Sprinting Exposure and Running Imbalance as they Relate to Hamstring Injury Risk

Previous research suggests that exposure to sprinting throughout training is strongly associated with HSI risk. More specifically, for athletes, achieving maximum velocity more regularly has been shown to protect against HSI. Research has pointed out that most hamstring injuries occur during the late swing phase of the stride when sprinting. Specifically, sprinting puts a large eccentric load onto the hamstring. This is unique to sprinting and is hard to replicate in strength training making the late swing phase hard to protect from injury. “Although eccentric strength training interventions have proven effective in certain contexts, there is contradictory evidence that suggests they may not fully address the impact of increased sporting demands. Several studies have failed to identify consistent and strong associations between eccentric strength and future HSI or reinjury” (Bramah et al.). This suggests that only sprinting itself is the most effective method to protect against hamstring injury or reinjury.

But, with increased exposure to sprinting, the question of how often, is brought into play. The same study suggests that too quick of an introduction to frequent sprinting may have the opposite of the intended effect. “High-speed running provides a mechanical stimulus to the hamstrings that is specific and essential for injury prevention, yet this same activity can increase injury risk when athletes are not progressively exposed to it” (Bramah et al.). It’s important to understand that sprinting is the most effective way to prevent hamstring injuries but it is only effective when introduced and maintained effectively. A sharp increase in the frequency of sprinting can be what ends up triggering the hamstring injury in the end.

This brings up the question of how often should one be sprinting to increase eccentric hamstring strength without putting themselves at higher risk of hamstring injury? A study done

on professional soccer players found that players who complete 7-8 efforts with >90% of their maximum speed were associated with decreased eccentric hamstring strength and suggested that the same would occur for >8 efforts completed in one week. They did not see decreased eccentric hamstring strength for <7 efforts at 90% of their maximum speed (Shah et al.). The study suggests that in order to maintain proper eccentric hamstring strength, players should focus on having less than 7-8 90% efforts in a week. This, though, was done on soccer players and the study suggests that athletes should change this threshold to reflect how often players sprint in their specific sport. Applying this concept to football which has many different positions, all of which have very different physical demands, asking all of the players on the team to sprint the same amount may increase the risk for HSI for some players while decreasing it for others.

As for the impact of running imbalance and risk for HSI, research has shown that running imbalance has a somewhat complicated relationship with HSI risk. One study looked at ground contact time and how it affects running economy in Division 1 collegiate runners. This study found that ground contact time did not vary significantly for individual athletes when running at different speeds (Joubert et al.). With that being said, for the purposes of this analysis, we don't predict that there will be large or significant differences in running imbalances for athletes that are healthy. With this, another study used a paired test approach to compare distance runners who had sustained a lower body injury to those who had not and found that runners that had sustained a lower body soft tissue injury had greater asymmetries in their strides than runners who had not sustained an injury (Zifchock et al.). The study found that strides in runners tended to be symmetrical before injury and only changed to a significantly asymmetrical stride after injury (Zifchock et al.). This study did not give an indication of a time frame in which a runner's stride returned to normal after injury.

Other studies, like one conducted on elite rugby players, found that running style played a large role in HSI risk. This study found that athletes who had greater thoracic lateral flexion when sprinting were at higher risk for running HSI (Kenneally-Dabrowski et al.). Thoracic lateral flexion is an indicator of poor core stability when running. This suggests that not just running imbalance may be associated with HSI risk but also running style.

Based on the studies above, in the context of this analysis, running imbalance may not be a very strong indicator of HSI for athletes who have not sustained an injury. Running imbalance though may be a strong indicator of athlete performance after sustaining an injury and may be useful when paired with other metrics.