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Dynamic Warm-up Routines for Sports

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Introduction

Warming up for participation in any sporting or exercise activity is universally accepted as being essential for minimising injuries and improving performance, however the methods by which many sports attempt to achieve this varies greatly and many are less than ideal.

The warm-up method used by many dynamic sports (both team and individual) usually includes an initial jog around the field or court, followed by 10-15 minutes of static stretching. This is then followed by a few drills, and the athletes then begin their training session or game.

Whilst the basis behind these methods may appear to be the sound application of current training principles, a closer analysis reveals major limitations with this method of preparing an athlete for a dynamic sport activity.

The main "physiological" reasons for a warm-up include:

- to increase core temperature (at least 1° to 2° Celsius recommended)
- to increase heart rate and blood flow to skeletal tissues, which improves the efficiency of oxygen uptake and transport, carbon dioxide removal, and removal and breakdown of anaerobic by products (lactate)
- to increase the activation of the Central Nervous System (therefore increasing co-ordination, skill accuracy and reaction time)
- to increase the rate and force of muscle contraction and contractile mechanical efficiency (through increased muscle temperature)
- to increase the suppleness of connective tissue (resulting in less incidence of soft tissue injuries)

The result of the above responses lead to an athlete's increased ability to do physical work, which is extremely important for sports requiring short duration high intensity work bursts such as sprinting and jumping. The improvement in the nervous system is especially helpful for athletes involved in sports that demand high levels of complete body movement, such as team sport athletes.

The "Traditional" Warm-up

Most coaches recognize and appreciate the need for a warm-up, however many think of it as something "totally separate" and "unrelated" to the rest of the practice session. Coaches therefore often have the athletes perform the same "traditional warm-up" routine, day in day out, irrespective of what they will actually be doing during the main body of the practice session.

The major criticism against the typical "traditional warm-up" is that it does not adequately prepare the athletes for the demands placed upon them in the ensuring session. Generally the initial jog is at a pace that has a minimal effect upon body temperature, and usually consists of jogging forwards, and in a straight line.

The stretching performed is usually that of static stretching, with most stretches performed slowly and with the athletes either standing still or sitting on the ground. This static method of stretching has been shown to be beneficial for the increase in limb range of motion, and aims to relax the muscles so that they are less resistant to passive stress for stretching. But

this type of stretching does not prepare the muscle and connective tissue for the "active" contraction - relaxation process that will occur with any running, jumping, throwing or kicking movements as required in a dynamic sport training or game situation.

During this static stretching period (typically from 5 – 20 minutes), the small increase in body temperature from the initial jog is quickly lost if the athlete does nothing but statically stretch for this time. This is even more prevalent in cold climatic conditions, which is when many team sport competitions and practices are held. Many injuries occur at the beginning of a competition due largely to an inadequate preparation for the activity. A poor warm-up can be one factor to be blamed for such injuries occurring, and can easily be corrected with a modification to warm-up procedures by the athletes involved.

Inadequate warming up can lead to less than optimal speed and skill levels that could result in quick scoring by the opposing team or individual early in the game leading then to athletes having to catch up placing more pressure on the player(s) involved.

Dynamic Warm-up Routines
The aim of the warm-up for a dynamic sport should be; the complete "physical" and "mental" preparation for the dynamic actions to follow. The athlete should be able to begin the game or training session totally ready to perform at maximal intensity if required.

Pre-practice warm-ups should be considered "the start of the actual practice"; not something separate to the practice. Consideration should be given to the "specific" movements and actions which will be performed during the main body of the practice session, and "specific" warm-up activities should be included which systematically progress in intensity to closely mimic those movements and actions to be performed.

Multi-directional movements
The "traditional" initial jog can be replaced with a more dynamic series of running exercises that include regular alternation of running & skipping forwards, backwards, sideways, high knee drills, butt flicks, crossovers, bounding, jumps and progressive sprints.

Various fundamental skills and footwork patterns similar to that of the particular sport can and should also be incorporated. Examples include i.e. dribbling or passing a ball whilst executing different running, skipping, jumping variations. This is wise as it provides more specificity to the warm-up, more mental stimulation, and it uses your total practice time more efficiently by reinforcing fundamental skills during warm-ups.

These dynamic movements will serve to elevate the heart rate and core body temperature, increase central nervous system activation and increase suppleness and mobility far more effectively than the traditional "jog 2 laps" could ever do!

The Role of Stretching:

"Dynamic" Stretching (Moving)
The dynamic stretching component is very important for the specific preparation of the musculature to dynamic movements. Dynamic stretching is defined as repetitive contractions of an agonist muscle (i.e. muscle producing the movement) to produce quick stretches of the antagonistic muscle (i.e. muscle opposing the movement), therefore any active callisthenic movement can be classified as dynamic stretching (i.e. jumping, body rotations, bending, etc). This method very specifically prepares the muscle tissue for active muscle contraction and relaxation as required in a sporting situation and is far more appropriate than "static" stretching.

Whilst "dynamic" stretching is the most suitable method to use prior to competition and practice, there is however limited ability by this method to cause long term increases in range of motion due to the limited time that a muscle is held in a stretch. This short

stretching time is not long enough to allow time dependant stress relaxation to occur, leading to minimal flexibility improvements.

