

**Supplementary Table S1: Search terms and strategy used in the Medline database**

#	Query	Results
1	exp Anterior Cruciate Ligament Injuries/ or exp Knee Joint/ or exp Athletic Injuries/ or exp Knee Injuries/	116738
2	((anterior cruciate ligament or ACL) and (injur* or tear* or ruptur*)).tw,kf.	11499
3	1 or 2	117963
4	((lower extremit* or lower limb*) adj5 (angle* or kinematic* or biomechanic* or kinetic or force)).tw,kf.	3469
5	knee/	16046
6	exp Knee Joint/	71805
7	(knee or knees).tw,kf.	154707
8	4 or 5 or 6 or 7	172646
9	exp Fatigue/ or exp Muscle Fatigue/	46148
10	3 and 8 and 9	537

**Supplementary Table S2:** Detailed summary of the outcome of each of the included studies

Author	Kinematic Outcomes	Kinetic Outcomes	Neuromuscular Outcomes	Other Outcomes
Abergel	<p>Increase sagittal plane pelvic excursion</p> <p>Increased hip flexion, knee flexion, ankle dorsiflexion in dominant leg</p> <p>Increased peak hip flexion, knee flexion, knee abduction, and ankle external rotation in non-dominant leg</p>	<p>Decrease in vertical ground reaction force</p> <p>Increase in peak knee extensor moment</p>		
Allison				No difference in force sense
Bedo	<p><b>Single leg landing</b> - increased hip adduction and knee abduction after ground contact</p> <p><b>Single leg counter movement</b> -reduction in hip flexion at 14–29% and 44–68% of the SCM cycle and hip abduction reduced (0–11% of the cycle); decrease in knee flexion at 7–36% and 53–73% of the cycle and knee abduction increased (20–23% of the cycle</p> <p><b>Drop vertical jump</b> - hip flexion reduced from 19–44% of the cycle; decrease knee flexion during fatigue at 1–16% and 18–77% of the cycle.</p>			
Behrens	Increased anterior translation in females		<p>In males increased semitendinosus onset latency</p> <p>In females increased latency in Biceps Femoris and Semitendinosus</p>	
Benjaminise	Both males and females decreased maximum knee valgus (but still in valgus) and decreased knee flexion angles at initial contact			
Borotikar	<p>Decreased hip flexion and increased hip internal rotation at initial contact</p> <p>Increased knee abduction and internal rotation at peak stance</p>			
Bossuyt	<b>Single leg hop</b> -Increased internal rotation	<b>Single leg hop</b> - Increased vertical ground reaction force	Decreased Hamstring/Quad ratio	

Brazen	Increased knee flexion	Increased vertical ground reaction force		Increased time to stabilization
Chappel	Decreased knee flexion angle	Increased anterior shear force Increased varus moment		
Coratella			<b>Functional Hamstring/Quad ratio</b> - decreased at 3.14rad/s and 5.24 rad/s in the dominant limb	
Cortes	Decreased knee flexion angle and increased increased knee adduction at initial contact			
Cortes	Decreased knee flexion (100% fatigue) increased knee abduction (50% fatigue), increased hip flexion (100% fatigue), decreased hip abduction (100% fatigue) at initial contact  Increased knee flexion (50% fatigue) and decreased hip flexion (100% fatigue) at peak stance	increased knee abduction moment (50% fatigue) and decreased hip adduction moment (50% fatigue, 100% fatigue) at initial contact  Decreased hip adduction moment (100% fatigue) at peak stance		
Cortes	Decrease knee internal rotation, decrease hip flexion at initial contact  Decrease knee flexion at Peak Posterior GRF  Decreased knee flexion and decreased hip flexion at peak angle			
Dickin	Increased hip abduction at initial contact  Decreased ankle dorsiflexion, increased knee valgus at maximum flexion	Increased peak impact, loading rate at initial contact  Decrease in knee power absorption		
El-Ashker			Decreased Hamstring/Quad ratio in males and females	
Gehrig	Increased knee flexion 200ms after contact	No change in vertical ground reaction force  Reduction in vertical ground impulse	Decreased hamstring muscle activity with unchanged quadricep activity	

