MODEL HEALTH

Drop vertical jump analysis report

Subject	Session	Trial	Type
-	b1b3c70a	dropjump	Double leg

Drop vertical jump metrics

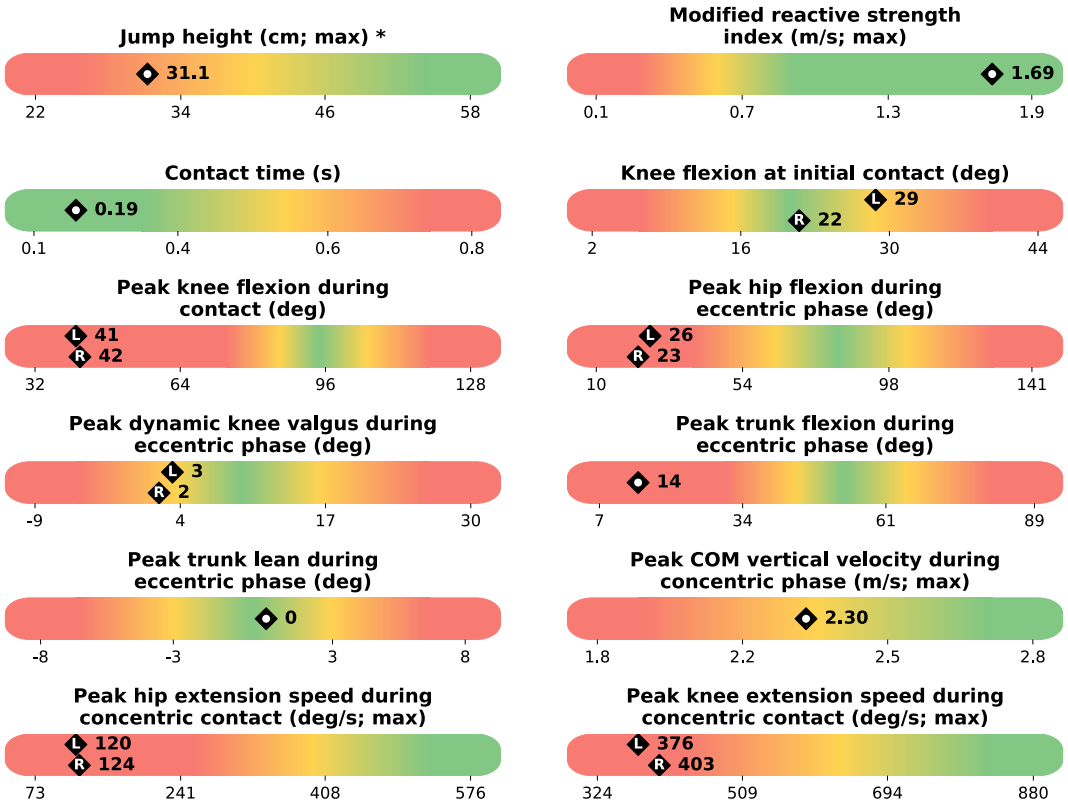

Figure 1: Colors indicate how results compare to normative data from healthy adult populations, comprising both males and females. For directional metrics (where higher or lower is universally better), the top 25% is green, the middle 50% yellow, and the bottom 25% red. For centered metrics (where both extremes are unfavorable), green represents the middle 40% (30th-70th percentile), red the outer extremes (below the 10th or above the 90th percentile), and yellow the transition zones in between. If multiple repetitions are performed, the reported value is the average, except when a specific value is indicated in brackets. *Zones boundaries are dependent on the subject's leg length.

