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Optimizing Dancer Flexibility

Dance performance continues to evolve with new techniques, new tricks, and seemingly more and more flexibility than in previous decades. Dancers, teachers, and coaches often work endlessly to improve flexibility to meet new performance demands.

The science and understanding of how to maximize flexibility while minimizing injury risk has also evolved in the past few decades. This resource paper will serve to hi-light these updates and provide evidence-based flexibility training guidelines for you to build upon in your practice.

What is Flexibility?

Let's first differentiate how the terms **range of motion** and **flexibility** are used in this resource paper. **Range of motion** refers to the total amount of motion available at a specific joint. **Flexibility** refers to the ability of the muscles, fascia, and tendon to elongate.

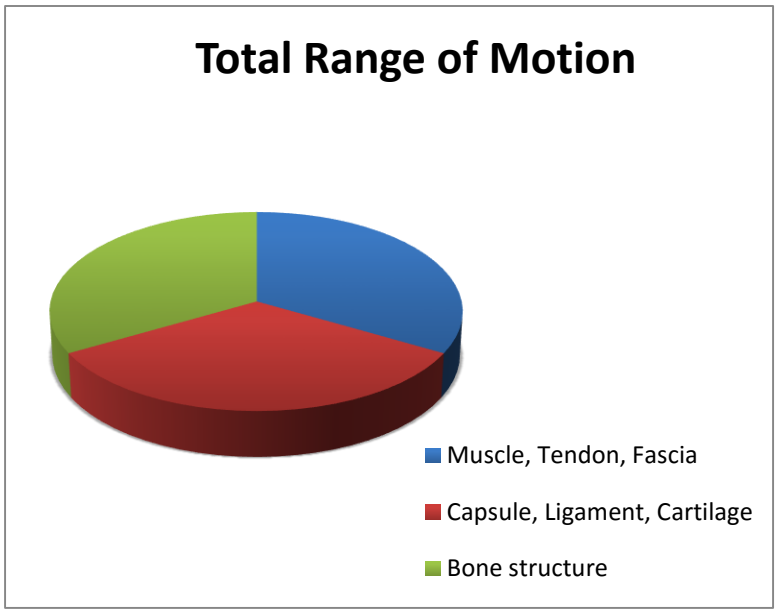

Fig 1. Factors contributing to total range of motion.

There are two main types of flexibility: static and dynamic:

Static flexibility means that the muscles, fascia, and tendon can lengthen when external force is placed upon them. An example would be doing the splits where the force of the floor is serving as the external force.

Dynamic flexibility means that the muscle, fascia, and tendon can elongate in desired directions when the dancer is actively contracting muscles to create the movement. Dynamic flexibility requires a high degree of control and coordination from the nervous system, as well as strength (particularly in the core and pelvic regions). Think of a leap or a battement, these are examples of dynamic flexibility.

Flexibility is different than **hypermobility**. Hypermobile dancers may have laxity in their ligaments, capsules, and other connective tissue. This does not necessarily lead the dancer to have good dynamic flexibility. Often the hypermobile dancer may have to work harder than his/her peers to

develop superior levels of coordination and core control to stabilize the joints in ways that lead to safe performance of movements.

What Factors Can a Dancer Modify Through Training in Order to Increase Flexibility?

There are both modifiable and non-modifiable factors that impact a dancer's flexibility.
Modifiable factors include: experience with movement, postural alignment, presence of muscle imbalances, and effects from previous injury.
Non-modifiable factors include: bone structure, ligamentous laxity, genetics, age, connective tissue extensibility, and growth spurts.

What Type of Stretching is Best?

Let's examine three major types of stretching: self myofascial release (SMR), static, and dynamic (Fig 2). There are other types as well, but most of the sub-types fall into these three major categories.