Geiser	Increased hip abduction, increased Hip ROM toward adduction, increased knee adduction, and Increase knee ROM toward abduction, at initial contact	Decreased hip abductor moment and increased knee adduction moment during weight acceptance		
Gillot	No change in anterior translation		Increased Hamstring/Quad ratio at 15 and 30 deg flexion at 240 deg/s Increased functional H/Q ratio at 15 and 45 deg flexion	Some results might indicate that the fatigue protocol did not work
Greco			Decreased concentric Hamstring/Quad ratios and decreased Hamstring <sup>ecc</sup> /Quad <sup>con</sup> ratio	
Greig	No Change in knee flexion Increased knee varus at 75, 90, and 105 minutes			
Harato	<b>Elite females</b> - decreased LESS and increased peak knee flexion  <b>Recreational Females</b> - decreased LESS, increased peak knee flexion, and decreased knee abduction at initial contact	<b>Elite females</b> - decreased knee flexion moment 40ms after initial contact  <b>Recreational Females</b> - increased knee abduction moment 40ms after initial contact		
Hassanlouei			<b>Anterior Slide</b> - decreased muscle activation in the VL, RF, BF, ST and increased EMG onset time in the VM, VL, BF  <b>Posterior Slide</b> -decreased muscle activation in the VL, RF, BF, ST and increased EMG onset in the VM, VL, BF, ST	
Hunt	Increased knee flexion angle	Increased knee flexion moment		
Iguchi	No difference in onset or maximum knee flexion angle	Females had increased vertical ground reaction force impulse	Decreased semimembranosus activity with no change in quadriceps activity	

Kellis	<p><b>Extensor Fatigue</b> - increased knee flexion at contact, increased maximum knee flexion angle and increased maximum hip flexion angle</p> <p><b>Flexor fatigue</b> - increased knee flexion at contact, increased maximum knee flexion angle</p>	<p><b>Extensor fatigue</b>- decreased ground reaction force</p>	<p><b>Extensor Fatigue</b> - increased Quads/Hamstring co-activation in the pre-activation and loading response phase</p> <p><b>Flexor Fatigue</b> - increased Quads/Hamstring co-activation in the pre-activation phase and decreased Quads/Hamstring in the loading response 1 phase</p>	
Kernozek	<p>Increased hip flexion</p> <p>Females had no change in max knee flexion, while males had an increase in max knee flexion</p>	<p>Decreased hip compression and decreased hip extension moment</p> <p>Lower peak knee compression</p> <p>Both males and females decreased maximum shear but males decreased by more</p> <p>Both males and females decreased anterior knee abduction moment</p>		
Khalid	<p>Increased knee extension</p>	<p>Increased peak knee extension moment, increased peak vertical ground reaction force, and increased A-P ground reaction force</p>		
Kim	<p>No differences in knee kinematics</p> <p>Increased peak and total excursion and lateral trunk flexion</p>	<p>No change in MSK model derived ACL loading</p> <p>Increased knee adduction moment, knee internal rotation moment, and hip adduction moment</p>		
Kim	<p>Decreased knee RoM</p>	<p>Decreased vertical ground reaction force</p>		

