Transfer of training to athletic competition remains one of the ultimate goals of all strength and conditioning coaches. Performance improvement, regardless of the skill, is ultimately determined by adaptation. Simply put, in order to improve any skill or performance quality, an athlete must be exposed to that stimulus, or stressor, and adapt appropriately. The key to performance improvement is continued adaptation to the stress, or stimulus, and the timely removal of that stress for recovery before reapplication of an increased stress, often termed progressive overload (5). If the training completed does not cumulatively improve performance, or stress a specific skill required on the competition field to a high enough degree, training time may be wasted and optimal performance may never be achieved. Transfer of training is achieved through many methods that are implemented throughout an annual program. Appropriate exercise selection, as well as implementation, is essential for performance improvement to be realized.

The sport of lacrosse, like the majority of athletic competitions, requires rapid changes of direction, sprinting, and transfer of force through the kinetic chain, all of which must be reactive in multiple planes of direction. These are just a few of the physical requirements of lacrosse. However, they must be specifically improved in order for performance enhancements to be realized to the greatest extent.

Performance improvement can be accomplished in the weight room through the improvement of specific physical parameters, or training adaptations. These include the ability to rapidly and safely decelerate, the ability to produce peak power levels, and the ability to accomplish each of these in multiple planes of motion. It should be noted that these are just a handful of the possible adaptations that can be improved through training, and there are many other skills required to be successful in competition. Keeping the parameters required for performance in mind, selected exercises must target desired adaptations based on the athlete’s sport.

The jump to hop, or “JOP” Matrix, allows the training of multiple physical variables/movements with a single exercise; thus, it has potential utility as an exercise that could benefit the training of lacrosse players. The JOP Matrix is described as a jump into a hop, which means it is completed using a double-leg jump followed by a single-leg landing. This JOP is then completed in each of the three planes of motion: sagittal, frontal, and transverse. By completing this exercise in all three planes of motion, a strength and conditioning coach is able to determine whether or not athletes are capable of producing and absorbing force in all planes, which are commonly experienced during competition.

The JOP Matrix is composed of three different explosive jumps with single-leg landings. This exercise is capable of not only being progressed, but also regressed, based on an athlete’s needs. A youth athlete can begin with only the vertical component of the jump and then add the movement (forward, lateral, or rotational) as they become capable of decelerating safely. Each movement...
within the JOP Matrix is demonstrated in Figures 1 – 3. Arrows are utilized to display the direction of the movement, with the solid athlete depicting the start position and the faded athlete depicting the final position.

FIGURE 1. THE JOP MATRIX MOVEMENT – SAGITTAL PLANE

The athlete jumps forward as far as possible while maintaining control and then sticks the landing on a single leg. The athletic, controlled position upon landing is critical for appropriate force absorption.

FIGURE 2. THE JOP MATRIX MOVEMENT – FRONTAL PLANE

The athlete jumps laterally as far as possible, sticking the landing on the outside leg. Once again, coaching appropriate landing position is crucial for force absorption.

FIGURE 3. THE JOP MATRIX MOVEMENT – TRANSVERSE PLANE

In this jump, the athlete completes a 90-degree turn and sticks the landing on the outside leg. Appropriate takeoff and landing cues should be utilized for optimal force production and absorption.

During the JOP Matrix, an athlete can begin in the same square, or area, for each of the jumps. They will begin with the forward JOP (sagittal plane) for the prescribed number of repetitions on a single leg (right, for example), and walk back to the starting position for each repetition. The athlete will then continue to use the right leg and complete the lateral JOP (frontal plane) for the prescribed number of repetitions, returning to the starting position after each repetition. Finally, the athlete will complete the rotational JOP (transverse plane) on the right leg, jumping as far as possible before sticking the landing on a single leg and absorbing the produced force. By returning to the starting position with each repetition, an athlete is able to set goals for improvement based on how much distance they are able to cover while remaining in control of their body and decelerating on a single leg, as is commonly required in competition.

The sport of lacrosse, like many athletic competitions, requires rapid change of direction, sprinting, and transfer of force. These movements require rapid eccentric to concentric muscle actions and in multiple planes of direction. When considering the physical performance requirements of lacrosse, the JOP Matrix improves an athlete’s ability to safely decelerate and stabilize on a single leg upon landing. As sports are primarily played in this single-leg fashion, this exercise matches that need and requires an athlete to rapidly absorb, and produce high levels of force through a single leg. This ability to quickly decelerate is affected by one’s rate of force absorption (RFA). Rate of force development (RFD) (i.e., the ability to produce force rapidly) receives the majority of attention in training but RFA is critical to sports performance, more specifically lacrosse, because athletes are constantly required to absorb and overcome forces. If an athlete’s RFA is inadequate, he or she may not have the ability to decelerate properly, and the likelihood of injury is dramatically increased (3,6).
JOP MATRIX—APPLICATION TO LACROSSE

As all coaches for lacrosse are aware, the game is played at extremely high velocities; therefore, speed is a critical component to improve and transfer onto the field. This ties back to the RFD concept introduced earlier. RFD becomes important in the sport of lacrosse due to the limited time an athlete has to produce force. Explosive movements in lacrosse such as running, reacting to opponents, and shooting all require a high RFD. The time available for force development in athletic movements is much smaller than the time needed for the body to produce maximal force, which takes up to 0.3 – 0.4 s (2,9). Sprinting is a simple example. The ground contact time in maximal velocity sprinting is typically between 0.08 – 0.12 s in elite level runners (2,9). Movement quality and effectiveness in lacrosse can be affected by how much force can be produced in the limited time allowed (1,2,4,8,9,11). Training programs or exercises that place focus on explosive strength, or high velocity movements, improve early force development by increasing neural drive (1,2,7,10). By emphasizing the jump portion of the JOP Matrix, an athlete may be able to improve their RFD and be able apply greater forces in the limited time allotted for each respective movement (7,9). It is important to note the transfer of RFD is listed second, behind RFA, as an athlete will not be able to reach these peak power outputs if they are not able to safely decelerate their body.

Returning to the transfer of the JOP Matrix to the sport of lacrosse, anytime an attackerman in lacrosse cuts or dodges, and anytime a defender shuffles or moves dynamically to match an offensive player’s movements, there is constant undulation between producing and absorbing force. On the field, athletes are speeding up or slowing down with every movement. As an athlete speeds up, RFD plays a major role as ground contact time decreases; however, as he or she slows down, or decelerates, the athlete’s RFA ability plays the most significant role. When implemented correctly, the JOP Matrix improves both RFA and RFD in all three planes of motion, which can potentially affect both performance and injury prevention.

Ultimately, there is no “one magical exercise” that can be programmed to appropriately develop all physical training adaptations required in competition, but the JOP Matrix can be used to help address several necessary adaptations needed for lacrosse players. Strength and conditioning coaches must continue to understand the physical requirements of their sport, then select exercises specifically and systematically to ensure each determined parameter is adequately stressed. Movements must be prioritized to produce training programs that are transferrable and will lead to significant improvements on the playing field.

The author would like to acknowledge Gary Gray for coining the term “JOP Matrix.”

REFERENCES

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