



## Abstract

# Acute Effect of Intermittent and Continuous Static Stretching on Hip Joint Range of Motion in Trained and Untrained Subjects <sup>†</sup>

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**Abstract:** **Aim:** It is well documented that static stretching acutely increases range of motion (ROM) in a dose-dependent manner. However, most previous studies have utilized intermittent stretching protocols, and it is not known if intermittent and continuous stretches elicit different changes in joint ROM and, in particular, in flexibility-trained subjects. The aim of this study was to examine changes in hip joint ROM after an intermittent or a continuous static stretching protocol of equal total duration. **Material & Method:** Twenty-seven female subjects (age,  $19.9 \pm 3.0$  years; height,  $167.3 \pm 6.1$  cm; body mass,  $58.2 \pm 5.2$  kg), 14 artistic and rhythmic gymnasts, and 13 recreationally active participants performed 3 min of intermittent ( $6 \times 30$  s with 30 s rest) or continuous stretching (3 min) of the hamstring muscles, with an intensity of 8–9 on a 10-point visual analogue scale. Hip joint ROM was measured for both legs after warm-up and immediately after stretching. The same individuals performed both conditions with alternate legs in a randomized, counterbalanced order. Data were analysed using mixed-model three-way ANOVA. **Results:** In the untrained participants, only intermittent stretching increased ROM by 13% (from  $91.0 \pm 7.2^\circ$  to  $102.4 \pm 14.5^\circ$ ,  $p = 0.001$ ), while continuous stretching did not affect ROM (from  $92.4 \pm 6.9^\circ$  to  $93.1 \pm 9.2^\circ$ ,  $p = 0.99$ ). In the trained participants, both stretching types equally increased ROM by ~6% (continuous,  $140.9 \pm 20.4^\circ$  to  $148.6 \pm 18.8^\circ$ ,  $p = 0.047$ ; intermittent,  $141.8 \pm 20.3^\circ$  to  $150.0 \pm 18.8^\circ$ ,  $p = 0.029$ ). **Conclusions:** The different effect of intermittent vs. continuous stretching on hip ROM between trained and untrained subjects suggests that stretching mode is an important variable when examining the acute effects of static stretching on ROM enhancement.

**Keywords:** flexibility; warm-up; hamstrings; stretch; gymnasts



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