Stretching and Flexibility - Flexibility

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Flexibility

Flexibility is defined by *Gummerson* as "the absolute range of movement in a joint or series of joints that is attainable in a momentary effort with the help of a partner or a piece of equipment." This definition tells us that flexibility is not something general but is specific to a particular joint or set of joints. In other words, it is a myth that some people are innately flexible throughout their entire body. Being flexible in one particular area or joint does not necessarily imply being flexible in another. Being "loose" in the upper body does not mean you will have a "loose" lower body. Furthermore, according to *SynerStretch*, flexibility in a joint is also "specific to the action performed at the joint (the ability to do front splits doesn't imply the ability to do side splits even though both actions occur at the hip)."

Types of Flexibility

Many people are unaware of the fact that there are different types of flexibility. These different types of flexibility are grouped according to the various types of activities involved in athletic training. The ones which involve motion are called *dynamic* and the ones which do not are called *static*. The different types of flexibility (according to *Kurz*) are:

dynamic flexibility
: Dynamic flexibility (also called *kinetic flexibility*) is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through its full range of motion in the joints.

static-active flexibility
: Static-active flexibility (also called *active flexibility*) is the ability to assume and maintain extended positions using only the tension of the agonists and synergists while the antagonists are being stretched (see section Cooperating Muscle Groups). For example, lifting the leg and keeping it high without any external support (other than from your own leg muscles).

static-passive flexibility

Static-passive flexibility (also called *passive flexibility*) is the ability to assume extended positions and then maintain them using only your weight, the support of your limbs, or some other apparatus (such as a chair or a barre). Note that the ability to maintain the position does not come solely from your muscles, as it does with static-active flexibility. Being able to perform the splits is an example of static-passive flexibility.

Research has shown that active flexibility is more closely related to the level of sports achievement than is passive flexibility. Active flexibility is harder to develop than passive flexibility (which is what most people think of as "flexibility"); not only does active flexibility require passive flexibility in order to assume an initial extended position, it also requires muscle strength to be able to hold and maintain that position.

Factors Limiting Flexibility

- Strength and Flexibility: (next section)
- Types of Flexibility: (previous section)
- Flexibility: (beginning of chapter)

According to *Gummerson*, flexibility (he uses the term *mobility*) is affected by the following factors:

- Internal influences
    - the type of joint (some joints simply aren't meant to be flexible)
    - the internal resistance within a joint
    - bony structures which limit movement
    - the elasticity of muscle tissue (muscle tissue that is scarred due to a previous injury is not very elastic)
    - the elasticity of tendons and ligaments (ligaments do not stretch much and tendons should not stretch at all)
    - the elasticity of skin (skin actually has some degree of elasticity, but not much)
    - the ability of a muscle to relax and contract to achieve the greatest range of movement
    - the temperature of the joint and associated tissues (joints and muscles offer better flexibility at body temperatures that are 1 to 2 degrees higher than normal)
- External influences
    - the temperature of the place where one is training (a warmer temperature is more conducive to increased flexibility)
    - the time of day (most people are more flexible in the afternoon than in the morning, peaking from about 2:30pm-4pm)
    - the stage in the recovery process of a joint (or muscle) after injury (injured joints and muscles will usually offer a lesser degree of flexibility than healthy ones)
    - age (pre-adolescents are generally more flexible than adults)
    - gender (females are generally more flexible than males)
    - one's ability to perform a particular exercise (practice makes perfect)
    - one's commitment to achieving flexibility
    - the restrictions of any clothing or equipment

Some sources also the suggest that water is an important dietary element with regard to flexibility.

Increased water intake is believed to contribute to increased mobility, as well as increased total body relaxation.

Rather than discuss each of these factors in significant detail as *Gummerson* does, I will attempt to focus on some of the more common factors which limit one's flexibility. According to *SynerStretch*, the most common factors are: bone structure, muscle mass, excess fatty tissue, and connective tissue (and, of course, physical injury or disability).

Depending on the type of joint involved and its present condition (is it healthy?), the bone structure of a particular joint places very noticeable limits on flexibility. This is a common way in which age can be a factor limiting flexibility since older joints tend not to be as healthy as younger ones.

