1. Statistical analysis

All statistical analyses were conducted in R (v 4.4.2; R Core Team, <https://www.r-project.org/>) within a Bayesian framework using the “brms” package interfaced with Stan to perform sampling (Bürkner, 2023). Instead of dichotomizing findings through null hypothesis significance testing, which has been widely critiqued (Amrhein, 2019), we adopted an estimation-based approach. Each model was fit using non-informative priors (default “brms” priors) and employed four Hamiltonian Monte Carlo Markov Chains with 2000 warmup and 2000 sampling iterations. Posterior predictive checks and trace plots were visually inspected to ensure model validity and convergence before extracting any estimates.

For our primary outcome (i.e., change in muscle thickness), a linear mixed-effects model was generated to assess mean differences in outcome measures between conditions at two muscle regions - mid-thigh and side-thigh individually, as well as the interaction of condition and measurement site within each muscle region. Models were adjusted for the baseline values of the muscle thickness mimicking an analysis of covariance (i.e., ANCOVA). Specifically, each model included condition and the interaction between condition and site as fixed effects, and as each model contained multiple observations, participants were added as random intercepts.

To compare longitudinal trend of fatigue between sets, weeks and conditions, a linear mixed-effects model was generated. Peak torque values were standardized to a z-score via the following equation: . The fixed effects included set number, week, and the interaction between set number and condition, and the interaction between set number and week. Participants were added as random intercepts, and random slopes were included for the effects of set number, set number by condition, week, and set number by week interactions.

Posterior draws were extracted using the “tidybayes” package (Kay, 2023), and estimated marginal effects were calculated using the “emmeans” package (Lenth, 2023). Inferences for all analyses were made on posterior distributions, summarized using point estimates (posterior means) and their associated 95% high-density credible intervals (95% HDI). We compared the posterior distributions to a region of practical equivalence (ROPE), defined by the typical error (TE) of measurement (REF). All of the R code for the statistical analyses used can be found on the Open Science Framework (REF).

1. Results
   1. *Overall muscle thickness*

Raw mid-thigh and side-thigh muscle thickness (average of three measurement sites) changes from pre-post intervention can be found in Figure XX. Estimates of posterior distributions suggest similar increases mid-thigh muscle thickness for ISOM [1.11 mm (95% HDI: -0.09, 2.32)] and DYN [0.435 mm (95% HDI: -0.724, 1.68)] conditions. Probabilities of the change being greater than null effect and the ROPE was 96%, 85% for the ISOM, and 77%, 48% for DYN conditions, respectively. The model estimates for between condition changes (contrasts) was -0.67 mm (95% HDI: -1.46, 0.03), with a 96% and 71% probability of the change being greater than a null effect, and ROPE, respectively.

A diagram of a normal distribution

Description automatically generated

Figure X. Mid-thigh within-condition, and between-condition (i.e., contrasts between DYN and ISOM) posterior distributions that show central tendency (i.e., point estimates) and 95% high density credible intervals. Grey shaded area indicates the region of practical equivalence (ROPE).

Increases in side-thigh muscle thickness were observed for ISOM condition [0.47 mm (HDI: -0.08, 1.06)] with 95% and 52% probabilities of the change being greater than a null effect and the ROPE, respectively. Similarly, The DYN condition observed 0.21 mm increase in muscle thickness (95% HDI: -0.38, 0.78) with 77% and 20% probabilities of the change being greater than a null effect and the ROPE, respectively. The model estimates for between condition changes (contrasts) was -0.25 mm (95% HDI: -0.80, 0.30), with a 82% and 23% probability of the change being greater than a null effect, and ROPE, respectively.

A diagram of a normal distribution

Description automatically generated

Figure X. Mid-thigh within-condition, and between-condition (i.e., contrasts between DYN and ISOM) posterior distributions that show central tendency (i.e., point estimates) and 95% high density credible intervals. Grey shaded area indicates the region of practical equivalence.

* 1. *Regional muscle thickness*