

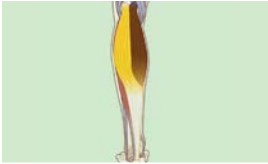
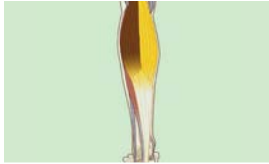




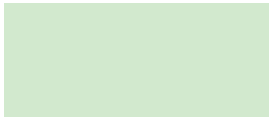









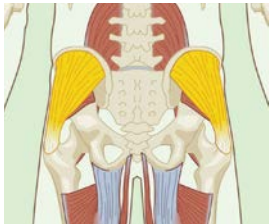


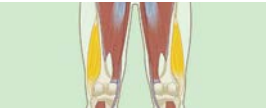
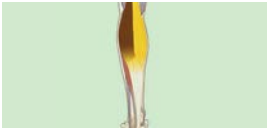
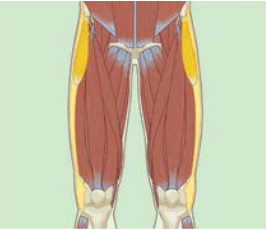

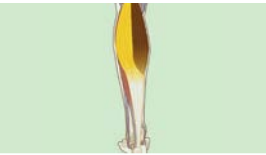
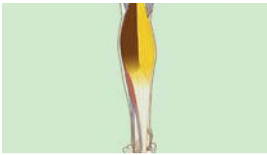


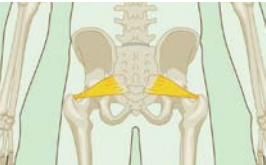







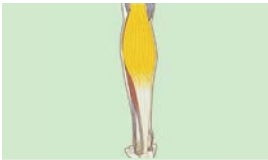




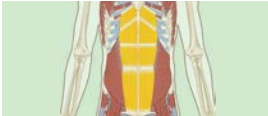





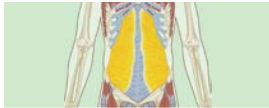

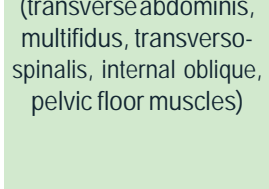





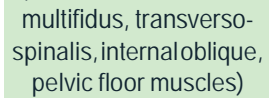
OVERHEAD SQUAT ASSESSMENTS



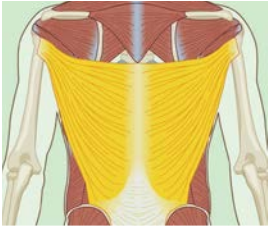


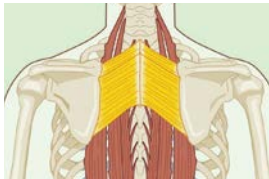
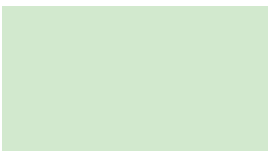


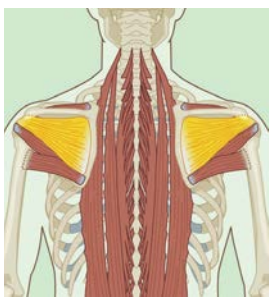
COMPENSATION	OVERACTIVE (SHORT)	WHY	UNDERACTIVE (LENGTHENED)	WHY	POSSIBLE INJURIES	WHY
Feet Turn Out	Soleus 	Excessive plantar flexion limits dorsiflexion, which means that in order to squat and achieve desired depth, the feet turn out.	Anterior Tibialis 	Promotes dorsi flexion to allow proper range of motion and stabilizes the foot and ankle complex	Plantar Fasciitis	As the arch falls, fascia is stretched excessively—pain typically occurs at insertion (heel)
	Lateral Gastrocnemius 		Medial Gastrocnemius 	Promotes tibial internal rotation	Achilles Tendinopathy	Due to excessive plantar flexion (tight gastrocnemius and soleus) and rotation of the Achilles during movement patterns
	Biceps Femoris (Short Head) 	Attaches from lower femur to fibula, externally rotates lower leg and disrupts normal ankle mechanics.	Medial Hamstring 	Helps stabilize lumbo pelvic hip complex and promote internal rotation of the lower leg	Medial Tibial Stress Syndrome ("shin splints")	Improper ankle mechanics (lack of dorsiflexion) and externally rotated lower leg leads to overuse of the ant/post tibialis
	Tensor Fascia Latae (TFL) 		Gluteus Medius/Maximus 	TFL being an overactive internal rotator and hip flexor can inhibit the hip external rotators and hip extenders	Ankle sprains	Lack of mobility through the ankle and underactive glutes and be associated with chronic ankle instability and repetitive ankle sprains.
			Popliteus 	Promotes tibial internal rotation and knee stabilization		Because the lower leg is not aligned properly, it is more likely to suffer from excessive strain on the patellar tendon

