HOW TO DO JOINT MOBILITY DRILLS

The science behind the most important part of your workout

(Don't just go through the motions)

A Free E-Report by Todd Hargrove

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Make the impossible possible, the hard easy, and the easy elegant.

– Moshe Feldenkrais

Before starting a program of inactivity, consult your doctor. A sedentary life is unnatural and unhealthy.

– Frank Forencich
# Table of contents

**Introduction**

**Joint Mobility Drills Defined**

**How do Joint Mobility Drills Work?**

**Mobility Drills and the Body**

**Mobility Drills and the Brain**

**Blurred Maps Can Create Pain**

**Movement Creates Sensory Gating**

**Conclusion: How to do Joint Mobility Drills**

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Introduction

Dynamic joint mobility drills are becoming very popular, and are starting to replace static stretching as a way to warm up, train healthy movement patterns, and (p)rehab injuries. If you are interested in fitness and performance, chances are you have heard of the benefits of mobility drills for increasing movement skill and decreasing pain.

Unfortunately, there are many misconceptions about how mobility drills should be done, and this can make them dramatically less effective, or even detrimental.

In this report I'm going to explain what they are, exactly how and why they provide benefit, and most importantly, how to do them and how not to do them.

The rules of thumb described below can be applied to any mobility drills, dynamic warmups, muscle activations, or movement prep work that is currently part of your training routine. In fact you can apply most of this advice to the movements you do in a pilates or yoga class, or even the weight room.

Here we go.

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Dynamic joint mobility drills defined

First a definition:

**Mobility drills can be defined as deliberate movements through a defined pathway, done repetitively, usually without resistance.**

Examples include wall slides or arm circles for the shoulders, clam shells or leg circles for the hips, and cat/cows or rotations for the spine.

One good way to understand mobility work is to contrast it with static stretching. In static stretching, you take a certain joint to its end range of motion and then stay there for a while. In a mobility drill, you are always moving as opposed to staying still. Further, you typically move from the neutral or middle ranges of motion out to the end ranges and then back. The point is not so much how far you go but how smoothly and easily you get there.

For these reasons, joint mobility work promises to have far more carryover to real world activities than static stretching. Most of life and sport takes place during *movement* through the middle ranges of motion, not during rest at the end ranges. Thus, healthy athletic movement at most joints has far more to do with *quality* of motion than *quantity* of motion. So the trend toward mobility drills is a very positive development.
How do joint mobility drills work?

The mainstream idea is that joint mobility drills work by making changes to the local muscular and connective tissues involved in the movement. The vision seems to be that the joints and connective tissues get “gummed up” or stuck, and that repetitive movement can get those joints freed, oiled, smoothed out and aligned. There may be a small grain of truth here, but as discussed in more detail below, there are not really any plausible physiological events that would square with this vision.

In fact, mobility work has only a limited ability to cause significant adaptation in the actual structure of the joint. Instead, it works by changing the way the brain organizes the movement of the joint.

In other words, mobility work is about:

- function not structure
- the brain not the body
- the software not the hardware
- the virtual joint not the joint
- the ectoderm not the mesoderm
- the driver not the car

OK, enough with the metaphorical distinctions. Here’s a detailed explanation of what I mean.
Mobility drills and the body

There is little reason to believe that joint mobility drills have any notable effects on the local tissues that are being mobilized. We can see this by comparing it to various other forms of exercise that have significant impacts on the physical tissues.

Unlike weight training or endurance training, mobility work does not create enough tension or demand enough energy to cause adaptations in the size or metabolic capacities of muscle cells. So mobility work won't make you buff or fit.

Unlike stretching, mobility drills do not involve enough time at the end ranges of motion to permanently add more muscle or connective tissue length. Mobility work doesn't change your shape.

Unlike sports or other habitual physical activities, mobility work will probably not create enough mechanical stress to the tendons, ligaments and joint capsules to cause any significant connective tissue remodeling (unless you did thousands of repetitions at a pretty good speed.) Mobility work doesn't change your structure.

