Knee Surg*. 2018;31:568–572

Retrospective, single-surgeon study of:

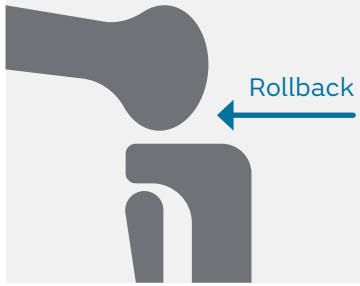
64 JOURNEY II BCS	50 Oxford™ Partial Knee*	50 normal knees
Mean age: 71.3 years	Mean age: 73.8 years	N/A

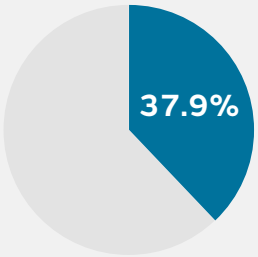
Follow up: **6–9 months**

Assessed:

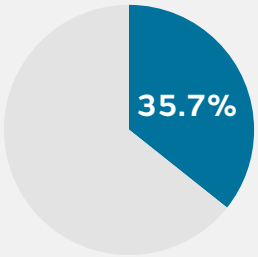
When subjects had recovered their range of knee flexion (6–9 months post-op), lateral radiographs in active flexion were taken to measure rollback ratio and flexion angle

Results

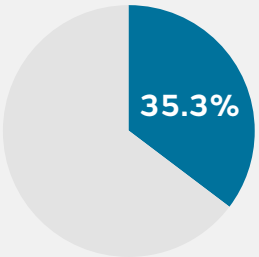




JOURNEY II BCS



Oxford™ UKA*



Normal knee

No significant difference in rollback ratio and no significant difference in knee flexion angle among the three groups

A significant correlation between rollback ratio and knee flexion angle among the three groups (p=0.002)

Conclusion

JOURNEY II BCS showed no significant difference in rollback ratio when compared with UKA or asymptomatic control knees. The results suggest that JOURNEY II BCS reproduces native anterior and posterior cruciate function and native knee rollback.

Full summary | Published paper

*Manufactured by Zimmer Biomet, Warsaw, Indiana, USA.

BCS

The bicruciate substituting knee design and initial experience[29]

Nodzo SR, Carroll KM, Mayman DJ. *Tech Orthop.* 2018;33:37–41

Retrospective, single-surgeon, study of:

100 JOURNEY II BCS | 100 LEGION◊ Total Knee System

Mean age: 51.0 years

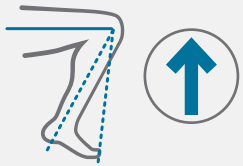
Mean follow up: **1 year**

Assessed at pre-TKA and 6 weeks and 1 year post-TKA:

ROM	✓
KSS	✓

Results

JOURNEY II BCS patients, compared to PS TKA patients, demonstrated:



Significantly greater mean ROM at 1 year post-TKA (119° vs 96°; p<0.0001)

Numerically higher mean KSS score at 6 weeks post-TKA (88 vs 73)

Significantly higher mean KSS scores at 1 year post-TKA (89 vs 81; p<0.001)

Conclusion

JOURNEY II BCS led to significant improvements in ROM and patient-reported outcomes at 1 year post-TKA, compared with standard PS TKA. The authors noted that the results suggest that the more anatomic design of the implant, which is intended to replicate a more normal knee position and kinematic patterns, may be responsible for the improved flexion and patient satisfaction in JOURNEY II BCS patients.

Full summary | Published paper

In vivo knee kinematics: how important are the roles of femoral geometry and the cruciate ligaments?[17]

Smith LA, Nachtrab J, LaCour M, Cates H, Freeman MG, Komistek RD. *J Arthroplasty.* 2021;36:1445–1454

Kinematic study of:

40 JOURNEY II CR	10 JOURNEY II XR◊	10 normal knees
Mean age: 68.8 years	Mean age: 62.3 years	Mean age: 57.4 years

Mean follow up: **24.8 months (JOURNEY II CR)** and **16 months (JOURNEY II XR)**

Assessed:

Kinematics were measured at full extension and at 30° increments to full flexion, during a weight-bearing deep knee bend ✓

Results

Early flexion
0–30°

JOURNEY II XR demonstrated a similar magnitude of posterior femoral rollback (PFR) to normal knees

Mid flexion
30–60°

JOURNEY II XR demonstrated similar anterior-posterior translation or axial rotation compared to normal knees

Deeper flexion
60–90°

Late flexion
90°+

No significant difference with JOURNEY II XR or CR in anterior-posterior translation compared to normal knees

Conclusion

In early and mid flexion, JOURNEY II XR patients experienced more normal-like kinematic patterns compared to JOURNEY II CR patients, demonstrating the role of of ACL retention and subtle changes in femoral geometry in kinematic outcomes. However, the authors stated that JOURNEY II CR subjects achieved increased amounts of lateral condyle PFR and axial rotation compared to previously studied CR TKAs.

Full summary | Published paper

BCS

A comparison of patient reported outcomes between total knee arthroplasty patients receiving the JOURNEY II bi-cruciate stabilizing knee system and total hip arthroplasty patients[33]

Snyder MA, Sympson A, Gregg J, Levit A. *Orthop Trauma Prosth.* 2018;3:5–10

Retrospective review of clinically matched data from a regional US total joint registry (Cincinnati, Ohio):

48 JOURNEY II BCS	48 THA
Mean age: 58.3 years	Mean age: 55.9 years

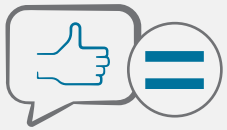
Mean follow up: **1 year**

Assessed at 3 months and 1 year post-op:

- Patient satisfaction ✓
- UCLA activity scores ✓
- EQ-5D-5L ✓

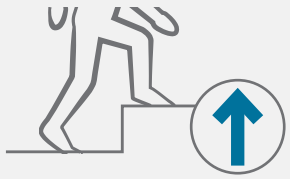
Results

JOURNEY II BCS patients, compared to THA patients, reported:



No significant difference in overall satisfaction at 3 months (p=0.398) or 1 year (p=0.590)

Significantly greater median UCLA activity scores at 3 months (8 vs 7; p=0.028) and 1 year (8 vs 7; p<0.001; maximum score: 10)



Significantly greater median EQ-5D-5L scores at 3 months (90 vs 80; p<0.001; maximum score: 100); no significant difference at 1 year

Conclusion

JOURNEY II BCS TKA patients reported similar levels of satisfaction and patient reported outcomes as THA patients at 3 months and 1 year post-op. The kinematic design advancements of JOURNEY II BCS demonstrate improvements in patient satisfaction following TKA compared to past TKA procedures, via comparison with THAs.

Full summary | Published paper

XR BCS

Anatomical bi-cruciate retaining TKA improves gait ability earlier than bi-cruciate stabilized TKA based on triaxial accelerometery data: a prospective cohort study[48]

Amemiya K, Kaneko T, Omata M, Igarashi T, Takada K, Ikegami H, Musha Y. *AP-SMART.* 2021;25:35–41

Independent, single-surgeon, prospective study of:

10 JOURNEY II XR◊	15 JOURNEY II BCS
Mean age: 75.0 years	Mean age: 74.4 years

Follow up: **1.5–3 months**

Assessed at pre-TKA and at 6 weeks and 3 months post-TKA:

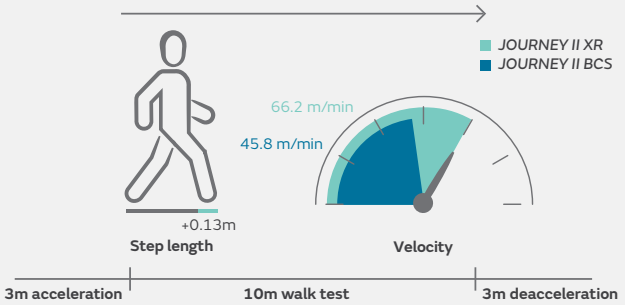
Walking time, number of steps, walking cycle time, coefficients of variability (CV) of double leg support time, gait velocity and stride length during a 10m walk test ✓