COMPENSATION	OVERACTIVE (SHORT)	WHY	UNDERACTIVE (LENGTHENED)	WHY	POSSIBLE INJURIES	WHY
Feet Turn Out			Gracilis 	Promotes tibial internal rotation and knee stabilization	General knee pain	Lack of stability to the knee and poor foundation from the foot and leads to a variety of knee problems.
			Sartorius 	Promotes knee internal rotation and knee stabilization	General knee pain	Lack of stability to the knee and poor foundation from the foot and leads to a variety of knee problems.
Feet Flatten	Peroneal Complex 	Eversion (show bottom to outside, so inside "falls") – overpronation	Anterior Tibialis 	Promotes ankle dorsiflexion and inversion (bottom of foot to inside)	Plantar Fasciitis	As arch falls, fascia is stretched excessively- pain typically occurs at insertion (heel)
	Lateral Gastrocnemius 	Causes eversion (show bottom to outside, so inside "falls")- overpronation	Posterior Tibialis 	Promotes inversion (bottom of foot to inside)	Achilles Tendinopathy	Due to excessive plantar flexion (tight gastrocnemius and soleus)
	Biceps Femoris 	Causes tibial external rotation, which promotes arch falling	Medial Hamstring 	Promotes tibial internal rotation and knee stabilization	General knee pain	Lack of stability to the knee and poor foundation from the foot and leads to a variety of knee problems.
Knees Move Inward (Valgus)	TFL 	Attaches from the ilium to the tibia, will cause internal rotation of femur and external rotation of the tibia, which sets up tibia/feet to turn out and knees to cave in	Gluteus Medius 	Posterior fibers promote external rotation of femur, if not firing properly knees will cave in, which would prevent knee valgus and tibial external rotation and excessive pronation	IT Band Tendonitis	Caused by excessive pronation of the foot, altering the position of the knee, and the IT Band becomes compressed into the surrounding tissues
	Adductor Complex 	Adduct and internally rotate hips, causing collapse of knees	Medial Hamstring 	Promotes tibial internal rotation, which would align entire leg to prevent knees from caving in	Patellar Tendinopathy ("Jumper's Knee")	Because the lower leg is not aligned properly, it is more likely to suffer from excessive strain on the patellar

COMPENSATION	OVERACTIVE (SHORT)	WHY	UNDERACTIVE (LENGTHENED)	WHY	POSSIBLE INJURIES	WHY
Knees Move Inward (Valgus)	Biceps Femoris (Short Head) 	Causes knee flexion and tibial external rotation, causing knees to collapse because not properly aligned	Medial Gastrocnemius 	Promotes tibial internal rotation, which would align entire leg to prevent knees from caving in	Patellofemoral Pain Syndrome	Larger Q angle means the patella is not tracking correctly with the femur
	TFL 	Attaches from the ilium to the tibia, will cause internal rotation of femur and external rotation of the tibia, which sets up tibia/feet to turn out and knees to cave in	Gluteus Medius/Maximus 	Promotes hip external rotation, which would prevent knee valgus and tibial external rotation	ACL Injury	More prone to injury due to repetitive strain on the ligaments of the knee
	Lateral Gastrocnemius 	Causes tibial external rotation, which causes knees to collapse because not properly aligned	Medial Gastrocnemius 	Promotes tibial internal rotation and knee stabilization	IT Band Tendonitis	Caused by excessive pronation
	Vastus Lateralis 	Knee valgus position creates a "bowstring" effect on the VL; it adapts to the shortened position over time	Vastus Medialis Oblique (VMO) 	Promotes knee stabilization and alignment of the patella	Patellofemoral Pain Syndrome	Improper tracking, typically a lateral tilt or shift of the patella, begins to wear down the posterior articular surface of the patella
	Piriformis 	Causes hip external rotation	Adductor Complex 	Would promote hip adduction	Piriformis Syndrome	Overactive piriformis can place pressure on the sciatic nerve, often causing radiating pain to the knee.
Knees Move Outward (Valgus)	Biceps Femoris 	Due to attachment at ischial tuberosity, can pull the knees out	Medial Hamstring 	Would promote hip adduction	Patellofemoral Pain Syndrome	Improper alignment of the knee will place repeated stress on the patellar tendon