PNF (Proprioceptive Neuromuscular Facilitation) Stretching
PNF or "partner" stretching (as it is sometimes referred to) involves taking a muscle to its end of range and then holding it in that position and gently contracting the muscle against and immovable object i.e. a wall or partner etc. for approximately 5-6 seconds. Contracting a muscle at it's end of range helps produces a relaxation effect upon release and a subsequent increase in it's length. This type of stretching is extremely effective in improving flexibility and joint range of motion and is highly recommended to be performed during the warm down or periodically outside of competition and practice.

Static Stretching (Stationary)
Static stretching (as used in the "traditional" warm up model) involves taking a muscle to its end of range and then holding it in that "static" position for a predetermined duration (generally 20-30 seconds), releasing the muscle then taking it to it's "new" end of range and repeating (generally 3 times). Static stretching is very effective in increasing muscle length and therefore improving joint range of motion and flexibility. If an athlete can enhance their flexibility and range of motion through static stretching beyond the functional range of motion required for the movements of their sport, they are in effect creating a safety zone or "buffer" for avoiding injury.

Enhanced range of motion also allows greater forces and mechanical advantage to be produced, plus helps movement efficiency, therefore "static" stretching has an important role to play.

It is important to include some "static" stretching in the warm down to continue to improve joint range of motion; removal of waste products such as lactic acid; and to increase the athlete's rate of recovery.

It is also important to perform "static" stretching periodically outside of competition and practice in order to maintain and continue to improve range of motion.

"Static" stretching can still be included in the "dynamic" warm-up routine, as many athletes (particularly those with poor range of motion) still feel they need some static stretching to really prepare themselves. Over time it would be ideal to phase static stretching out of the warm-up routine and place it only in the warm down period.

A recommended strategy for including "static" stretching into the "dynamic" warm-up is to stretch one muscle group between each run or drill, (e.g. the hamstring group), the athletes are given approximately 30 seconds to stretch both hamstrings statically (this also has the affect of decreasing talk time between athletes which can be a major time waster, especially with younger athletes). The athletes are then directed to perform another dynamic activity, either an easy run-through or if running drills have been taught, they perform variations of skipping and running drills and butt kick drills etc.

An example warm-up sequence for athletes who feel they need to statically stretch could be as follows:
Walking dynamic stretches
Jogging variations (forward, backwards, sideways, etc.)
Static stretch of hamstring group (30 seconds)
Skipping variations (forward, backwards, sideways, etc.)
Static stretch of quadriceps group (30 seconds)
Run-through (forwards and backwards, running technique drills, etc.)
Stretch adductors (groin) (30 seconds)
Run-through (zigzags, rotations, swerves etc.)
Stretch calves (30 seconds)
Run-through/drills (higher intensity)

Bounds and jumps (near maximal)
Stretch (athletes' choice)
100% intensity game like actions or drills
Start of training session…

The athlete should now be considered warmed up for the ensuring training session or game.

The key to this type of warm-up is to make the dynamic portion of the warm-up "progressive" and ensure that the limbs are taken through at least the ranges of motion that will be required in the game situation.

Mental Warm-up
The "traditional" warm-up of jog 2 laps and stretch was never very mentally stimulating; incorporating activities into your dynamic warm-up in which the athlete has to "think quick", "make decisions" and "react" to an external stimulus are an excellent idea because the warm-up should prepare the athlete "mentally" as well as "physically" to compete or practice. There are many such drills e.g. rabbits/roosters, green light/red light, mirror drills etc. which serve this purpose and are also a lot of fun so use your imagination!

Sport specific games or drills
Using sport specific drills, games set plays etc. are all appropriate inclusions into a dynamic warm-up routine, so long as they start off at low intensity and gradually progress in intensity as the athlete warms up. If the game or drill is too competitive too early in the warm-up, the athlete's "competitive drive" can take over and injuries can occur, so be smart with this!

Co-ordination and Movement Efficiency
Typical drills used in "dynamic" warm-ups are ideal for teaching young developing athletes "how to move". Athletes are taught how to kick, throw, pass, hit and catch by their sporting coaches from a very young age, yet many of those coaches just assume that the athlete knows how to "move"!

Correct footwork, balance and co-ordination are the keys to success in almost every sport yet this does not come naturally to everybody, and like any other skill it can be improved through regular "perfect practice".

Many of the sports we play require intricate combinations of movements and footwork patterns; incorporating these movements into your "dynamic" warm-up routines reinforces correct movement mechanics and helps the athlete eventually perform those movements at an autonomous level, thus allowing greater conscious awareness to be devoted to other aspects of the game.

Rehabilitation/Reconditioning
Range of motion, dynamic flexibility, strength, speed, balance, co-ordination, movement efficiency can all be affected when an athlete suffers a serious injury. Just as dynamic movement drills can help young athletes develop these qualities, they are also ideal to use in rehabilitation programs for injured athletes to assist with injury rehabilitation, reconditioning and return to sport!

Conclusion
A thorough warm-up which features a variety of dynamic activities is usually much more effective than a routine warm-up which contains traditional, static stretches. By 'effective', we mean that the varied warm-up is better at promoting flexibility and getting athletes really ready to perform at their best during strenuous workouts, compared to the "traditional" combination of easy exercise and static stretching.