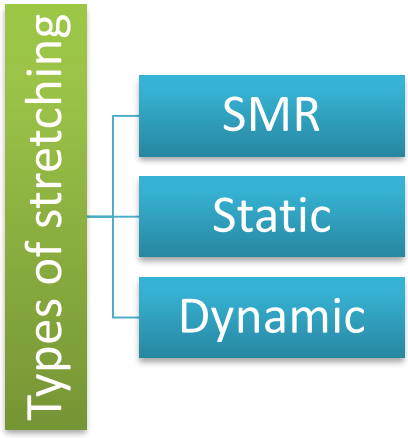

Fig 2. Types of stretching

Dancers are often familiar with using foam rollers or various release balls to decrease myofascial tension. This is known as **self myofascial release**. It is often used to correct muscle imbalances for muscles thought to be overly activated by the nervous system. This method can be employed pre or post activity, and the tender spots should generally be held for 30 seconds or until 50% less tender.[1]

Fig 3. Self myofascial release of the thoracic spinal musculature

Dancers are also often familiar with holding positions like the splits to increase flexibility. These held positions are called **static stretches**. Static stretches can be used to correct muscle imbalances, and when performed more than three times/week, they can improve static flexibility over time. The current consensus to improve flexibility with static stretches is to hold the stretch 30 seconds, and repeat it 3-4 times. [2]

Fig 4. Static stretch of the biceps femoris (outer hamstring)

While external resistance can come from the floor or stretch strap, some dancers also use partner stretching. During partner stretching, excessive force is not recommended. The neuromuscular system often responds well to very gentle pressure that is only 1-2 pounds. [3]

Because static stretching may impact power and joint stability, performing extensive static stretching is generally reserved for after dance class, or separate days dedicated to flexibility training. Current evidence suggests that static stretching before class can decrease the nervous system drive to the muscles for 15 minutes, and the neuromuscular power for 1 hour. [4]

Dynamic flexibility is the currently recommended method to incorporate in the beginning of class as part of the warm up. Dynamic flexibility involves moving through gradually increasing directions, ranges of motion, and speed with proper alignment and muscle coordination. An example that many dancers are familiar with is the attitude leg swing. Other common examples include yoga flow sequences, squats, lunges, and arm circles.

Fig 5. Example of dynamic flexibility involving dance-specific ranges of motion and coordination

Type	Purpose	When	How
SMR	Correct imbalances "knots"	Pre/Post activity	Hold tender spots 30 seconds
Static	Correct imbalances Improve static flexibility over time	After class	Hold 30 seconds, repeat 3-4 x for each stretch
Dynamic	Improve skill specific useful flexibility	Part of warm up	Move through increasing range of motion and speed

Fig 6. Summary of major types of flexibility and applications

How Much Stretching Is Optimal?

The FITT principle, Frequency, Intensity, Time/Duration, and Type are the key variables used to guide how much stretching is optimal.

Frequency can be described as how many days per week a dancer should stretch. Generally 1x/week will maintain flexibility, while 3-5 x/week are needed to gain flexibility. [5]

Intensity refers to how hard a stretch should be. Generally, tension is OK, but pain is not. Additionally, the tension should be felt along a line that corresponds to the line of the muscle. If the tension is felt as a spot or in a specific joint, that is an indication to decrease the intensity, reposition, and potentially consult with a medical provider if there continues to be a spot of pain that is persistent.

Time defines how long should be spent in each stretching session. Starting with 15-30 minutes is generally adequate to enhance a well-balanced training program.

Type refers to the kind of stretch. Employing SMR, static, and dynamic stretching can help you optimize flexibility. Remember that dynamic stretching is used in the warm up, and static stretching is used post-class or in separate stretching sessions where optimizing power and neuromuscular drive are not priorities. [1]

Variable	Question	Summary
Frequency	How many days/week?	1x/week to maintain 3-5x/week to gain
Intensity	How hard?	Line of tension, not pain
Time	How long/session?	15-30 min sessions
Type	What kind of stretch?	Dynamic in warm-up Static post-class SMR—pre and/or post class

Fig 7. Frequency, intensity, time, and type of flexibility in a training program

How Would The Different Types of Stretching Be Organized in a Daily Lesson Plan?