Drop vertical jump phases and events

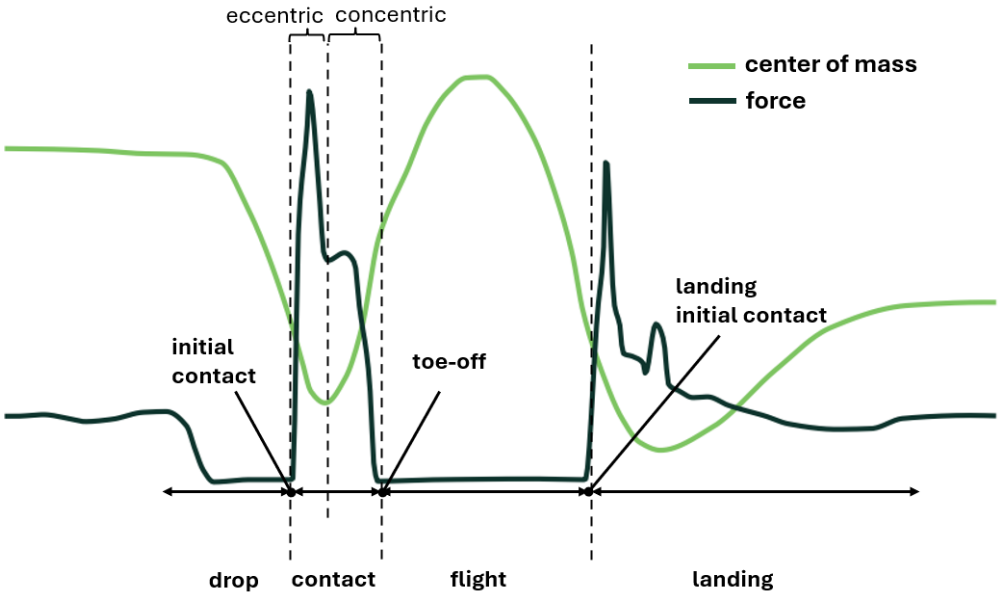

Figure 2: Phases and events of the drop vertical jump defined by center-of-mass vertical position and vertical force. The drop phase is followed by the contact phase, which includes an eccentric portion (downward center-of-mass motion) and a concentric portion (upward motion). The contact phase ends at toe-off, initiating the flight phase, and the movement concludes with the landing phase starting at initial landing contact.

Per-repetition metrics

Metric	1		2		3	
	L	R	L	R	L	R
Jump height (cm)	28.3		30.2		31.1	
Modified reactive strength index (m/s)	1.54		1.51		1.69	
Contact time (s)	0.18		0.20		0.18	
Eccentric time (s)	0.08		0.10		0.08	
Concentric time (s)	0.10		0.10		0.10	
Knee flexion at initial contact (deg)	25.6	24.3	27.5	18.3	33.0	22.0
Peak knee flexion during contact (deg)	39.0	40.4	41.8	42.8	42.1	42.4
Peak hip flexion during eccentric phase (deg)	24.4	22.3	25.4	22.4	29.0	23.2
Peak dynamic knee valgus during eccentric phase (deg)	3.4	1.5	2.0	2.4	4.7	2.3
Peak trunk flexion during eccentric phase (deg)	13.3		15.0		14.7	
Peak trunk lean during eccentric phase (deg)	-0.6		0.5		1.5	
Peak COM vertical velocity during concentric phase (m/s)	2.12		2.30		2.26	
Peak hip extension speed during concentric contact (deg/s)	98	107	120	117	115	124
Peak knee extension speed during concentric contact (deg/s)	338	378	374	392	376	403
Knee flexion at initial landing contact (deg)	13.6	14.4	17.4	13.9	23.0	24.2
Peak knee flexion during landing (deg)	61.0	54.4	85.1	74.5	78.7	75.0
Peak dynamic knee valgus during landing (deg)	3.5	7.9	5.8	14.4	5.5	8.8

Description of the metrics

Performance

- **Jump height** is the vertical distance between the center of mass in a standing position and its highest point during flight. Higher values indicate better performance.
- **Modified reactive strength index (RSI)** is the ratio of jump height to contraction time. A higher RSI reflects the ability to produce explosive movement while minimizing the time required to execute the jump.
- **Contact time** is the duration of the contact phase. Shorter values indicate greater reactivity.