Muscle mass can be a factor when the muscle is so heavily developed that it interferes with the ability to take the adjacent joints through their complete range of motion (for example, large hamstrings limit the ability to fully bend the knees). Excess fatty tissue imposes a similar restriction.

The majority of "flexibility" work should involve performing exercises designed to reduce the internal resistance offered by soft connective tissues (see section Connective Tissue). Most stretching exercises attempt to accomplish this goal and can be performed by almost anyone, regardless of age or gender.

How Connective Tissue Affects Flexibility

- How Aging Affects Flexibility: (next subsection)
- Factors Limiting Flexibility: (beginning of section)

The resistance to lengthening that is offered by a muscle is dependent upon its connective tissues: When the muscle elongates, the surrounding connective tissues become more taut (see section Connective Tissue). Also, inactivity of certain muscles or joints can cause chemical changes in connective tissue which restrict flexibility. According to *M. Alter*, each type of tissue plays a certain role in joint stiffness: "The joint capsule (i.e., the saclike structure that encloses the ends of bones) and ligaments are the most important factors, accounting for 47 percent of the stiffness, followed by the muscle's fascia (41 percent), the tendons (10 percent), and skin (2 percent)".

M. Alter goes on to say that efforts to increase flexibility should be directed at the muscle's fascia however. This is because it has the most elastic tissue, and because ligaments and tendons (since they have less elastic tissue) are not intended to stretched very much at all. Overstretching them may weaken the joint's integrity and cause destabilization (which increases the risk of injury).

When connective tissue is overused, the tissue becomes fatigued and may tear, which also limits flexibility. When connective tissue is unused or under used, it provides significant resistance and limits flexibility. The elastin begins to fray and loses some of its elasticity, and the collagen increases in stiffness and in density. Aging has some of the same effects on connective tissue that lack of use has.

How Aging Affects Flexibility

- How Connective Tissue Affects Flexibility: (previous subsection)
- Factors Limiting Flexibility: (beginning of section)

With appropriate training, flexibility can, and should, be developed at all ages. This does not imply, however, that flexibility can be developed at the same rate by everyone. In general, the older you are, the longer it will take to develop the desired level of flexibility. Hopefully, you'll be more patient if you're older.

According to *M. Alter*, the main reason we become less flexible as we get older is a result of certain changes that take place in our connective tissues. As we age, our bodies gradually dehydrate to some extent. It is believed that "stretching stimulates the production or retention of lubricants between the connective tissue fibers, thus preventing the formation of adhesions". Hence, exercise can delay some of the loss of flexibility that occurs due to the aging process.

M. Alter further states that some of the physical changes attributed to aging are the following:

- An increased amount of calcium deposits, adhesions, and cross-links in the body
- An increase in the level of fragmentation and dehydration
- Changes in the chemical structure of the tissues.
- Loss of *suppleness* due to the replacement of muscle fibers with fatty, collagenous fibers.

This does *not* mean that you should give up trying to achieve flexibility if you are old or inflexible. It just means that you need to work harder, and more carefully, for a longer period of time when attempting to increase flexibility. Increases in the ability of muscle tissues and connective tissues to elongate (stretch) can be achieved at any age.

Strength and Flexibility

- Overflexibility: (next section)
- Factors Limiting Flexibility: (previous section)
- Flexibility: (beginning of chapter)

Strength training and flexibility training should go hand in hand. It is a common misconception that there must always be a trade-off between flexibility and strength. Obviously, if you neglect flexibility training altogether in order to train for strength then you are certainly sacrificing flexibility (and vice versa). However, performing exercises for both strength and flexibility need not sacrifice either one. As a matter of fact, flexibility training and strength training can actually enhance one another.

