



## Stretching optimization of the posterior chain of the lower limbs: comparison between two different executions of the same exercise

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**ABSTRACT:** the stretching of the posterior chain muscles of the lower limb, especially the hamstrings, is an exercise commonly prescribed both in physical activity and rehabilitation setting. Different stretching exercises have been proposed but it is unclear whether they focus the stretch in different structures. If so, one exercise may even be preferable to another. The aim of this trial was to investigate the location of the stretching sensation (SS) during the performance of two different variants of the same stretching exercise. The research hypothesis was that the second variant focused the SS more specifically on the posterior tight and to a lesser extent to the back region.

**MATERIAL and METHODS:** a sample of 161 participants (86 females, 75 males) participated. Exclusion criteria were: hip and knee prosthesis, hip and spinal osteoarthritis, acute pain and recent surgical procedures. For stretching A (SA) (FIG 1a) subjects were sitting on a couch with the knee extended, neutral rotation of the pelvis and both upper arms stretched forward. For stretching B (SB) (FIG 1b) subjects were sitting on a couch with the knee flexed at approximately 20° and both hands resting on the couch. After the performance of each exercise subjects shaded a pain drawing (PD) reporting the location of the SS. PDs were shaded on a digital body chart using a stylus pen on an iPad®. PDs were then superimposed to generate a pain frequency map (PFM) for each exercise using a custom designed software.



**Fig 1a**



**Fig 1b**

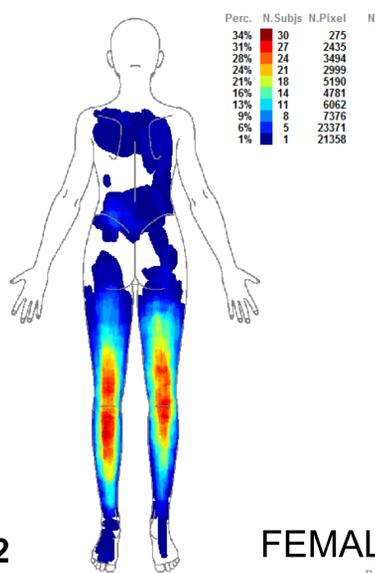
**RESULTS:** The most frequently reported SS area by participants performing the SA (24-34% females, 23-32% males) corresponded to the posterior region of the thigh (particularly the distal part), and the leg (particularly the proximal part). As expected these regions corresponded to the hamstring and the triceps surae muscles (Fig 2). Similar results were found in participants performing the SB (24-35% females, 28-41% males). A small percentage of participants performing SA (1-7%), differently from SB, reported the SS also in the back region.

**Stretching A**

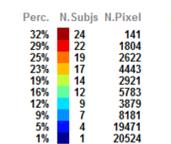
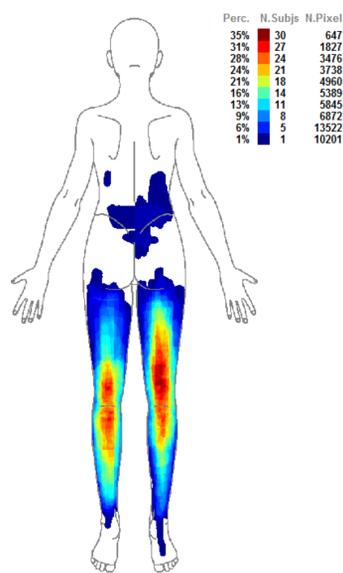
**Stretching B**

**Stretching A**

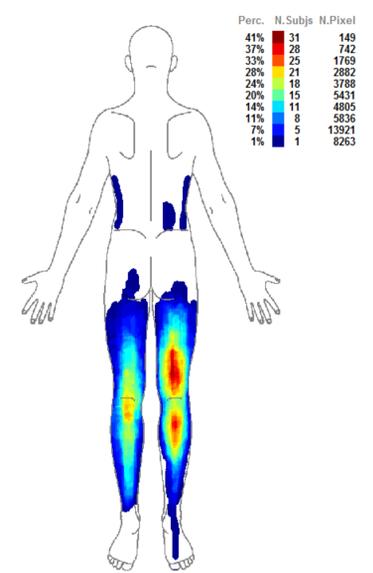
**Stretching B**



**FEMALES**



**MALES**



**CONCLUSIONS:** both variants of the same stretching exercise for the posterior chain muscles of the lower limbs induced the stretching sensation approximately in the same regions. Considering that SA shown a slightly higher involvement of the back region, SB could be considered the preferable exercise for people with back pain.

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