So what does mobility work do? Joint mobility drills will provide circulation and warmth to the local tissues and synovial fluids, which is great and totally necessary for health. However, we would expect similar benefits to accrue from almost any repetitive non-harmful motion in the

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So why would the specific form of a mobility exercise matter? Why not just move all your joints through all their ranges of motion in any old way? The answer is that mobility exercises work by communicating with the brain, and it will only communicate effectively when it sends the correct signals. Following is a discussion of some neural mechanisms by which mobility drills could improve coordination and reduce pain.

**Mobility drills and the brain**

Coordination happens in the brain not the body. Some key networks in the brain that sense and coordinate the muscles are called the **body maps**. The body maps are discrete parts of the brain that are organized in such a way as to represent the different body parts, just as lines on a map represent roads. Each part of the body has a separate area of the brain dedicated to moving and sensing that body part.

Body parts that have greater sensory motor demands have bigger maps. Not surprisingly, the map for the hand is significantly larger than the map for the elbow. Thus, larger and more detailed maps means better coordination. The information necessary to maintain and build the maps is provided by proprioceptive signals from the body. Proprioception occurs when movement or touch stimulates nerve mechanoreceptors, which are located all over the body and primarily in joints.

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You can sense the effects of mechanoreception on your maps instantly by doing a simple experiment. Try to imagine or sense the exact position of your third toes. Now rub just the left middle toe for a few seconds and then compare your ability to sense the left middle toe and the right. You will note that it is much easier to form a clear mental picture of the left toe. The simple reason is that touching the toe activated its mechanoreceptors, which sent a signal to the brain, which excited the neurons in the map for that area. Of course, the additional clarity in the map is only temporary, and after a minute your toes will feel the same.

In order to make long term changes in the maps, you need to place demands on them consistently over a long period of time. When a certain movement is used repeatedly in a coordinated and mindful fashion, *there are actual physical and observable changes in the part of the brain that controls that movement.* For example, the finger maps in a braille reader’s brain are *observably larger* than the counterpart of the average person.

While movement will clarify maps, *lack of movement will tend to blur them.* In a famous *experiment*, researchers found that sewing a monkey’s fingers together for a few weeks caused it’s brain to map the fingers *as one unit*, not as two separate parts capable of individual movements. We would expect similar map blurring to occur when any joint movement is neglected for a certain period of time. This loss of control over previously accessible movements is the neural version of the “use it or lose it” principle, and is sometimes called *sensory motor amnesia* or SMA.

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In my opinion, most of the benefit from joint mobility drills comes precisely from their ability to cure sensory motor amnesia. For example, a common area for SMA is the thoracic vertebrae. Most people probably have at least one vertebra in their upper back that hasn’t moved in a certain direction with respect to its neighbor in years. The movement isn’t physically impossible, it’s just not part of the brain’s current movement programs due to neglect. A good analogy might be a language that you could once speak fluently that you haven’t spoken for years. The knowledge is in there somewhere, but a good portion of it is not readily accessible without some brushing up.

A well designed thoracic mobility drill will force you to move the trunk in ways that you habitually avoid. This requires the brain to brush up on its thoracic movement skills and reactivate some rusty movement programs.

This can be very beneficial. If the brain remembers how to move a currently static vertebra, a whole new set of movement options is returned. The result is an immediate qualitative change in the movement of the entire spine. The decisive change is not to the physical tissues of the vertebral joint, but to the way that the brain maps the vertebrae for sensation and movement.

Some common other areas for SMA are the feet, hip joints and shoulder blades, which is why most mobility drills focus on these areas.
Blurred maps can create pain

Accurate maps also have important consequences for how we feel. Phantom limb pain is a dramatic example. Many people with an amputated limb experience pain in the missing body part. This is because even though the arm is gone, the virtual arm in the brain lives on, and can be stimulated by cross talk from nearby neural activity. When this occurs, the brain creates a sensation of the missing arm that is incredibly realistic and often excruciatingly painful.

