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Data Article

Single-leg landing neuromechanical data following load and land height manipulations

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A R T I C L E I N F O

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A B S T R A C T

Lower extremity sagittal kinematic and kinetic data are summarized alongside electrical muscle activities during single-leg landing trials completed in contrasting external load and landing height conditions. Nineteen subjects were analyzed during 9 landing trials in each of 6 experimental conditions computed as percentages of subject anthropometrics (bodyweight: BW and subject height: H; BW, BW+12.5%, BW+25%, and H12.5%, H25%). Twelve lower extremity variables (sagittal hip, knee, ankle angles and moments, vertical ground reaction force (GRFz), gluteus maximus, biceps femoris, vastus medials, medial gastrocnemius, and tibialis anterior muscles) were assessed using separate principal component analyses (PCA). Variable trends across conditions were summarized in "Neuromechanical synergies in single-leg landing reveal changes in movement control. *Human Movement Science*" (Nordin and Dufek, 2016) [1], revealing changes in landing biomechanics and movement control.

Specifications Table

Subject area	Kinesiology
More specific subject area	Biomechanics

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Type of data	Figures
How data was acquired	Kinematic (10 camera Vicon MX-T40S), kinetic (Kistler force platform, Type 9281CA), and electromyographic (EMG) (Noraxon Myosystem 2000) time series data.
Data format	Filtered, analyzed
Experimental factors	Kinematic data were low-pass filtered (15 Hz cutoff), ground reaction force data were low-pass filtered (50 Hz cutoff), EMG data were band pass filtered (15–300 Hz cutoffs) rectified and low pass filtered (15 Hz cutoff).
Experimental features	Nineteen healthy volunteers were analyzed during 9 single-leg drop landing trials in each of six experimental conditions (3 load and 2 landing height: BW, BW + 12.5%, BW + 25% and H12.5% and H25%; BW is subject bodyweight and H is subject standing height). Lower extremity sagittal joint angles and moments (hip, knee, ankle), vertical ground reaction force (GRFz), and electrical muscle activities were analyzed in each trial.
Data source location	University of Nevada, Las Vegas, Las Vegas, NV, USA
Data accessibility	All relevant data are presented within the article.

Value of the data

- Data include ensemble curves and principal components extracted from single-leg landing trials among 19 healthy volunteers.
- Previously injured or individuals susceptible to injury may reveal different movement patterns following load and landing height manipulations.
- Baseline comparisons may be useful for identifying atypical landing biomechanics.

1. Data

The six figures present patterns of change among 12 lower extremity variables collected in a single-leg landing task following external load and landing height manipulations. Ensemble time series plots and principal component analysis (PCA) results are shown for each variable. Principal component (PC) loading vectors and PC scores present magnitude and temporal changes among conditions, along with analysis of variance results (ANOVA, $p < 0.05$).

Lower extremity single-leg landing biomechanical data were summarized among subjects for sagittal joint angles and moments (hip, knee, ankle), vertical ground reaction forces (GRFz), and muscle activation patterns (gluteus maximus, biceps femoris, vastus medialis, medial gastrocnemius, tibialis anterior). Subject-specific anthropometrics were used to calculate load and landing height conditions (bodyweight: BW, and subject height: H). Six experimental load and landing height combinations were completed: BW, BW + 12.5%, and BW + 25% at H12.5% and H25%. Principal component analyses (PCA) were performed for each lower extremity variable. PC loading vectors depicted movement patterns. PC scores summarized movement pattern differences among conditions.

2. Experimental design, materials and methods

We analyzed 19 healthy volunteers (15M, 4F, age: 24.3 ± 4.9 y, mass: 78.5 ± 14.7 kg, height: 1.73 ± 0.08 m) during 9 single-leg drop landing trials in each of six experimental conditions. External load and landing height were adjusted as percentages of subject-specific anthropometrics (bodyweight: BW, and subject height: H). We applied external loads to the trunk with small backpacks and iron weights. Landing height was manipulated with an adjustable platform. Conditions were: 1.) BW●H12.5, 2.) BW + 12.5●H12.5, 3.) BW + 25●H12.5, 4.) BW●H25, 5.) BW + 12.5●H25, 6.) BW + 25●H25, completed in randomized order.