Why Bodybuilders Should Stretch

- Why Contortionists Should Strengthen: (next subsection)
- Strength and Flexibility: (beginning of section)

One of the best times to stretch is right after a strength workout such as weightlifting. Static stretching of fatigued muscles (see section Static Stretching) performed immediately following the exercise(s) that caused the fatigue, helps not only to increase flexibility, but also enhances the promotion of muscular development (muscle growth), and will actually help decrease the level of post-exercise soreness. Here's why:

After you have used weights (or other means) to overload and fatigue your muscles, your muscles retain a "pump" and are shortened somewhat. This "shortening" is due mostly to the repetition of intense muscle activity that often only takes the muscle through part of its full range of motion. This "pump" makes the muscle appear bigger. The "pumped" muscle is also full of lactic acid and other by-products from exhaustive exercise. If the muscle is not stretched afterward, it will retain this decreased range of motion (it sort of "forgets" how to make itself as long as it could) and the buildup of lactic acid will cause post-exercise soreness. Static stretching of the "pumped" muscle helps it to become "looser", and to "remember" its full range of movement. It also helps to remove lactic acid and other waste-products from the muscle. While it is true that stretching the "pumped" muscle will make it appear visibly smaller, it does not decrease the muscle's size or inhibit muscle growth. It merely reduces the "tightness" (contraction) of the muscles so that they do not "bulge" as much.

Also, strenuous workouts will often cause damage to the muscle's connective tissue. The tissue heals in 1 to 2 days but it is believed that the tissues heal at a shorter length (decreasing muscular development as well as flexibility). To prevent the tissues from healing at a shorter length, physiologists recommend static stretching after strength workouts.

Why Contortionists Should Strengthen

- Why Bodybuilders Should Stretch: (previous subsection)
- Strength and Flexibility: (beginning of section)

You should be "tempering" (or balancing) your flexibility training with strength training (and vice versa). Do not perform stretching exercises for a given muscle group without also performing strength exercises for that same group of muscles. Judy Alter, in her book *Stretch and Strengthen*, recommends stretching muscles after performing strength exercises, and performing strength exercises for every muscle you stretch. In other words: "Strengthen what you stretch, and stretch after you strengthen!"

The reason for this is that flexibility training on a regular basis causes connective tissues to stretch which in turn causes them to loosen (become less taut) and elongate. When the connective tissue of a muscle is weak, it is more likely to become damaged due to overstretching, or sudden, powerful muscular contractions. The likelihood of such injury can be prevented by strengthening the muscles bound by the connective tissue. *Kurz* suggests dynamic strength training consisting of light dynamic exercises with weights (lots of reps, not too much weight), and isometric tension exercises. If you also lift weights, dynamic strength training for a muscle should occur *before* subjecting that muscle to an intense weightlifting workout. This helps to pre-exhaust the muscle first, making it easier (and faster) to achieve the desired overload in an intense strength workout. Attempting to perform dynamic strength training *after* an intense weightlifting workout would be largely ineffective.

If you are working on increasing (or maintaining) flexibility then it is *very* important that your strength exercises force your muscles to take the joints through their full range of motion. According to *Kurz*, Repeating movements that do not employ a full range of motion in the joints (like cycling, certain weightlifting techniques, and pushups) can cause of shortening of the muscles surrounding the joints. This is because the nervous control of length and tension in the muscles are set at what is repeated most strongly and/or most frequently.

Overflexibility

- Strength and Flexibility: (previous section)
- Flexibility: (beginning of chapter)

It is possible for the muscles of a joint to become too flexible. According to *SynerStretch*, there is a tradeoff between flexibility and stability. As you get "looser" or more limber in a particular joint, less support is given to the joint by its surrounding muscles. Excessive flexibility can be just as bad as not enough because both increase your risk of injury.

Once a muscle has reached its absolute maximum length, attempting to stretch the muscle further only serves to stretch the ligaments and put undue stress upon the tendons (two things that you do *not* want to stretch). Ligaments will tear when stretched more than 6% of their normal length. Tendons are not even supposed to be able to lengthen. Even when stretched ligaments and tendons do not tear, loose joints and/or a decrease in the joint's stability can occur (thus vastly increasing your risk of injury).

Once you have achieved the desired level of flexibility for a muscle or set of muscles and have maintained that level for a solid week, you should discontinue any isometric or PNF stretching of that muscle until some of its flexibility is lost (see section Isometric Stretching, and see section PNF Stretching).

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