Some pain researchers believe that less severe instances of mapping errors may be involved in many chronic pain conditions. Numerous studies have shown that sensory motor illusions caused by mirrors or other tricks can cause pain. For example, if you immerse your index and ring fingers in warm water and the middle finger in cold water, this will often cause your middle finger to feel painfully hot. Other studies have shown that pain from these illusions can be alleviated with proprioceptive input that corrects distortions in the maps. For example, an amazing treatment for phantom limb pain involves placing the remaining limb in a mirror box in such a way that it fools the brain into thinking the missing limb is alive and well! Based on these and other studies, many pain researchers believe that clarifying the motor sensory maps is a promising treatment for many forms of chronic pain.
Movement creates sensory gating

Mobility drills can also reduce pain by sensory gating. Sensory gating means that the processing and perception of sense information is reduced by the presence of competing sense information. If your nervous system is busy trying to process signals resulting from movement or touching (proprioception), it has less ability process signals caused by tissue damage (nociception). Imagine trying to hear what someone is saying in crowded bar with lots of other voices. Pain is the same way. It can be drowned out by other interesting conversations.

Most people will instinctively take advantage of sensory gating by rubbing a painful area. The rubbing sends sensory signals to the brain which compete with the damage signals. Have you ever experienced temporary pain relief after a massage, exercise, or yoga? Sensory gating is probably a major reason why. And joint mobility drills are an ideal way to activate it, especially if they create novel and interesting sensory input.

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Conclusion: how to mobility drills

Based on the foregoing, there is good reason to believe that the brain should be the primary target for joint mobility work. With this in mind, here is a quick list of rules that will help you hit this target with mobility work.

Avoid pain and threat

If you create pain while doing joint mobility drills, the brain will attend to the pain and ignore the potentially interesting proprioceptive information that can help build better movement maps. Further, the brain is not interested in adopting a new movement pattern that is threatening.

Therefore, make sure the movement does not cause discomfort or create other signs of threat such as holding the breath, grimacing, collapsing your posture, or using unnecessary tension.

Be mindful and attentive to what you are doing

The brain receives massive amounts of sensory information each second and must be selective in deciding what information to process. As such, it will ignore any inputs it deems irrelevant, uninteresting or redundant. If you pay careful attention to what you are doing during mobility drills, this will act like a spotlight or microphone on the proprioceptive information that helps to build your movement maps. If you want your brain to really

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notice the interesting sensory data you are sending it by mobilizing your joints, place your attention on what you are doing and how it feels. Just going through the motions isn't enough.

**Use novel movements**

The brain is more likely to pay attention to a stimulus that is novel. Most joint mobility drills incorporate novelty already and that is why they work. However, endlessly repeating the same drill will have diminishing returns. So you might want to change things up from time to time to keep the brain interested.

**Start slow**

The benefits of moving slowly and gently to improve coordination have been recognized by martial artists, elite athletes and musicians for a long time. The scientific explanation for why slow and easy works requires a [post of its own](http://www.bettermovement.org), but here is a start. Slow and easy movement works because it: is inherently non threatening; is less likely to cause pain; allows you to find movement angles that would be missed at higher speeds; improves the proprioceptive signal to noise ratio; allows greater opportunity to focus on the subtle differences in joint movements; and, under the Weber Fechner rule, less force equals greater ability to discriminate in the amount of force used.
Be curious, exploratory and playful

Motor learning is greatly facilitated by a curious playful attitude. All animals engage in the most play during the times of their lives when the educational demands are the highest. This means that play is the best solution to difficult education problems that evolution has found. With this in mind, use mobility work as a way to experiment with subtle variations of how to move and figure out which ones work best. Think of joint mobility work as way to explore how your joints work, and find out what feels good, what does not.

In summary, next time you do some joint mobility drills, move slowly and carefully, completely avoiding any discomfort. Reduce speed and range of motion as necessary. Use the minimum amount of force and effort to get the job done. Pay careful attention to exactly what you are doing and play with subtle variations to assess which are most efficient and comfortable. Try a few repetitions at the slowest speed you can possibly move. Then see how you are moving. I think you will see some improvements. Good luck!

If you want to try some movement lessons which were specifically designed with all these considerations in mind (and many more) check out Better Core Movement, available at bettermovement.org/products/.

If you have any questions, please feel free to contact me at toddharg@gmail.com

Thanks for reading and best of luck with your movement!

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