Results

JOURNEY II XR patients, compared to JOURNEY II BCS patients, experienced:

Significantly improved gait ability at 6 weeks post-TKA (p<0.05), with a significant reduction in walking time (9.2 vs 13.7s; p=0.01) and in number of steps (18.1 vs 23.6; p=0.02)

Significantly greater improvement in gait stability from pre-TKA to 6 weeks post-TKA (-27.2 vs 85.8; p=0.04)



Significantly greater velocity (66.2 vs 45.8m/min; p=0.01) and stride length (56.2 vs 43.2cm; p=0.01)

Conclusion

JOURNEY II XR patients experienced significantly improved gait ability compared to JOURNEY II BCS at 6 weeks post-TKA, with a significant improvement in gait stability compared to pre-TKA.

Full summary | Published paper

BCS

Midterm performance of a guided-motion bicruciate-stabilized total knee system: results from the international study of over 2000 consecutive primary total knee arthroplasties[39]

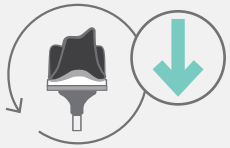
Harris AI, Christen B, Malcorps JJ, O'Grady CP, Kopjar B, Sensiba PR, Vandenneucker H, Huang BK, Cates HE, Hur J, Marra DA. *J Arthroplasty.* 2019;34:S201–S208

Retrospective, multicentre, international case series study of:	**Assessed at last follow-up:**
2,059 JOURNEY II BCS Mean age, 64.3 years	Survivorship compared to all other PS cemented TKA in the AOANJRR ✓
Mean follow up: **3.87 years**	

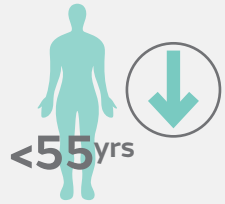
Results

At 5 years, JOURNEY II BCS, compared to the AOANJRR control, resulted in:

Similar high survivorship rate (96.4 vs 95.9%)



Lower percentage of major revisions, accounting for <1% of JOURNEY II BCS TKAs and defined as all revisions involving tibial and/or femoral component removal (29.9 vs 41.6%)



Lower revision rate in patients <55 year olds (3 vs 7%)

Conclusion

The JOURNEY II BCS knee system performs favourably when compared to PS TKA control from the AOANJRR, particularly in patients <55 years of age. At up to 6.1 years post TKA, less than 1% of all JOURNEY II BCS TKAs required major revision.

Full summary | Published paper

BCS

Gait analysis comparing kinematic, kinetic, and muscle activation data of modern and conventional total knee arthroplasty[30]

Hyodo K, Kanamori A, Kadone H, Takahashi T, Kajiwara M, Yamazaki M. *Arthroplast Today.* 2020;6:338–342

A retrospective analysis of:

12 JOURNEY II BCS TKA	12 LEGION◊ TKA
Mean age: 69.4 years	Mean age: 70.0 years

Mean length of study: **6 months**

Assessed at 6 months post-TKA:

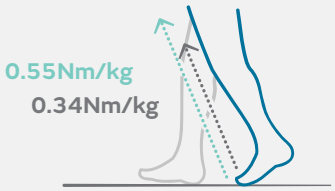
Gait and motion capture analysis with a force plate and electromyogram of the lower limb muscles

Results

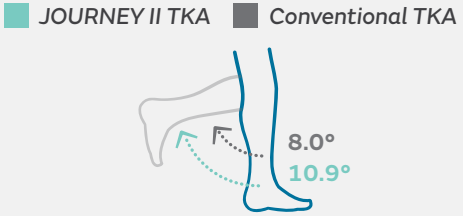
JOURNEY II BCS TKA, compared to conventional TKA, demonstrated:

Significantly longer step length (p=0.03)

Significantly faster gait speed (p=0.03)



Significantly greater maximum knee extension moment (p=0.04)



Significantly greater maximum knee flexion angle during initial stance phase (p=0.04)

Conclusion

JOURNEY II BCS patients demonstrate faster gait speed, longer step length and greater knee extension moment, compared to conventional PS TKA. This suggests that the quadriceps muscles are more effectively activated and that anterior stability function of the anterior cruciate ligament can be achieved with JOURNEY II BCS TKA compared to conventional PS TKA.