Eccentric phase

- **Eccentric time** is the duration of the eccentric phase phase.
- **Knee flexion at initial contact** is indicative of coordination during preparation for the contact phase. A balanced value reflects a trade-off between shock absorption and force generation capacity.
- **Peak knee flexion during contact** is indicative of coordination during the contact phase and influences performance. A balanced value reflects a trade-off between shock absorption and force generation capacity.
- **Peak hip flexion during eccentric phase** is indicative of coordination during the contact phase and influences performance. A balanced value reflects a trade-off between shock absorption and force generation capacity.
- **Peak dynamic knee valgus during eccentric phase** is indicative of frontal-plane knee control. Lower values are desirable to reduce injury risk (e.g., iliotibial band and patellofemoral pain syndromes).
- **Peak trunk flexion during eccentric phase** is indicative of coordination during the contact phase and influences performance. A balanced value reflects a trade-off between shock absorption and force generation capacity.
- **Peak trunk lean during eccentric phase** is indicative of coordination and asymmetry during the contact phase. Smaller values are generally desirable, though in single-leg jumps small deviations may be beneficial for performance.

Concentric phase

- **Concentric time** is the duration of the concentric phase phase.
- **Peak COM vertical velocity during concentric phase** is indicative of force generation. Higher values are associated with greater jump height.
- **Peak hip extension speed during concentric contact** is indicative of force generation. Higher values are desirable.
- **Peak knee extension speed during concentric contact** is indicative of force generation. Higher values are desirable.

Landing phase

- **Knee flexion at initial landing contact** is indicative of coordination during landing. While the landing phase is less critical for performance, a balanced value reflects a trade-off between shock absorption and efficiency.
- **Peak knee flexion during landing** is indicative of coordination during landing. While the landing phase is less critical for performance, a balanced value reflects a trade-off between shock absorption and efficiency.
- **Peak dynamic knee valgus during landing** is indicative of coordination during landing. While the landing phase is less critical for performance, a balanced value reflects a trade-off between shock absorption and efficiency.

