



Football Training Programs for Performance Enhancement & Injury Prevention

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Performance Needs Analysis for American Football

- **Common Injuries:** American football has been shown to have the highest musculoskeletal injury rates when compared to other sports at the high school & collegiate levels (Whiting, 2015). Contact related injuries can include contusions, concussions, strains, ligament tears, tendon ruptures, and fractures. Strains, sprains, and tears can also be the result of non-contact movements (Whiting, 2015). Common areas of the body injured during football due to contact trauma include the ankle, knee, hip, glenohumeral, hand/wrist, and cervical spine (Whiting, 2015).
- **Sports Specific Movement Patterns Required:** While a detailed analysis of all positions of football are beyond the scope of this needs analysis, all positions to varying degrees will include multi-directional deceleration and acceleration (agility), linear acceleration, and absolute speed, all with a reactive component (quickness) from trying to evade or catch an opponent/ball (Robbins & Goodale, 2012). Specific tasks include tackling, blocking, and being tackled (total body strength & power; glenohumeral & cervical stability), throwing (QB: total body rotational power, mobility, shoulder stability), catching (reactivity, jumping, landing); kicking/punting. (lower extremity strength, power, mobility, and stability).
- **Multi-directional Agility & Quickness Demands:** Multiple short acceleration/deceleration change of direction either anticipated (agility) or reactive (quickness) is a large movement component for all positions for catching or evading opponents.
- **Linear Acceleration Demands:** Short distance linear acceleration (< 20 yards) is a large component of many positions, especially WR, DB, RB, LB, & DL
- **Absolute Speed Demands:** Longer distance linear sprinting (> 20 yards) is more relevant to WR, DB, RB, LB, as well as special team coverage and return units, although all positions will most likely require longer sprints during varying points in the game.
- **Flexibility Demands:** Emphasis on ankles, hips, and thoracic spine mobility in 3 planes of motion to meet movement demands listed above and reduce risk of injury. For QB's, asymmetries in glenohumeral internal & external and thoracic spine rotation are expected based on dominant arm. Asymmetries in mobility for kickers (K) and punters (P) are expected with hip internal/external rotation between right and left leg based on dominant kicking leg.
- **Stabilization Demands:** Lower extremity (Foot, ankle, & hip) emphasis on multi-planar horizontal and vertical deceleration (jump, hop, bound); Upper extremity: (core, shoulder girdle, & neck) stabilization (tackling, blocking, and being tackled).
- **Power Demands:** Lower body horizontal power is highest priority for short distance acceleration and deceleration (horizontal plyometric, speed-strength, and strength-speed training emphasis); Total body rotational power for throwing, tackling, kicking, & punting (speed-strength & strength-speed emphasis); Lower body vertical power for jumping & longer sprinting (horizontal plyometric & speed strength training emphasis), Upper body power for blocking, tackling, throwing, and "stiff arms" to avoid tackles.
- **Strength Demands:** Total body strength for efficient force transfer in linear sprinting, multi-planar cutting, delivering and absorbing contact, and injury prevention. Emphasis on periodized strength training with varying strength movements, volume, and intensity based on time of year and position.
- **Core Strength Demands:** core stability for efficient contact absorption (warding); core strength and power for efficient force transfer in multi-directional cutting, linear sprinting, throwing, punting, and kicking (rotational).
- **Energy System Demands:** 5–6 seconds per play; approximately 15–35 seconds between plays when no stoppage occurs for no huddle offenses; longer recovery between huddles, timeouts, quarter, and halftime breaks (Kraemer, Torine, Dudley, & Martin, 2015). Total playing time for a regulation contest is 48 minutes (high school) and 60 minutes for NCAA & NFL. Although the training the ATP-PC system is most critical for power and speed output, ESD training should include components of both glycolytic and aerobic systems throughout training and practice to recovery between plays and endurance for the entire 48-60 minute game. The energy system demands will vary among positions, with WR, DB, RB, and LB generally covering more distance on each play than OL, DL, QB, K, & P.
- **Common Football Performance/Athletic Profiling Tests:** NFL Combine performance tests include the 40 yard dash, broad jump, vertical jump, 3 cone drill, 20 yard shuttle, 60 yard shuttle, bench press, and medical injury screening (Robbins & Goodale, 2012). High school and collegiate programs will often test maximal lower extremity strength (squat or deadlift) and power (varying Olympic lifts). It is also recommended unilateral asymmetries be assessed with tests such as single leg horizontal hopping or triple jumps.

