

# Stretching

## Why Stretch?

A way to prepare the body  
A way to help muscles recover (?)  
A way to prevent injury (?)  
Encourage range of motion  
Relaxation  
Feels nice! (?)

## Health Benefits

Humans invented a way of resting that works against the needs of the body...

Sitting!

Sit < 4 hrs = 6 degrees more ROM hip compared to sit > 7 hrs

"Sedentary people so stiff can injure themselves just sitting at a desk"

Focus on a screen = tension in neck and shoulders

What did we do before the invention of chairs = squat

Squat = Maintain ROM lower limb to enable walk and run

## CVS

Stiff body = stiff arteries (Yamamoto, 2009)

Least flexible (1354 Japanese men) = Highest level of atherosclerosis (plaque) (Suwa, 2018)

Stretching improves arterial stiffness ?

? Improve elasticity skeletal muscle = improve elasticity blood vessels

? Atherosclerosis inflammatory - stretching helps...

## Fascia-nating

Fascia stretching releases anti-inflammatory molecules in rats (Langevin, 2016)

Stretching speeds up healings and releases resolvins

Resolvins turn off bodies response to inflammation

Full ROM more important than super bendy

Hypermobility

## How to use in a Pilates class

Warm up

Preparation

Main Body

Recovery from a difficult sequence

Transition Period - flow

Cool down

Prevent tightening muscles (DOMS) ??

## Teaching a class

Name

Explain the aim of the stretch

Recovery

Increase flexibility / mobility

"Hold in a position of comfort"

Modify based on skill / flexibility / mobility

## Range of Motion limited by Joints and Muscles

Joint

Geometry

Congruency

Capsuloligamentous structures

Muscle

Muscle

Active

Dynamic

Neuroflexive (alpha motor neuron)

Reflexive activation (gamma motor neuron)

Not just muscles stretching over a joint but how far the joint moves within the joint capsule and the component of motor control within the nervous system.

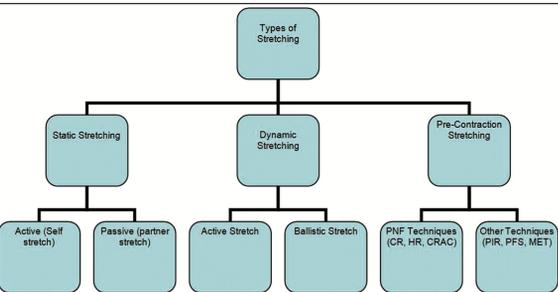
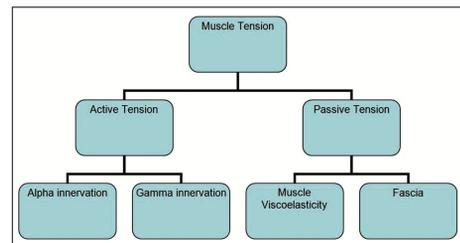
## Mobility (Joints)

"Ability of a joint to move actively through a range of motion"

## Flexibility (Muscle)

"The ability of a muscle or muscle groups to lengthen passively through a range of motion"

## Factors Contributing to Muscle Tension



## Static

Common

Muscle held at the point of most tension 15-30 secs

## Dynamic

Common in Pilates

Muscle repeatedly taken into a stretched then shortened position in a controlled and flowing manner

Designed to maximise full functional ROM of a joint

Ensure clients maintain movement within range of their flexibility.

"Danger Zone" Passive Range - No active control.

Functional

## Watch animals stretch... Pandiculation

"Evolved as a reflex to wake up the muscles after a spell of stillness" ?

## Ballistic

A muscle is taken beyond its normal range within a short space of time then asked to contract concentrically in the opposite direction.

ACSM - Not recommended.

Bouncing - move too quick and force ROM.

## Pre-Contraction Stretching

PNF - principles of hold relax, contract - relax and hold relax with opposing muscle contractions.

## Neural

All stretching involves neural component

Neural tissue mobilised at the same time

Ensure strong neural tension positions are entered and controlled appropriately

Warn clients about latent discomfort and sensitivity.

## Research

Acute Effects - Immediate results of stretching

Training Effects - Results over a period of time.

Vary by:

Muscles | Populations | Interpretations - Recommendations difficult

Increased ROM may not be caused by increased length (decreased tension) of muscle rather the subject may simply have increased tolerance to stretching.

Changing sarcomere length? Reducing the bodies sensitivity to ROM adaptation?

## Static Stretching

Static Stretching increases ROM - greatest change 15-30 secs

No increase in muscle elongation after 2-4 reps

Static stretching immediately pre-exercise shown to be detrimental to dynamometer measured muscle strength and performance in running and jumping.

"Stretch induced strength loss" - >1min, 3 mins effect, 5% effect (Behm,2016)

? Cause (neural / mechanical / length of muscle at time of testing / duration

Maximum contraction before the static stretch may decrease effect

## Dynamic Stretching

Improve dynamometer measured power

Jumping

Running performance.

## PNF

20-60% effort effective also

ROM increases seen bilaterally with pre-contraction stretching

? Neurological phenomenon

## Conclusion

Well rounded program - difficult to isolate effect of stretching - benefits individual

Static stretching - dancers / gymnasts + HS strains (+ longer) + (65 - 60 secs) + cool down + chronic pain = increased tolerance to stretch after 3 weeks

Dynamic stretching - running / jumping + warm up

Stretching not reduce overall incidence of injuries except musculotendinous injuries.

PNF more effective for immediate gains

OA knee - PNF + TKR - benefits from all

## Is stretching always appropriate

What are you stretching?

Why are you stretching?

What is the muscle doing in 3D? Muscle long and short at the same time?

Alignment

Tight + Weak / Long + weak - muscle imbalance / compensation pattern

Just because it feels nice doesn't mean it's effective

## Why are you stretching?

Stretching an area that seems tight compared to others without understanding why the tightness is present may interfere with the CNS current adaptation causing it to work hard to adapt more.

Stretching areas that can feel tight can become a self fulfilling prophecy if they are tight because they are continually being held long - like an itch you want to scratch but can't find it.

Helen Hall, Even with your Shoes on

## Is static stretching functional

(muscles = on / off / on / off - never static)

"The sensation you feel at the end of a stretch and the reason you can't stretch any further is because the muscle is actively contracting against you. Defending itself from going too far by decelerating the journey to end range (myotactic reflex)."

A lengthened muscle = ready to contract / if held in stretch = fatigues NS ?

eg horse reins

Does stretching address the inhibitions in muscle tone without addressing the state and balance of the body as a whole? (Gary Ward, What the Foot)

## Dynamic stretching is functional

In dynamic movement, muscles both lengthen and shorten, lengthen and shorten (on - off, on - off)

By encouraging this pattern, the body naturally allows the short muscles to lengthen and the overstretched muscles to shorten - allowing the body to find a natural state of balance. (Gary Ward, What the Foot)

Eccentric work = benefits of stretching (Nuzzo, 2020)

## Eg Hamstrings

Role

- Control Pelvis
- Stabilise knee
- Hip Extension
- Diaphragm / Rib position!

Tight / Stiff back? Sciatica? Knee Pain? Tight Hamstrings?

Or... Weak

## What, When, Why to stretch

Pre / Post

Type?

How long?

Why is it tight? What's going on elsewhere in the body

What's the desired outcome?

...

Then the how... Pilates repertoire