Joint kinematics

Lower-body and lumbar joint angles

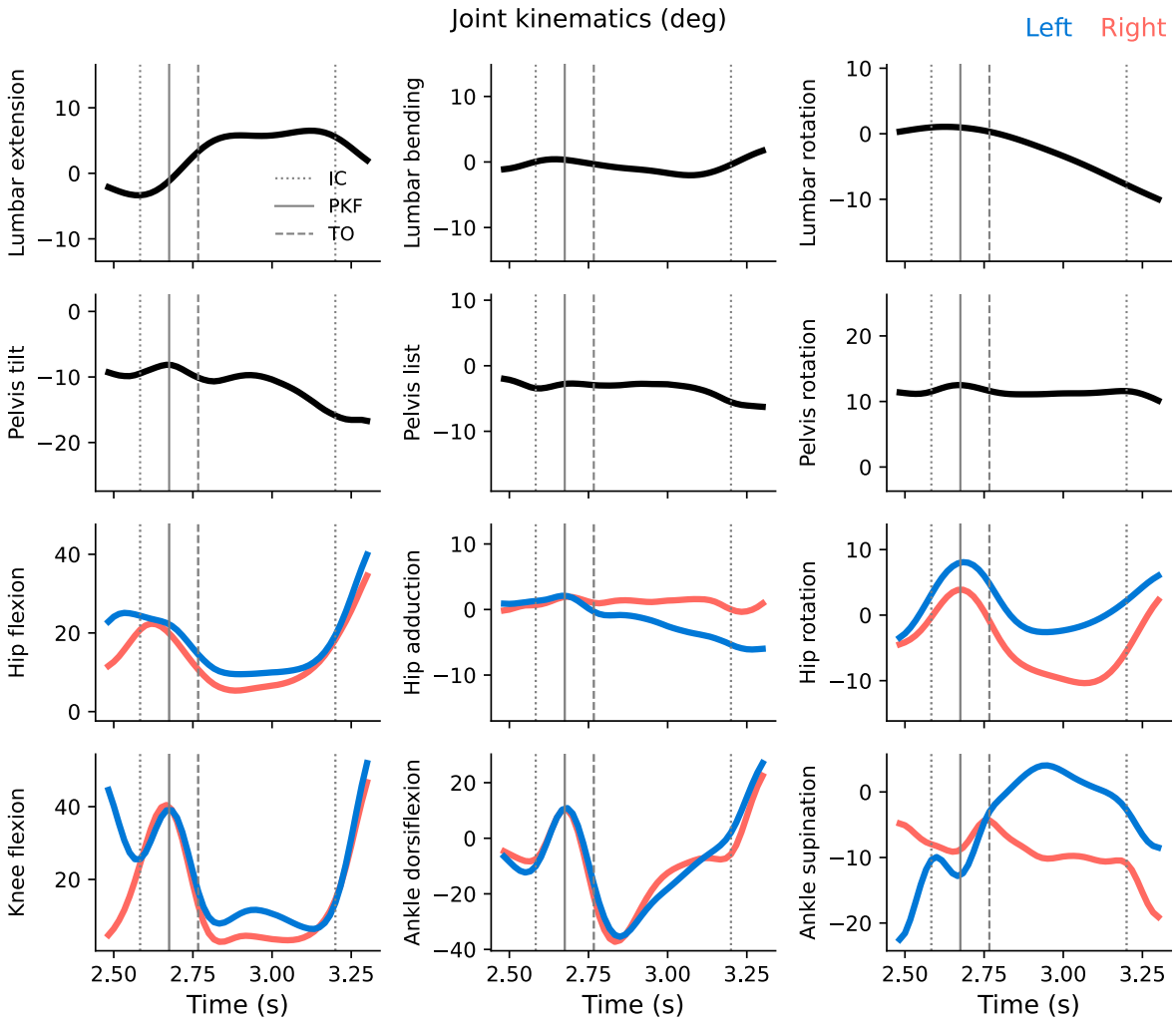

Figure 3: Joint angles from drop to landing for the first jump. IC is initial contact, PKF is peak knee flexion angle (average across legs if double leg), and TO is toe-off.

- Lumbar extension (sagittal plane) is positive when the trunk extends posteriorly.
- Lumbar bending (frontal plane) is positive when the trunk bends toward the right side.
- Lumbar rotation is positive when the torso is rotating leftwards.
- Pelvis tilt is positive when the pelvis tilts posteriorly.
- Pelvis list is positive when the left side of the pelvis moves upward.
- Pelvis rotation (transverse plane) is positive when the right side of the pelvis rotates anteriorly.
- Hip rotation is positive when the femur rotates medially (internal rotation).

Pelvis translations

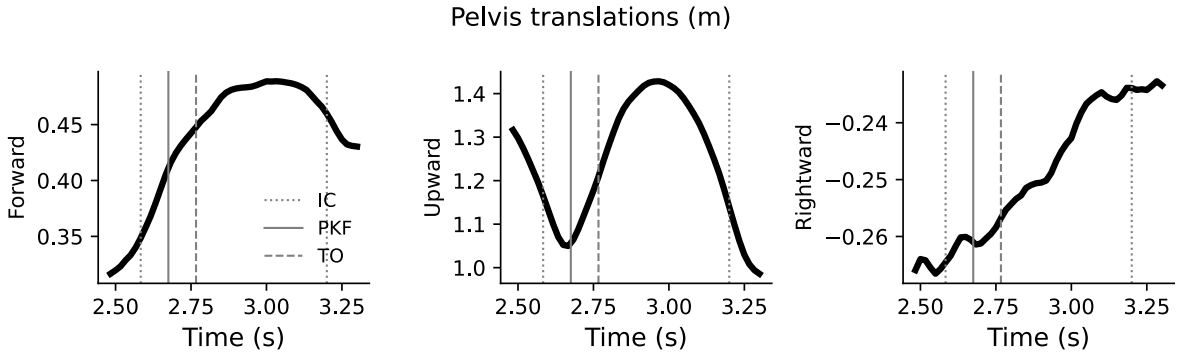

Figure 4: Pelvis translations from drop to landing for the first jump. IC is initial contact, PKF is peak knee flexion angle (average across legs if double leg), and TO is toe-off.