References:

- Kovacs, M., Katzfey, T. (2015). A sport-specific performance and prevention program for the throwing quarterback. *Strength & Conditioning Journal*. 37(6), 37-42.
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- Robbins, D., Goodale, T. (2012). Evaluation of the physical test battery implemented at the national football league combine. *Strength & Conditioning Journal*. 34(5), 1-10.
- Whiting, W. (2015). Biomechanics of common musculoskeletal injuries in American football. *Strength & Conditioning Journal*. 37(6), 79-87.

Benefits of Power Plate Training for Football

Performance Benefits: Strength & Power

Force Production

Pre-activation for Strength & Power Production

Elasticity

Injury Prevention Benefits:

Mobility

Knee Stabilization

Ankle Stabilization

Core Stabilization

Recovery: Circulation & Pain Dampening

Power Plate peer-reviewed research: <https://powerplate.com/education-training/research>

Power Plate Football Strength/Power: Base Conditioning (Lower Body Knee Dominant/Upper Pull)

Movement Preparation	Sets	Frequency & Amplitude	Duration	Load	Rest
Soft-Tissue					
Lateral Thoracic Spine	1	40 Hz/High	:30 each	BW	0
Medial Hip: Adductor	1	40 Hz/High	:30 each	BW	0
Lateral Hip: IT Band/TFL	1	40 Hz/High	:30 each	BW	0
Anterior Hip: Quadriceps	1	40 Hz/High	:30 each	BW	0
Mobility					
Anterior Lunge Elbow to Instep/Hamstring Rock Back	1	35-40 Hz/Low	:30 each	BW	0
Lateral Squat	1	35-40 Hz/Low	:30 each	BW	0
Anterior Lunge & Overhead Reach (Trail Leg on PP)	1	35-40 Hz/Low	:30 each	BW	0
Upper Trap/Shoulder Strap Stretch	1	35-40 Hz/Low	:30 each	BW	0
Rotational Neck/Shoulder Strap Stretch	1	35-40 Hz/Low	:30 each	BW	0
Activation					
Supine Hip Extension w/Mini Band	1	35-40 Hz/Low	:45	Mini-Band	0
Single Leg Balance & 3D Reach	1	35-40 Hz/Low	:45 each	BW	0
Pushup w/Rotational Holds	1	35-40 Hz/Low	:45	BW	0
Athletic Base w/Mini-Band Hip Rotations	1	35-40 Hz/Low	:45	Mini-Band	:60
Strength & Power Circuit					
1a.) Hang Clean	5	N/A	5	60-70%	0
1b.) Power Plate Stretch or Activation (Athlete Choice)	5	35-40 Hz/Low	2:00	BW	2:00
2a.) Front Squat or Safety Bar Squat	4	N/A	8-10	60-70%	0
2b.) 1 Arm ½ Kneeling DB Row on Bench	4	N/A	8-10 ea.	60-70%	1:30
3a.) DB Split Squat	4	35-40 Hz/High	8-10 ea.	60-70%	0
3b.) Pullup	4	N/A	8-10	60-70%	1:30
4a.) 1A Cable Bent Over Row	2-3	35-40 Hz/High	:30 ea.	Cable	0
4b.) Single Leg Squat	2-3	35-40 Hz/High	:30 ea.	BW	0
4c.) Standing Cable Curls	2-3	35-40 Hz/High	:30	Cable	0
4d.) Lateral Plank	2-3	35-40 Hz/High	:30 ea.	BW	:60
Post- Session Recovery					
Upper Trap/Lateral Neck Stretch w/Straps	1	40 Hz/High	:30 each	BW	0
Anterior Hip: Quadriceps	1	40 Hz/High	1:00	BW	0
Medial Hip: Adductors	1	40 Hz/High	1:00 each	BW	0
Lateral Hip: IT Band/TFL	1	40 Hz/High	1:00 each	BW	0
Gastroc/Hamstrings	1	40 Hz/High	1:00	BW	0
Notes for Strength & Power Circuit: <ul style="list-style-type: none"> • Load and Duration: can be TBD by athlete • High Volume: 4-5 circuits each • Low Volume or In-Season: 2-3 circuits each • Frequency: 1-2 days per week • Cycle Duration: 4 weeks; <ul style="list-style-type: none"> ○ Can alternate with “Pre-Activation” Program if using non-linear periodization ○ Can use same parameters for a “Hip Dominant-Upper Push” exercise selection 					