Full summary | Published paper

XR

In vivo kinematics of bicruciate-retaining total knee arthroplasty with anatomical articular surface under high-flexion conditions[49]

Kono K, Inui H, Tomita T, Yamazaki T, Taketomi S, Tanaka S. *J Knee Surg.* 2021;34:452–459

A single-center case series of:

17 JOURNEY II XR◊
Mean age: 72.0 years

Mean length of study: **7.6 months**

Assessed:

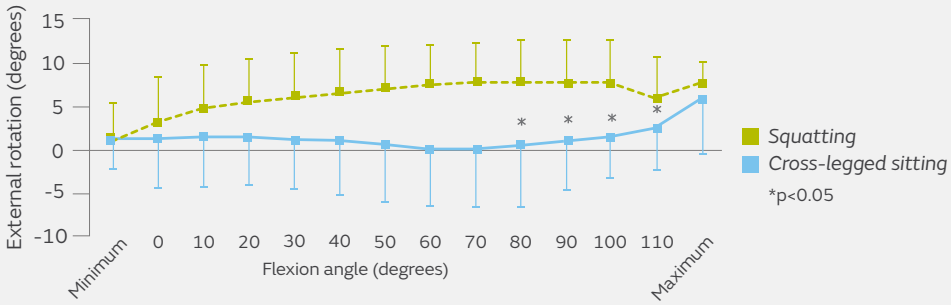
In vivo kinematics during high-flexion activities	✓
Fluoroscopy during squatting and cross-legged sitting motions, starting with legs fully extended	✓

Results

JOURNEY II XR kinematics were similar to the normal knee:

During cross-legged sitting: slight femoral internal rotation from early- flexion to mid-flexion, followed by femoral external rotation beyond mid- flexion

Significantly larger external rotation from 80 to 110° of flexion during squatting compared to cross-legged sitting ($p<0.05$)



Conclusion

JOURNEY II XR patients exhibited kinematics which were consistent with those reported in the literature for normal knees and which differed depending on high-flexion activity.

Full summary | Published paper

CR

Comparison of functional outcomes following total knee arthroplasty with a conventional implant design or one designed to mimic natural knee kinematics[26]

Lutes W and Fitch D. Presented at: 39th SICOT Orthopaedic World Congress; 2018; Montreal, Canada

Retrospective, single-surgeon study of:

52 JOURNEY II CR	60 P.F.C. Sigma™ CR*
Mean age: 67.3 years	Mean age: 70.2 years
Mean follow up: **2 years**	

Assessed at 3, 6, 12 and 24 months post-TKA:

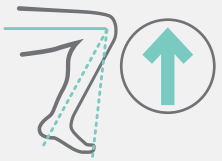
KSS	✓
WOMAC scores	✓
ROM (only assessed up to 12 months)	✓

Results:

JOURNEY II CR patients, compared to P.F.C. Sigma™ CR* patients, reported:

Significantly greater KSS scores at 3 (69.5 vs 63.0), 6 (84.4 vs 70.1), 12 (93.0 vs 86.1) and 24 (96.4 vs 91.7) months post-TKA ($p<0.05$)

Significantly lower WOMAC scores at 6 (17.8 vs 24.6) and 12 (12.4 vs 18.5) months post-TKA ($p<0.05$)



Significantly greater change in ROM from baseline at 3 (-4.4 vs -10.1), 6 (5.8 vs -1.8) and 12 (11.4 vs 4.0) months post-TKA ($p<0.05$)

Conclusion

JOURNEY II CR patients reported significant improvements in functional outcomes compared to P.F.C. Sigma™ CR* TKA.

Full summary

*Manufactured by DePuy Synthes Orthopaedics, Warsaw, IN, USA.

