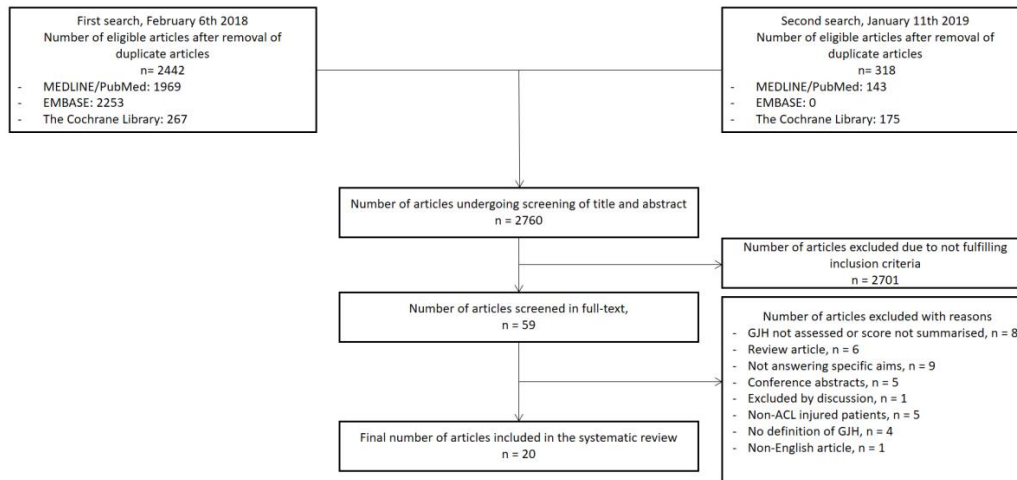


1 Supplementary material

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4 Supplementary Figure 1. Flow-chart of the study selection process. GJH generalised joint hypermobility, ACL anterior cruciate ligament

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Supplementary table 1 – Search strategies stratified according to database.	
PubMed	
#1	anterior cruciate ligament* OR ACL
#2	"Anterior Cruciate Ligament"[Mesh]
#3	"Anterior Cruciate Ligament Injuries"[Mesh]
#4	#1 OR #2 OR #3
#5	laxity OR hypermobility OR GJH OR GJL OR beighton OR generalized OR generalised
#6	#4 AND #5
EMBASE	
#1	'anterior cruciate ligament*':ti,ab,kw OR 'acl':ti,ab,kw
#2	'anterior cruciate ligament'/exp OR 'anterior cruciate ligament injury'/exp
#3	#1 OR #2
#4	'laxity':ti,ab,kw OR 'hypermobility':ti,ab,kw OR 'gjh':ti,ab,kw OR 'gjl':ti,ab,kw OR 'beighton':ti,ab,kw OR 'generalized':ti,ab,kw OR 'generalised':ti,ab,kw
#5	#3 AND #4
The Cochrane Library	
#1	anterior cruciate ligament* or ACL:ti,ab,kw
#2	laxity or hypermobility or GJH or GJL or beighton or generalized or generalised:ti,ab,kw
#3	#1 AND #2
ACL anterior cruciate ligament, GJH generalised joint hypermobility, GJL generalised joint laxity	

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Supplementary table 2. Methods for evaluation of generalised joint hypermobility.				
Evaluation method	Used by authors	Joints examined	Dichotomisation limit used to define GJH	Easily reproducible methodology
Beighton and Horan score	Kim et al. ^{5, 8, 9}	TOTAL 5 POINTS Passive dorsiflexion of little finger beyond 90° Passive apposition of thumb to flexor aspect of the forearm Hyperextension of elbow beyond 10° Hyperextension of knee beyond 10° Forward flexion of the trunk with knees straight so that the palms of the hand rest easily on the floor	≥4 ^{5, 8}	Yes ^{5, 8, 9}
Beighton hypermobility score	Akhtar et al. ^{1 P} Anderson et al. ^{2 Q} Astur et al. ³ Kramer et al. ¹⁰ Ramesh et al. ¹⁴ Scerpella et al. ¹⁵ Uhorchak et al. ^{20 S} Vacek et al. ²¹ Vaishya et al. ²² Kim et al. ^{6, 7 T} Shimozaki et al. ¹⁷	TOTAL 9 POINTS Passive dorsiflexion of little finger beyond 90° Passive apposition of thumb to flexor aspect of the forearm Hyperextension of elbow beyond 10° Hyperextension of knee beyond 10° Forward flexion of the trunk, with knees straight, so that the palms of the hand rest easily on the floor	≥4/8 ^{6, 7} ≥4/9 ^{1, 3 22} ≥5/9 ²⁰ , ≥6/9 ¹ , >6/9 ²	Yes
Harners method	Harner et al. ⁴	TOTAL POINTS NA The amount of passive dorsiflexion of little finger beyond 90° measured in degrees Passive apposition of thumb to flexor aspect of the forearm, distance measured in centimeters Hyperextension of elbow beyond 0° measured in degrees	N/A	Yes
Larsons method	Larson et al. ¹¹	TOTAL 4 POINTS Fifth MCP joint hyperextension angle greater than 90° Thumb can reach the forearm or the thenar eminence can reach the forearm Elbow hyperextension measure 10° or greater Knee hyperextension measure 10° or greater OR heel height form table was greater than 5-cm.	≥ 3/4	Yes
Method according to Fukubayashi	Motohashi et al. ¹²	TOTAL 7 POINTS Passive apposition of the thumb to flexor aspect of the forearm Hyperextension of the knee equal to or beyond 10° Forward flexion of the trunk with knees straight so that the palms of the hand rest easily on the floor	NI	No

