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Bilateral Asymmetry in the Single Leg Step Down among Young Healthy Adults

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Asymmetries in functional movements/rehabilitation exercises are used by practitioners in the pre-habilitation and rehabilitation of athletes and clients. Normative asymmetry data is essential to evaluate the asymmetry values for determining rehabilitation progress and return to play. The majority of asymmetry literature focuses on performance asymmetry (e.g., single leg hop distance) as opposed to asymmetry of movement skill biomechanics. **PURPOSE:** To determine normative bilateral asymmetry values of joint kinematics and kinetics during the single leg step down (SLSD). **METHODS:** Eighteen healthy college-aged individuals (n=4 male, n=14 female; Age: 20.0 ± 1.19 y, Ht: 1.68 ± 0.08m, Mass: 65.1 ± 9.7 kg) each completed 3 trials of 5 functional movement skills. For this study only SLSDs were analyzed. Eighteen reflective markers were placed on 24 anatomical landmarks to create a 7-segment model (pelvis, and R/L thigh, lower leg, and foot) of the participant. A motion capture system integrated with force plates was used to capture 3D data and ground reaction forces. Bilateral asymmetry indices (BAI) were calculated for maximum ankle, knee and hip flexion; maximum sagittal plane ankle, knee, and hip power; and medial-lateral (M/L) knee displacement. Joint power was expressed as a percent of total lower extremity power prior to calculating BAI. BAI was calculated as 100*[((Max(R/L)-Min(R/L))/Min(R/L)]. Mean and standard deviations of BAI are reported. **RESULTS:** Mean BAI for ankle flexion was 8.58 ± 7.51%, BAI for knee flexion was 7.51 ± 4.60%, and BAI for hip flexion was 9.35 ± 6.04%. M/L knee displacement BAI was 33.43 ± 39.81%. Percent power BAI for the ankle was 39.49 ± 29.03%, for the knee was 19.16 ± 21.03%, and for the hip was 51.99 ± 62.09%. **CONCLUSIONS**: Bilateral asymmetry was smallest for variables related to SLSD depth, hip and knee flexion, indicating high levels of symmetry for these motions (>94%). Variables related to control strategies and stabilization, such as joint power and M/L displacement, had large bilateral asymmetry. The large normative asymmetry for key SLSD biomechanical measures could question the use of lower extremity biomechanical symmetry as a return to play/function guide. Conclusions should be tempered by the small sample size; increasing sample size is warranted.