

STRENGTH & CONDITIONING II PROJECT

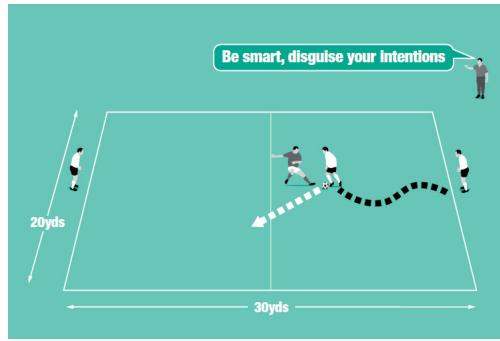
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0 - Introduction. The second part of strength and conditioning class was very informative and useful for me as a soccer coach. The course covered some deeper concepts on the science (biomechanics) and theory behind successful strength and conditioning programs. A key idea that I found particularly useful was the idea of periodization. Periodization is the guidance of a training process such that the athlete is able to perform at the highest level at major predetermined points. Long and short term training strategies can be employed to achieve these goals. The process of organizing these various programming strategies and aligning them with the targeted performance goals and timelines is referred to as periodization. A typical periodization structure may consist of various cycles of differing lengths

- (1) Multi-Year Plan (2-4 years) - Long term plan that outlines the progression of training goals over several annual plans.
- (2) Annual Plan (1 year) - Outlines a year of training containing multiple macrocycles.
- (3) Macrocycle (several months to a year) - Consists of the competitive season which includes off-season, pre-season and in-season.
- (4) Mesocycle (2-6 weeks) - Usually 4 weeks and contains multiple microcycles.
- (5) Microcycle (several days to 2 weeks)
- (6) Training Day
- (7) Training Session

As a coach, I have experienced the setback of having players injured during key moments in a periodization model - particularly during the competition phase when we would need peaking or maintenance. Hamstring strains are among the most common injury in soccer particularly because soccer involves so much sprinting, turning and jumping. In this project, I give a brief analysis of a skill that involves the hamstrings in soccer in which there is potential for players to get injured. I also provide a training plan whose goal would be to help with injury prevention for the hamstrings in particular.

1 - Soccer-specific skills. In this project, we want to consider the skill of dribbling with the ball with a change of direction to beat an opposition player in a 1v1 situation.



2 - Physiology of the Hamstring. In dribbling with changes of direction, the hamstring plays a key role. The hamstring group consists of 3 individual muscles: biceps femoris, semitendinosus, and semimembranosus. The hamstrings work primarily to flex the knee and extend the hip. Also creating knee flexion, the hamstrings co-contract to minimize both anterior and lateral tibial translation aiding knee stability. In addition, the biceps femoris muscle secondarily acts as a lateral rotator of the semiflexed knee and extended hip. “Specific to soccer, it has been suggested that the hamstrings’ main roles are to control the running action and stabilize the knee during turns or tackles”¹. Muscle strain injury is characterized by a disruption in the muscle-tendon unit. This can be due to lack of preconditioning or a larger than usual force applied to the muscle.

¹See the article, “Hamstring Strain Prevention in Elite Soccer Players,” Turner, et. al, Conditioning Journal.

3 - Range of Motion. In the skill we are examining, the range of motion consists of an extension of the legs (quadriceps, calves and hamstrings) at high speed. The angle pertaining to direction in the motion is also crucial in the turning phase. During sprinting, the hamstring muscles work extremely hard to slow down the lower leg. Once the foot is on the ground, the hamstrings are used to straighten the hip backwards which allows the other leg to move forwards. Thus, hamstrings most often become injured during the time right before the foot strikes the ground. At this stage, the muscles are maximally activated and are approaching their maximum length. This can be either in the deceleration or acceleration phase of the skill. A strain can also occur when pushing off to spring.

4 - Training Plan. A training plan to combat hamstring injuries in this specific skill will need to contain the two basic elements - injury prevention (muscle strength) and improving explosiveness (particularly to combat strains that occur in a sprint phase). We propose two training days in a microcycle periodization phase that can be used by the athlete to improve their hamstring strength. Each workout should be preceded by the dynamic workout specified below.

- (1) Dynamic Warm-Up
 - (a) Optional: begin with a fun game to get athletes warmed up (spike ball, gaga).
 - (b) Forward squats (x10)
 - (c) Side Squats (x10 on each side)
 - (d) Sumo Squats (x10) - key hamstring stretch
 - (e) Glute Bridges (single x6/double x10)
 - (f) Iron Crosses (x5 on each side)
 - (g) Scorpions (x5 on each side)
 - (h) Sprinter/Runner stretches - key hamstring stretches
 - (i) **Injury Prevention:** ABC Woodchoppers (x5 on each side)
 - (j) **Movement Prep/Neuromuscular phase:** ankle hoppers
- (2) Day 1: Max Rep Day
 - (a) Weights: Parallel Squat (4x3-4 @85%)
 - (b) Weights: HH Dead Lift (4x3-4 @85%)
 - (c) Glute Hamstring Raise (4x8-10)
 - (d) Glute Bridge (4x6)
 - (e) Step-Ups (2x10)
 - (f) Weighted Lunge Walk (x5)
- (3) Day 2: Resistance Day - perform the weight routine below with resistance bands
 - (a) Weights: Parallel Squats (4x6 @40%)
 - (b) Vertical Jump (4x5)
 - (c) Weights: Banded HH Deadlift (4x6 @40%)
 - (d) Reverse Hypers (3x15)
 - (e) Band Pull Throughs (3x12)
 - (f) Hamstring Curls [Bands] (3x25)
 - (g) Goblet Cockeyx Squat (2x6)
 - (h) Lateral Leap (2x6)
 - (i) Lunge City (5 laps)