		Hyperextension of elbow equal to or beyond 15° Gripping hands behind the back, with one upper arm elevated and the other upper arm in parallel to the trunk. Dorsiflexion of the ankle equal to or beyond 45° Over pivot test of the hips		
Modified Beighton hypermobility score	Scerpella et al. ¹⁵ Stijak et al. ^{18, 19}	TOTAL 9 POINTS Extension of the fifth MCP beyond 90° Hyperextension of the elbow beyond 0° Hyperextension of the knee beyond 0° The ability to touch the thumb to the forearm with the wrist flexed The ability to touch the palms to the floor with the knees fully extended	≥5 ^{18, 19}	Yes
ACL Anterior cruciate ligament, GJH generalised joint hypermobility, MCP Metacarpophalangeal, N/A not applicable, NI no information				
<p>^P With use of <i>injury allowance point</i>^{41, Q} Without knee hyperextension, ^R Unknown if tests were performed bilaterally ^S Did not involve the palm to floor test ^T Excluding the assessment of the ACL injured knee</p>				

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Supplementary table 3. Bilateral ACL injury.

Author	Patients, (n male)	Mean Hypermobility Score ^P			Bilateral/contralateral ACL injury, % of total		<i>p</i> - value	Consideration for differences in sex and age
		Bilateral ACL injury	Unilateral ACL injury	Controls	Hypermobile	Non- hypermobile		
Anderson et al. ²	31 (18)	1.9		1.2			n.s.	S&A matched ^R
Larson et al. ¹¹	183 (81)				9.8	4.2	n.s.	No
Motohashi et al. ¹²	48 (0)	3.3, SD ± 1.4	2.2, SD ± 1.4				<0.05	No
Kim et al. ⁶ ^P	189 (NI)				5.1	1.4	n.s.	S&A equivalence ⁵
Kim et al. ⁷ ^Q	108 (NI)				11.4	5.6	n.s.	S&A equivalence ⁵

ACL anterior cruciate ligament, NI no information, n.s. not significant, SD standard deviation, S&A sex and age

^P Results from all patients, irrespective of graft, allocated to group based on presence of hypermobility at the 5-year follow-up. ^Q Results from 8-year follow-up presented. ^R The authors state that matching was performed but baseline equivalence not reported, ⁵ Baseline equivalence for sex and age observed

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Supplementary table 4. Graft failure.										
Authors	Patients, n (male)	Type of graft	Mean hypermobility score			Graft rupture (% of total)			p-value	Consideration for differences in sex and age
			Graft failure	Primary ACL injury	Controls	Hypermobile group, n (%)	Non-hypermobile group, n (%)			
Akhtar et al. ¹	209 (157)	Various ^P	4	2.9					=0.01	S&A matched ^T
			4		1.4				<0.001	
Kim et al. ^{6 Q}	189 (NI)	PT				3 (7.9)	1 (1.0)	n.s.	S&A equivalence ^U	
		HT				2 (9.5)	1 (2.3)	n.s.		
Kim et al. ⁷	108 (NI)	PT				4 (11.4)	4 (4.4)	n.s.	S&A equivalence ^U	
Larson et al. ¹¹	183 (81)	All ⁵				10 (24.4)	11 (7.7)	=0.006	No	
		HT				3 (25.0)	9 (12.3)	n.s.		
		PT				4 (21.1)	0 (0)	=0.24		
		AG				3 (30)	2 (4.8)	=0.043		
<p>In case of reporting of graft failure in the same cohort with different lengths of follow-up, the results of the longest follow-up time were reported. ACL anterior cruciate ligament, AG Allograft, HT Hamstring tendon autograft, NI no information, n.s. not significant, PT Patellar tendon autograft, S&A sex and age, *The exact follow-up time was not disclosed</p> <p>^P Quadruple hamstring tendon, patellar tendon and fascia lata autografts were used, ^Q Results from the Bonferroni analysis at the 5-year follow-up presented, ^R Results from the 8-year follow-up presented. ^S Summarizing all grafts (hamstring tendon, patellar tendon and allografts) ^T The authors state that matching was performed but baseline equivalence not reported, ^U Baseline equivalence for sex and age observed</p>										

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Supplementary table 5. Radiographic evaluations.					
Authors		Follow-up time	Hypermobility	Non-hypermobility	P-value
Kim et al. ⁶	IKDC radiographic grade, PT graft (% with A, B, C, D)	Min 2 years ^P	93, 7, 0, 0	96, 4, 0, 0	n.s.
		5 years ^P	73, 24, 3, 0	81, 19, 0, 0	n.s.
	IKDC radiographic grade, HT graft (% with A, B, C, D)	Min 2 years ^P	95, 5, 0, 0	96, 4, 0, 0	n.s.
		5 years ^P	67, 28, 6, 0	78, 22, 0, 0	n.s.
Kim et al. ⁷	IKDC radiographic grade, PT graft (% with A, B, C, D)	8 years ^P	63, 30, 7, 0	72, 25, 4, 0	n.s.

IKDC International Knee Documentation Committee, Min Minimum PT Patellar tendon, HT hamstring tendon

^P The exact follow-up time was not reported.

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