Power Plate Football Strength/Power: Hypertrophy (Lower Hip Dominant/Upper Push)

Movement Preparation	Sets	Frequency & Amplitude	Duration	Load	Rest
Soft-Tissue					
Lateral Thoracic Spine	1	40 Hz/High	1:00 each	BW	0
Posterior Hip: Glutes/External Rotators	1	40 Hz/High	1:00 each	BW	0
Lateral Hip: IT Band/TFL	1	40 Hz/High	1:00 each	BW	0
Posterior Hip: Hamstrings	1	40 Hz/High	1:00 each	BW	0
Mobility					
Anterior Lunge Elbow to Instep/Hamstring Rock Back	1	35-40 Hz/Low	:30 each	BW	0
Kneeling Anterior Chest Stretch on Foam Roll	1	35-40 Hz/Low	:30 each	BW	0
Anterior Lunge & Overhead Reach (Front Leg on PP)	1	35-40 Hz/Low	:30 each	BW	0
Standing Posterior Hip Stretch	1	35-40 Hz/Low	:30 each	BW	0
Rotational Neck/Shoulder Strap Stretch	1	35-40 Hz/Low	:30 each	BW	0
Activation					
Supine Hip Extension w/Mini-Band	1	35-40 Hz/Low	:45	Mini-Band	0
Prone Plank to Pushup 1 Arm Holds	1	35-40 Hz/Low	:45	BW	0
Single Leg RDL w/Hip Rotation	1	35-40 Hz/Low	:30 each	BW	0
1 Arm Cable Vertical Push	1	35-40 Hz/Low	:30 each	BW	0
Athletic Base w/Mini-Band Hip (1 Leg Rotations)	1	35-40 Hz/Low	:30 each	Mini-Band	:60
Strength & Power Circuit					
1a.) Push Press	4-6	N/A	5	70-80%	0
1b.) Power Plate Stretch or Activation (Athlete Choice)	4-6	35-40 Hz/Low	2:30	BW	2:30
2a.) Deadlift	4	N/A	6-8	80-85%	0
2b.) Glute Ham Raise or Cable Pull Thru	4	N/A	6-8	80-85%	2:00
3a.) Bench Press	4	N/A	6-8	80-85%	0
3b.) Pushup (Feet Elevated/Add Band Load)	4	35-40 Hz/High	6-8	80-85%	2:00
4a.) Single Leg Deadlift	2-3	35-40 Hz/High	:30 ea.	BW	0
4b.) Front Plank w/Alternate Hip Extension	2-3	35-40 Hz/High	:45	BW	0
4c.) Triceps (Athlete Choice)	2-3	N/A	8-10	70-80%	:60
Post- Session Recovery					
Lateral/Posterior Thoracic Spine	1	40 Hz/High	:30 each	BW	0
Anterior Hip: Quadriceps	1	40 Hz/High	1:00 each	BW	0
Medial Hip: Adductors	1	40 Hz/High	1:00 each	BW	0
Lateral Hip: IT Band/TFL	1	40 Hz/High	1:00 each	BW	0
Gastroc/Hamstrings	1	40 Hz/High	1:00	BW	0
Notes for Strength & Power Circuit: <ul style="list-style-type: none"> • Load: % of 1RM • High Volume Day: 4 sets each • Low Volume or In-Season: 2 sets each • Frequency: 1-2 days per week <ul style="list-style-type: none"> ○ Cycle Duration: 4 weeks; ○ Can alternate with “Pre-Activation” or “Tri-Set” program if using non-linear periodization ○ Can use same parameters with a “Knee Dominant-Upper Pull” exercise selection 					