Here is a diagram suggesting session organization to optimize both flexibility and safety:

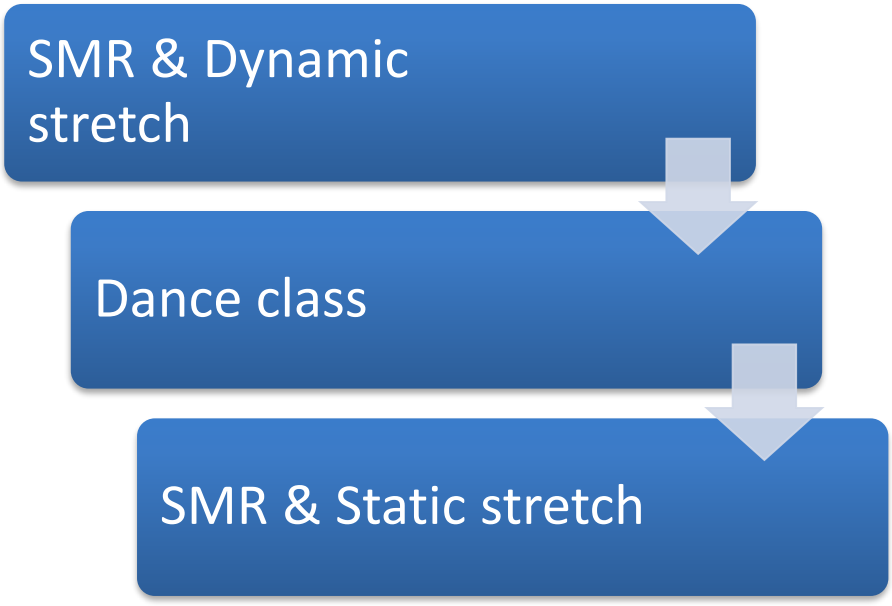

Fig 8. Single session lesson plan incorporating multiple types of stretching at appropriate times.[1]

Fig. 9. Face down frog stretch

Are All Stretching Positions OK? There are some positions that are considered high risk for most dancers. High risk means that the risk of injuring a particular tissue is often going to exceed the expected benefits. While we always need to consider the specific dancer, that specific dancer's goals, and that dancer's specific presentation on a particular day, examples of generally high risk positions include:

Face down frog (Fig.9) and/or excessively pressing the thigh bone into the front of the hip during a **deep lunge stretch** due to possible hip capsule, ligament, or labral injury.

Fig10. Hurdler's stretch. [7]

Hurdler's stretch (Fig.10) due to stress on the medial collateral ligament of the knee.

Fig 11. Oversplits [8]

Oversplits (Fig.11) due to excess stress placed on the lead leg including the ACL and ischial tuberosity growth plate (in youth/adolescents). This also stresses the front side of the trailing hip, with particular concern for the safety of the ligaments, capsule, and labrum of the trailing hip.

Fig 12. Plough stretch [9]

Plough/Jackknife variations (Fig.12) due to the excessive stress that can be placed on multiple structures in the neck. (Note that these variations can often be safely employed in methods like private Pilates sessions where careful supervision and cueing are used to help maximize safety for advanced dancers).

Fig 13. Pointed foot wedged under furniture

Wedging the feet under furniture (Fig.13) in the pointed position, as this can create damage at the Lisfranc joint and posterior ankle impingement syndrome.

Is Stretching OK For Everyone?

There are some situations and conditions in which a dancer should definitely consult with a medical provider prior to stretching. These include (but are not limited to) osteoporosis, joint replacements, rheumatoid arthritis, acute injuries, swelling, neuropathy, and undiagnosed pain.[1]

In conclusion, we hope that this resource paper has allowed you to consider specific factors that help you make informed decisions in designing your stretching routines.

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