BCS

Hospital-related clinical and economic outcomes of a bicruciate knee system in total knee arthroplasty patient[31]

Mayman DJ, Patel AR, Carroll KM. Poster presented at: ISPOR Symposium; 2018; Baltimore, Maryland, USA

A retrospective cohort study with real world evidence of:

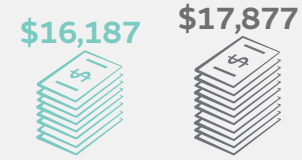
1,692 JOURNEY II BCS TKA	1,692 other TKA devices
Mean age: 64.1 years	Mean age: 63.9 years

Assessed:

Hospital-related clinical and economic outcomes (reported as 2016 US dollars)	✓
1:1 propensity score matching to control for patients and provider characteristics	✓

Results:

JOURNEY II BCS, compared to other TKA knees, was associated with:



Significantly lower total hospital costs (p=0.0001)

Significantly shorter mean length of hospital stay (p<0.0001)

Patients receiving JOURNEY II BCS were also:

51% less likely to be readmitted to hospital within 30 days (p=0.0037; calculated value)

35% more likely to be discharged to home (p=0.0008; calculated value)

41% less likely to be discharged to a skilled nursing facility (p<0.0001)

Conclusion

JOURNEY II BCS led to a significantly lower total hospital cost and significantly shorter hospital stay, and patients were less likely to be readmitted within 30 days. Patients receiving this device were also more likely to be discharged to home when compared with patients undergoing primary TKA with other posterior-stabilized TKA systems.

Full summary | Published paper

BCS

Evaluation of anteroposterior accelerometric change after bi-cruciate stabilized total knee arthroplasty and posterior stabilized total knee arthroplasty[25]

Tomite T, Saito H, Kijima H, Ishikawa N, Hatakeyama Y, Tazawa H, Miyakoshi N, Shimada Y. *Knee.* 2021;32:121–130

Independent, single-surgeon, prospective study of:

30 JOURNEY II BCS	30 PERSONA™ PS*
Mean age: 77.9 years	Mean age: 77.3 years
Mean follow up: **1 year**	

Assessed at pre-TKA and 12 months post-TKA:

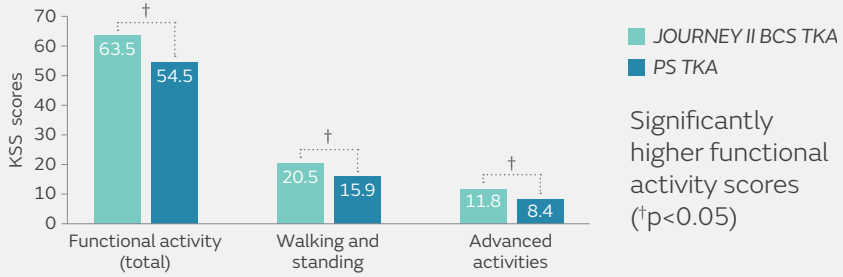
ROM	✓
KSS	✓
FTA	✓
Lateral X-rays of the standing extended knee	✓
Accelerometer data	✓

Results

JOURNEY II BCS patients, compared to PS TKA patients, demonstrated:

Significantly lower posterior offset ratio (2.1 vs 17.9%, respectively), with the AP positioning of the femur and tibia close to that of the normal knee

Lower anteroposterior (AP) acceleration on the femoral side of the knee



Significantly higher functional activity scores (†p<0.05)

Conclusion

JOURNEY II BCS resulted in better functional kinematics, closer positioning to that of the normal knee on lateral X-ray, and lower anteroposterior acceleration on the femoral side compared to PS TKA at 12 months post-TKA.

Full summary | Published paper

*Manufactured by Zimmer Biomet, Warsaw, IN, USA.