COMPENSATION	OVERACTIVE (SHORT)	WHY	UNDERACTIVE (LENGTHENED)	WHY	POSSIBLE INJURIES	WHY
Knees Move Outward (Valgus)	TFL 	When not acting as stabilizers, can become synergistically dominant for glute med and pull the knee out	Gluteus Medius/Maximus 	Can be underactive for a variety of reasons, leading to TFL becoming synergistically dominant for frontal plane control	IT Band Tendonitis	Caused by excessive pronation of the foot, altering the position of the knee, and the IT Band becomes compressed into the surrounding tissues
Excessive Forward Lean	Soleus 	Limits dorsiflexion, which means that in order to squat and achieve desired depth, one leans forward to offset center of gravity and prevent from falling backwards	Anterior Tibialis 	Inhibited by solues, is needed to pull the knee forward into ankle dorsiflexion during the squat	Posterior Tibialis Tendonitis (Shin Splints)	Improper ankle mechanics (lack of dorsiflexion) leads to overuse of the ant/post tibialis
	Gastrocnemius 	Excessive plantar flexion limits dorsiflexion, which means that in order to squat and achieve desired depth, one leans forward				
	Hip Flexor Complex 	Causes excessive hip flexion	Gluteus Maximus 	Inhibited by hip flexors. Glutes are needed to maintain torso alignment during a squat	Low back pain	As torso falls forward, torque on the hips increases and effective loading shifts superior to overload low-back muscles.
	Piriformis 	When glutes become underactive, piriformis becomes overactive in attempt to maintain force reduction during hip flexion	Intrinsic Core Stabilizers (transverse abdominis, multifidus, transversospinalis, internal oblique, pelvic floor muscles) 	Usually inhibited by improper alignment of LPHC, are needed to maintain neutral spine	Hamstring complex strains	Excessive hip flexion can lead to increased stress to hamstrings which are trying to compensate for inhibited core and glutes.
	Abdominal Complex 	Becomes synergistically dominant due to inhibit intrinsic core, causes excessive spinal flexion				

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Low Back Arches (Excessive Spinal Extension)	Hip Flexor Complex 	Causes excessive hip flexion, shortens distance between torso and femur	Gluteus Maximus/ Hamstrings 	Are inhibited by hip flexor complex, cannot maintain force production for hip extension and the spinal erectors compensate which alters spinal alignment	Hamstring complex, quad and adductor strains	Excessive hip flexion can lead to increased stress to hamstrings and adductor magnus which are trying to compensate for an inhibited gluteus maximus.
	Erector Spinae 	Causes excessive spinal extension	Abdominals 	Would promote spinal flexion to maintain neutral spine	Lower back pain	Excessive extension in the lumbar spine can compress facet joints and cause pain
	Latissimus Dorsi 	Become shortened during lumbar spine extension and synergistically dominant for spinal stabilization	Intrinsic Core Stabilizers (transverse abdominis, multifidus, transversospinalis, internal oblique, pelvic floor muscles) 	Are inhibited by lumbar spine extension and overactive lats. Are needed to provide proper stabilization to the lumbar spine	Shoulder Injuries	Due to the lats attachment, they can internally rotate the humerus and alter the position of the scapula leading to shoulder impingement
Low Back Rounds (Excessive Spinal Flexion)	Hamstrings 	Short hamstrings resist hip flexion, lumbar spine compensates	Gluteus Maximus 	Unable to be activated due to short hamstrings	Hamstring complex, quad and adductor strains	Excessive hip extension can lead to increased stress to hamstrings and adductors which are trying to compensate for an inhibited gluteus maximus
	Adductor Magnus 	Adductor magnus attaches to ischial tuberosity and if short will resist hip flexion, lumbar spine compensates	Hip Flexor Complex 	Inhibited by hip extensors (hamstring and adductor magnus) unable to maintain neutral LPHC		
	Rectus Abdominis/ External Obliques 	Causes excessive spinal flexion	Intrinsic Core Stabilizers (transverse abdominis, multifidus, transversospinalis, internal oblique, pelvic floor muscles) 	Unable to stabilize lumbar spine	Low-back pain	Excessive spinal flexion, lack of spinal stability can compress the disc and lead to pain in the low back.

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	Rectus Abdominis/ External Obliques 	Causes excessive spinal flexion	Latissimus Dorsi 	Flexed lumbar spine alters position of the lats and causes them to be inhibited	Shoulder Injuries	Due to the attachment, underactive lats can decrease stabilization to the scapula
Arms Fall Forward	Latissimus Dorsi 	Excessive shoulder extension and internal humeral rotation, altering the position of the scapula	Mid/Lower Trapezius 	Unable to retract and depress the scapula, leading to an altered position of the entire shoulder girdle	Headaches	Tight pecs pull the shoulder forward, causing upper crossed posture with tight muscles in neck (upper traps, levator scapulae), which can cause tension headaches
	Pectoralis Major/Minor 	Pec major internal rotates and horizontal adducts the humerus, while pec minor protracts the shoulder girdle	Rhomboids 	Unable to retract the scapula due to pec minor, leading to an altered position of the shoulder girdle	Biceps Tendonitis	Upper crossed posture causes internal rotation of arms, which places stress on biceps tendon
	Coracobrachialis 	Attaches to humerus and scapula, would prevent full shoulder flexion leading to arms falling forward	Posterior Deltoid 	Should stabilize shoulder girdle and prevent excessive internal rotation	Shoulder Injuries	Lack of shoulder stabilization
	Teres Major 	Excessive shoulder extension	Rotator Cuff 	Should stabilize shoulder girdle	Shoulder impingement	Improper shoulder alignment can result in an anterior and superior migration of the humeral head and compress the supraspinatus