Evaluating Minimal Clinically Important Difference, Patient Acceptable Symptom State, and Substantial Clinical Benefit in the Primary Total Joint Arthroplasty Population: A Systematic Review

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INTRODUCTION: Recently, the Centers for Medicare and Medicaid Services (CMS) mandated the collection of patient-reported outcome measures (PROMs) for all primary total hip or knee arthroplasty (THA/TKA), reinforcing their role in evaluating clinical outcomes. There is little consensus, however, on how to determine clinically meaningful change. This systematic review investigates the calculation methods and anchor questions used to derive key PROM-based thresholds such as MCID, SCB, and PASS for the Hip Disability and Osteoarthritis Outcome Score for Joint Replacement (HOOSJR) and the Knee Injury and Osteoarthritis Outcome Score for Joint Replacement (KOOSJR).

METHODS: A systematic review was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. PubMed, MEDLINE, Cochran Library and Google Scholar were queried for articles from 2000 to 2025 specific to the HOOS JR and KOOS JR. Articles were included if they: 1) reported calculated MCID, SCB, or PASS thresholds using anchor-based and/or distribution-based methods, 2) included the specific anchor question used, 3) studied only primary THA or TKA procedures, and 4) derived threshold-metrics specifically from the HOOS JR or KOOS JR. Study characteristics, MCID/PASS/SCB thresholds, and threshold calculation methods were extracted.

RESULTS: A total of 191 articles were screened, whereas only seventeen studies met inclusion criteria (i.e., six specific to the HOOS JR, five specific to the KOOS JR, and six that studied both). Upon assessment of the metrics specific to THA procedures, ten studies calculated a distribution-based MCID (range: 3.9-11.0 points), six studies derived an anchor-based MCID (range: 14.8-38.1 points), one study derived a SCB threshold (range: 22 points), and three calculated an overall PASS threshold specific to the total score for the HOOS JR (range: 73.5-81.0). Upon assessment of the metrics specific to TKA procedures, nine studies calculated a distribution-based MCID (range: 4.0-8.7 points), six derived an anchor-based MCID (range: 14.0-30.7 points), one derived a SCB threshold (range: 20 points), and two calculated an overall PASS threshold specific to the total score for the KOOS JR (range: 63.7-71.0). For THA, four distinct distribution methods and eight anchor questions were identified, while for TKA, three distribution methods and seven anchor questions were defined.

DISCUSSION AND CONCLUSION:

There is substantial variability in the calculation methods reported for deriving the anchor-based MCID, SCB and PASS thresholds. In addition, there are significant differences in the threshold cut-off values derived in both THA and TKA populations. As such, it is imperative to standardize methodology and utilization for calculation of MCIDs, SCB and PASS metrics to allow for improved assessment of PROMs specific to total joint arthroplasty, especially with the growing importance in assessing treatment quality and possible financial implications.

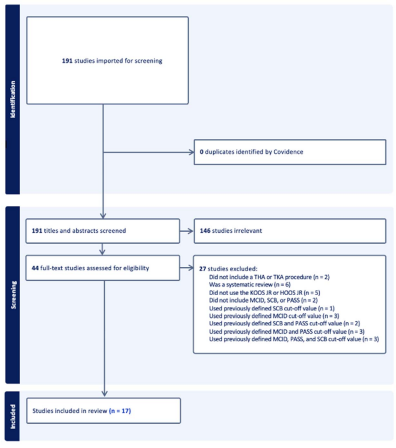

Table 1. Articles which included HOOS JR.

Year	Author	Study Design	Sample Size	Dates of Study	Population Sampled	Change Score(s)	Calculation Method	Mean Follow-Up
2018	Haug et al [22]	3	2226	2014 to 2017	Regional	MCID	Both	3m, >3m, 6m, >6m
2018	Lyman et al [11]	3	2323	2007 to 2012	Regional	MCID, SCB	Both	2y
2020	Kuo et al [24]	2	371	2015 to 2017	Regional	MCID	Both	1y
2021	Gunther et al [23]	2	514	2017 to 2018	Regional	MCID	Both	3m, 1y
2022	Kunze et al [13]	3	5218	2007 to 2012	Regional	PASS	Anchor	2y
2022	Ayers et al [31]	2	7934	2014 to 2018	National	MCID	Distribution	1y
2023	Dobbins et al [12]	3	783	2020 to 2021	Regional	MCID, PASS	Anchor	1y
2023	Carender et al [32]	3	5001	2012 to 2020	National	MCID	Distribution	1y
2023	Albright et al [27]	3	523	2017 to 2018	Regional	MCID	Both	1y
2023	Sein et al [29]	2	1898	NR	National	MCID	Distribution	1m, 3m, 6m, 1y
2023	McDonough et al [33]	3	1758	2016 to 2021	Regional	MCID	Distribution	RAI <30, 30-34, ≥35
2024	Iossaro et al [28]	2	382	2016 to 2018	Regional	MCID, PASS	Both	1y

Study Design: 1 = Randomized Control Trial, 2 = Prospective Cohort, 3 = Retrospective Cohort, 4 = Case-Control
MCID = Minimally Clinically Important Difference; SCB = Substantial Clinical Benefit; PASS = Patient Acceptable Symptom State; RAI = Risk Analysis Index; m = month(s); y = year(s); NR = Not Reported.

Table 2. Articles which included KOOS JR.

Year	Author	Study Design	Sample Size	Dates of Study	Population Sampled	Change Score(s)	Calculation Method	Mean Follow-Up
2018	Haug et al [22]	3	2220	2014 to 2017	Regional	MCID	Both	3m, >3m, 6m, >6m
2018	Lyman et al [11]	3	2630	2007 to 2012	Regional	MCID, SCB	Both	2y
2020	Kuo et al [24]	2	187	2015 to 2017	Regional	MCID	Both	1y
2020	Khalil et al [34]	3	875	2017 to 2019	Regional	MCID	Distribution	1m, 3m, 6m, 1y
2021	Ondy et al [26]	2	956	2017 to 2018	Regional	MCID	Both	3m, 1y
2021	Shaw et al [35]	2	990	2017 to 2019	Regional	MCID	Distribution	1m, 6m
2021	Daehlin et al [36]	3	872	2017 to 2019	Regional	MCID	Distribution	1y
2022	Kunze et al [13]	3	4016	2007 to 2012	Regional	PASS	Anchor	2y
2023	Dobbins et al [12]	3	682	2020 to 2021	Regional	MCID, PASS	Anchor	1y
2023	McDonough et al [33]	3	1582	2016 to 2021	Regional	MCID	Distribution	RAI <30, 30-34, ≥35
2024	Albright et al [28]	3	976	2017 to 2018	Regional	MCID	Both	1y

Study Design: 1 = Randomized Control Trial, 2 = Prospective Cohort, 3 = Retrospective Cohort, 4 = Case-Control
MCID = Minimally Clinically Important Difference; SCB = Substantial Clinical Benefit; PASS = Patient Acceptable Symptom State; RAI = Risk Analysis Index; m = month(s); y = year(s)