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Amemiya K, et al. 2021[48]	Anatomical bi-cruciate retaining TKA improves gait ability earlier than bi-cruciate stabilized TKA based on triaxial accelerometery data: A prospective cohort study	AP-SMART	Full summary; Published paper	XR, BCS	✓	✓			
Biały M, et al. 2021[51]	A comparison of the JOURNEY II◊ bi-cruciate stabilized total knee system and Genesis II cruciate-retaining implant	Physiotherapy Review	Published paper	BCS	✓	✓	✓		
Boese K, et al. 2019[35]	Early clinical and patient-reported results of a bi-cruciate retaining total knee implant: six-month results of a prospective multicentre study of 149 primary TKAs	EORS Congress	Full summary	XR	✓	✓	✓	✓	
Christen B, et al. 2018[52]	Second-generation bi-cruciate stabilized total knee system has a lower reoperation and revision rate than its predecessor	Arch Orthop Trauma Surg	Published paper	BCS		✓			
Coomer S, et al. 2021[53]	Determining patella function in non-implanted knees having functional cruciate ligaments and subjects having a bi-cruciate stabilized total knee arthroplasty	Orthopaedic Proceedings	Published paper	BCS	✓				

All evidence

Select the study icon to see the study overview (if applicable).

	Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
	Di Benedetto P, et al. 2019[24]	Pre-operative and post-operative kinematic analysis in total knee arthroplasty. A pilot study	Acta Biomed	Full summary Published paper	CR	✓	✓	✓		
	Grieco TF, et al. 2018[16]	In vivo kinematic comparison of a bicruciate stabilized total knee arthroplasty and the normal knee using fluoroscopy	J Arthroplasty	Full summary Published paper	BCS	✓				
	Harris AI, et al. 2018[37]	Short-term safety and effectiveness of a second-generation motion-guided total knee system	Arthro Today	Published paper	BCS	✓	✓	✓		
	Harris AI, et al. 2019[39]	Midterm performance of a guided-motion bicruciate-stabilized total knee system: results from the international study of over 2000 consecutive primary total knee arthroplasties	J Arthroplasty	Full summary Published paper	BCS				✓	
	Harris AI, et al. 2019[40]	Guided motion total knee arthroplasty system: five-year outcomes of the prospective multicenter US study	EFFORT Congress		BCS				✓	

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Harris AI, et al. 2019[54]	Guided motion total knee arthroplasty (TKA) system in younger patients has a lower revision rate than registry controls: results from the international multicenter study with up to 6 Years follow-up	EKS Congress		BCS				✓	
Harris AI, et al. 2019[55]	Guided motion total knee arthroplasty (TKA) in patients with BMI of 40kg/m^2 or more: results from the international multicentre study of 2,059 primary TKAs with up to 6 years follow–up	EKS Congress		BCS				✓	
Heir S, et al. 2019[36]	Clinical and functional outcomes of a second-generation guided motion total knee arthroplasty system: two-year results of a prospective multicentre study	EKS Congress		BCS	✓	✓	✓		
Hino K, et al. 2018[56]	Bi-cruciate substituting total knee arthroplasty provides varus–valgus stability throughout the midflexion range	Knee	Published paper	BCS	✓				
Hommel H, et al. 2017[57]	Good early results obtained with a guided-motion implant for total knee arthroplasty: A consecutive case series	Open Orthop J	Published paper	BCS	✓				

All evidence

Select the study icon to see the study overview (if applicable).

	Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
	Hyodo K, et al. 2020[30]	Gait analysis comparing kinematic, kinetic, and muscle activation data of modern and conventional total knee arthroplasty	Arthroplasty Today	Full summary Published paper	BCS	✓	✓			
	Inui H, et al. 2018[58]	The relationship between antereoposterior stability and medial-lateral stability of the bi-cruciate stabilized total knee arthroplasty	Knee	Published paper	BCS	✓				
	Inui H, et al. 2019[59]	The relationship between soft–tissue balance and intraoperative kinematics of guided motion total knee arthroplasty	J Knee Surg	Published paper	BCS	✓				
	Iriuchishima T, et al. 2018[21]	A comparison of rollback ratio between bicruciate substituting total knee arthroplasty and Oxford unicompartmental knee arthroplasty	J Knee Surg	Full summary Published paper	BCS	✓				
	Iriuchishima T, et al. 2019[60]	Bicruciate substituting total knee arthroplasty improves stair climbing ability when compared with cruciate-retain or posterior stabilizing total knee arthroplasty	Indian J Orthop	Published paper	BCS	✓				