Lattanzio				Increased AAE  Increased AAE for continuous and interval fatigue protocols in females
Lessi	Increased knee abduction in females and increased adduction in males at initial contact  Decreased pelvis drop  Decreased knee flexion and increased trunk flexion during landing		Increased hamstring activation with no change in quads	
Liederbach	Dancers had significantly less knee flexion compared to athletes at initial contact	Increased knee valgus moment, decreased hip adduction moment, and decreased Hip external moment at initial contact	No change in Quads/Hamstring ratio	
Longpre	<b>Squatting</b> - increased knee flexion angle	<b>Lunging</b> - decreased knee adduction moment and knee flexion moment <b>Squatting</b> - increased knee Flexion moment	Quads/Hamstring ratio	
Longpre	No change in knee flexion	Increased knee extension moment	No change in Quads/Hamstring ratio	
McEldowney			Increased Quads/Hamstring ratio	
McLean	Increased knee abduction and internal rotation	Increased knee abduction and internal rotation moments		
McLean	Decreased knee flexion at initial contact  Increased hip internal rotation and increased knee abduction at peak stance	Increased hip internal rotation and abduction moment and decreased knee flexion moment at peak stance		
Mejane	Increased knee abduction and internal rotation, and decreased knee flexion			

Miura				No changes in AAE in response to local fatigue  Increased AAE after general fatigue
Moran	No changes in knee flexion	Increased proximal tibial accelerations		
Moran	No changes in knee flexion	Increased proximal tibial accelerations		
Murdock	No change in knee flexion angle  Increased knee adduction and decreased internal rotation			
Nyland	No Kinematic Differences	No change in vertical ground reaction force and no change in braking force	Delayed onset of RF, VL, BF, and medial hamstrings	
O'connor	Decreased knee flexion angle	Decreased knee flexion moment		
Orishimo	Increased Knee flexion RoM	No Change in knee flexion moment	increased quads muscle activation	
Ortiz	Decreased knee flexion during up-down	No changes in kinetics	No change in muscle activation	
Parek	Increased hip abduction at initial contact  Decreased knee abduction 60ms after landing	Decreased knee adduction moment and hip adduction moment	Delayed onset of hip abductor muscles	
Quammen	Decreased hip flexion at all phases and decreased knee flexion at all phases			
Qu	<b>Landing Phase</b> Increased knee flexion at Impact Increased peak knee flexion  <b>Cutting Phase</b> Increased peak knee internal rotation	<b>Cutting Phase</b> Increased peak rotation moment		
Radzak	Increased hip adduction and increased hip internal rotation	Increased hip Internal rotation moment and knee Internal rotational moment		
Rahnama			Decrease Hamstring/Quads ratio	

Ribeiro				Increased AAE
Salgado				Increased AAE  Decreased RAE
Sanna	Increased touchdown knee internal rotation and internal rotation RoM			
Savage	Increased initial contact knee flexion angles	Increased knee extension moment		
Schmitz	Increased anterior tibial translation	Increased axial compression		
Smeets	No effects of fatigue	No effects of fatigue		
Thomas	Decreased knee flexion and increased hip and knee internal rotation at initial contact	Decreased knee flexion moment and increased internal rotation moment		
Thomas	<b>Hip Fatigue</b> - increased hip internal rotation at initial contact and increased hip internal rotation at peak stance  <b>Tricep Surae Fatigue</b> - decreased Knee flexion at Initial Contact	No differences in kinetics		
Tsai	Increased knee abduction and internal rotation	Increased knee adductor moment		
Weeks	Increased peak trunk flexion, decreased trunk lateral flexion, and increased peak trunk rotation  Increased peak pelvis tilt and decreased peak pelvis obliquity  Increased range of hip adduction			
Weinhandl	Decreased knee flexion and increased ankle dorsi-flexion at landing  Increased trunk and ankle RoM	No change in peak vertical ground reaction force		
Wojtys	Increased anterior tibial translation		Delay in muscle reaction time in medial and lateral quads	
Wong	Increased knee flexion and forward trunk lean at ground contact	Increased peak vertical ground reaction force and anterior tibial shear		

	Decreased knee RoM			
Xia	Increased knee flexion RoM and time to peak knee flexion  Increased hip flexion	No change in vertical ground reaction force		
Zago	Decreased hip and knee flexion			
Zebis	No change in hip or knee flexion	No change in vertical ground reaction force	Decreased hamstring muscle activity 50ms and 10ms pre-landing, 10ms post landing	