Power Plate Football: Max Strength & Power: Pre-Activation (Lower Body Knee Dominant/Upper Pull)

Movement Preparation	Sets	Frequency & Amplitude	Duration	Load	Rest
Soft-Tissue					
Lateral Gastroc/Anterior Tibialis	1	40 Hz/High	1:00 each	BW	0
Medial Hip: Adductor	1	40 Hz/High	1:00 each	BW	0
Lateral Hip: IT Band/TFL	1	40 Hz/High	1:00 each	BW	0
Anterior Hip: Quadriceps	1	40 Hz/High	1:00 each	BW	0
Mobility					
	Sets	Frequency & Amplitude	Duration	Load	Rest
Split Stance Hamstring Stretch	1	35-40 Hz/Low	:30 each	BW	0
Standing Adductor Stretch w/Rotational Reach	1	35-40 Hz/Low	:30 each	BW	0
Hip Swing: Rotational w/Gastroc Stretch	1	35-40 Hz/Low	:30 each	BW	0
Anterior Hip w/Overhead Reach (Front Foot on Plate)	1	35-40 Hz/Low	:30 each	BW	0
Lateral Posterior Hip/Shoulder Stretch	1	35-40 Hz/Low	:30 each	BW	0
Activation					
	Sets	Frequency & Amplitude	Duration	Load	Rest
Supine Hip Extension w/Mini-Band	1	35-40 Hz/Low	:45 each	BW	0
Single Leg Squat w/Contralateral Rotational Reach	1	35-40 Hz/Low	:45 each	BW	0
Prone Plank to Pushup 1 Arm Holds	1	35-40 Hz/Low	:45	BW	0
Single Leg RDL	1	35-40 Hz/Low	:45 each	BW	0
Athletic Base w/Mini-Band Hip (1 Leg Rotations)	1	35-40 Hz/Low	:45 each	Mini-Band	:60

Football Recovery: Post-Session/Practice/Game (14:00)

	Sets	Frequency & Amplitude	Duration	Load	Rest
Soft-Tissue					
Medial Hip: Adductor	1	40 Hz/High	1:00 each	BW	0
Lateral Hip: IT Band/TFL	1	40 Hz/High	1:00 each	BW	0
Anterior Hip: Quadriceps	1	40 Hz/High	1:00	BW	0
Posterior: Supine Hamstring/Gastroc	1	40 Hz/High	1:00	BW	0
Posterior: Low Back w/Feet Elevated	1	40 Hz/High	1:00	BW	0
Posterior/Lateral Thoracic Spine	1	40 Hz/High	1:00 each	BW	0
Mobility					
Standing Hamstring Stretch	1	35-40 Hz/Low	:45	BW	0
½ Kneeling Anterior Hip w/Handle Hold	1	35-40 Hz/Low	:30-:45 ea	BW	0
Kneeling Adductor w/Lateral Rocking	1	35-40 Hz/Low	:30-:45 ea	BW	0
Seated Posterior Hip	1	35-40 Hz/Low	:30-:45 ea	BW	0
Kneeling Thoracic Extension Stretch	1	35-40 Hz/Low	:45	BW	0
Notes: <ul style="list-style-type: none"> • Total Time: 14-16 min. • Can do immediately after session or in-between high intensity sessions/practices as part of an integrated recovery program (see figure 1 below) 					