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Ishibashi T, et al. 2020[42]	Kinematics of bicruciate and posterior stabilized total knee arthroplasty during deep knee flexion and stair climbing	J Orthop Res	Published paper	BCS	✓				
Ishida K, et al. 2017[61]	Comparison of intra-operative navigation-based kinematics between bi-cruciate-stabilised total knee arthroplasty (TKA) and conventional posterior-stabilised TKA	Orthop Proceedings	Published paper	BCS	✓				
Itou J, et al. 2021[62]	Anterior prominence of the femoral condyle varies among prosthesis designs and surgical techniques in total knee arthroplasty	BMC Musculoskeletal Disorders	Published paper	BCS	✓				
Kage T, et al. 2021[15]	The association between in vivo knee kinematics and patient-reported outcomes during squatting in bicruciate-stabilized total knee arthroplasty	J Knee Surg	Published paper	BCS	✓		✓		
Kaneko T, et al. 2017[19]	Bi-cruciate substituting total knee arthroplasty improved medio-lateral instability in midflexion range	J Orthop	Published paper	BCS	✓		✓		

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Kaneko T, et al. 2018[63]	The influence of compressive forces across the patello-femoral joint on patient reported outcome after bi-cruciate stabilized total knee arthroplasty	Bone Joint J	Published paper	BCS			✓		
Kaneko T, et al. 2020[64]	The influence of tibiofemoral joint forces on patient-reported outcome measurements after bicruciate stabilized total knee arthroplasty	J Orthop Surg	Published paper	BCS	✓		✓		
Kiyohara M, et al. 2021[65]	Comparison of in vivo knee kinematics before and after bicruciate-stabilized total knee arthroplasty during squatting	BMC Musculoskeletal Disorders	Published paper	BCS	✓	✓			
Kono K, et al. 2019[66]	Bicruciate-stabilised total knee arthroplasty provides good functional stability during high-flexion weight-bearing activities	Knee Surg Sports Traumatol Arthosc	Published paper	BCS	✓				
Kono K, et al. 2021[49]	In vivo kinematics of bicruciate-retaining total knee arthroplasty with anatomical articular surface under high-flexion conditions	J Knee Surg	Full summary Published paper	XR	✓				

All evidence

Select the study icon to see the study overview (if applicable).

	Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
	Kono K, et al. 2021[67]	In vivo kinematics and cruciate ligament forces in bicruciate-retaining total knee arthroplasty	Scientific Reports	Published paper	XR	✓	✓			
	Kopjar B, et al. 2019[38]	Clinical and functional outcomes of JOURNEY◊ II CR total knee system. Interim results of an ongoing, prospective, multicenter study	ISTA Congress		CR	✓		✓	✓	
	Kosse NM, et al. 2018[27]	Minor adaptations in implant design bicruciate-substituted total knee system improve maximal flexion	EFFORT Congress		BCS	✓				
	Lutes W, et al. 2018[26]	Comparison of functional outcomes following total knee arthroplasty with a conventional implant design or one designed to mimic natural knee kinematics	SICOT OW Congress	Full summary	CR	✓	✓	✓		
	Mayman DJ, et al. 2018[31]	Hospital related clinical and economic outcomes of a bicruciate knee system in total knee arthroplasty patients	ISPOR Symposium	Full summary Published paper	BCS		✓			✓
	Murakami K, et al. 2018[18]	In vivo kinematics of gait in posterior-stabilized and bicruciate-stabilized total knee arthroplasties using image-matching techniques	Int Orthop	Published paper	BCS	✓				

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Murakami K, et al. 2018[22]	Knee kinematics in bi-cruciate stabilized total knee arthroplasty during squatting and stair-climbing activities	J Orthop	Published paper	BCS	✓				
Murakami K, et al. 2018[68]	Preoperative tibial mechanical axis orientation and articular surface design influence on the coronal joint line orientation relative to the ground during gait after total knee arthroplasties	Knee Surg Sports Traumatol Arthrosc	Published paper	BCS	✓				
Moewis P, et al. 2020[69]	Retention of posterior cruciate ligament alone may not achieve physiological knee joint kinematics after total knee arthroplasty: a retrospective study	J Bone Joint Surg Am	Published paper	BCS, CR	✓		✓		
Nodzo SR, et al. 2018[29]	The bicruciate substituting knee design and initial experience	Tech Orthop	Full summary Published paper	BCS	✓	✓	✓		
Oikonomidis L, et al. 2020[70]	The Journey bicruciate knee replacement: design modifications yield better early functional results and reduce complications	J Knee Surg	Published paper	BCS	✓		✓		

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Patel AR, et al. 2019[32]	Hospital related clinical and economical outcomes of two premium knee systems in total knee arthroplasty (TKA) patients	ISPOR Symposium		BCS		✓			✓
Salzman M, et al. 2017[71]	Does postoperative mechanical axis alignment have an effect on clinical outcome of primary total knee arthroplasty? A retrospective cohort study	Open Orthop J	Published paper	BCS	✓		✓		
Smith AL, et al. 2021[17]	In vivo knee kinematics: how important are the roles of femoral geometry and the cruciate ligaments?	J Arthroplasty	Full summary Published paper	CR, XR	✓				
Snyder MA, et al. 2018[33]	A comparison of patient reported outcomes between total knee arthroplasty patients receiving the JOURNEY◊ II bi-cruciate stabilizing knee system and total hip arthroplasty patients	Orthop Trauma Prosth	Full summary Published paper	BCS	✓	✓	✓		
Takubo A, et al. 2017[28]	Comparison of muscle recovery following bicruciate substituting versus posterior stabilized total knee arthroplasty is an Asian population	J Knee Surg	Published paper	BCS	✓				

All evidence

Select the study icon to see the study overview (if applicable).

Authors/ Year	Study Title	Journal/ Source	Useful Links	JOURNEY II	Function	Recovery	Patient Satisfaction	Survivorship	Health Economics
Tomite T, et al. 2016[72]	Gait analysis of conventional total knee arthroplasty and bicruciate stabilized total knee arthroplasty using a triaxial accelerometer	Case Report Orthop	Published paper	BCS	✓				
Tomite T, et al. 2021[25]	Evaluation of anteroposterior accelerometric change after bi-cruciate stabilized total knee arthroplasty and posterior stabilized total knee arthroplasty	Knee	Full summary Published paper	BCS	✓				
Tria Jr AJ, et al. 2021[73]	Bicruciate retaining total knee arthroplasty: Short-term clinical outcomes using a novel prosthesis	J Long Term Eff Med Implants	Full summary Published paper	XR	✓				
West JA, et al. 2019[34]	Clinical outcomes and patient satisfaction after total knee arthroplasty: a follow-up of the first 50 cases by a single surgeon	J Int Med Res	Published paper	BCS	✓	✓	✓		
Zambianchi F, et al. 2018[74]	Changes in total knee arthroplasty design affect in vivo kinematics in a redesigned total knee system: A fluoroscopy study	Clin Biomech	Full summary Published paper	BCS	✓				

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17058 V4 0622. Published June 2022.

Developed by Evidence Communications,
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Abbreviations

ACL	Anterior cruciate ligament	**PS**	Posterior stabilised
AOANJRR	Australian Orthopaedic Association National Joint Replacement Registry	**ROM**	Range of motion
BCS	Bicruciate stabilised	**THA**	Total hip arthroplasty
CR	Cruciate retaining	**TKA**	Total knee arthroplasty
FJS-12	Forgotten joint score-12	**TKS**	Total knee system
ITB	Iliotibial band	**UCLA**	University of California Los Angeles
KOOS	Knee injury and osteoarthritis outcome score	**UKA**	Unicompartmental knee arthroplasty
KSS	Knee society score	**WOMAC**	The Western Ontario and McMaster Universities Arthritis Index
LOS	Length of stay	**XR**	Bicruciate retaining
PFR	Posterior femoral rollback		

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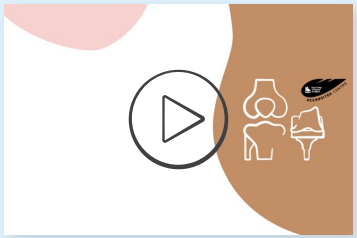

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