

BIOMECHANICAL ASSESSMENT REPORT

Emma Clarke

Treadmill running

DATE

6 October 2026

AGE

35 years

SPORT

Running and football

PROFESSIONAL

Sarah Lee

We analysed your running technique, from the front and from the side, at your usual training pace.

Your summary

For each exercise, the traffic light sums up what we saw. Below we explain, in plain words, what is going well, what we can improve and where to focus your training.

● Good ● Keep an eye on ● To work on ● No reference

Running: front view

● Keep an eye on

Your movement is generally good, with a few points to improve that can be addressed with training.

● WHAT IS GOING WELL

- Feet crossing the midline: within the expected range.
- Trunk balance: within the expected range.

● WHAT WE CAN IMPROVE

- During stance on the left, the pelvis drops on the opposite side more than expected.
- During stance on the left, the thigh moves inward more than expected.

● SUGGESTED TRAINING FOCUS

- Gluteus medius and hip abductor strengthening, and running practice with a stable pelvis.
- Hip abductor and external rotator strengthening and, if appropriate, a slight cadence increase.

Running: right and left side views

● Keep an eye on

Your movement is generally good, with a few points to improve that can be addressed with training.

● WHAT IS GOING WELL

- Step rate: within the expected range.
- Knee at touchdown: within the expected range.
- Trunk posture: within the expected range.

● WHAT WE CAN IMPROVE

- On the left, the foot lands further from the body than expected.
- Foot ahead of the body: notable difference between sides, less favourable on the left leg.
- Overstriding: notable difference between sides, less favourable on the left leg.

● SUGGESTED TRAINING FOCUS

- Gradual cadence increase (5–10%) and technique work with a slightly shorter stride.
- Single-leg exercises with extra work on the less favourable side, to reduce the difference between sides.

Notes from your professional

Sample report with fictitious data.

This video assessment is a movement screen, not a diagnosis. Results should be interpreted by your health professional together with the clinical assessment.

TASK 1 OF 2

Running: front view

Keep an eye on

Treadmill running filmed from the front. It assesses pelvic drop, hip adduction, knee alignment, foot crossover and lateral trunk sway.

Speed: 10.0 km/h

CAPTURE QUALITY

Valid cycles: R 14 · L 15 · Tracking 100 % · 120 fps

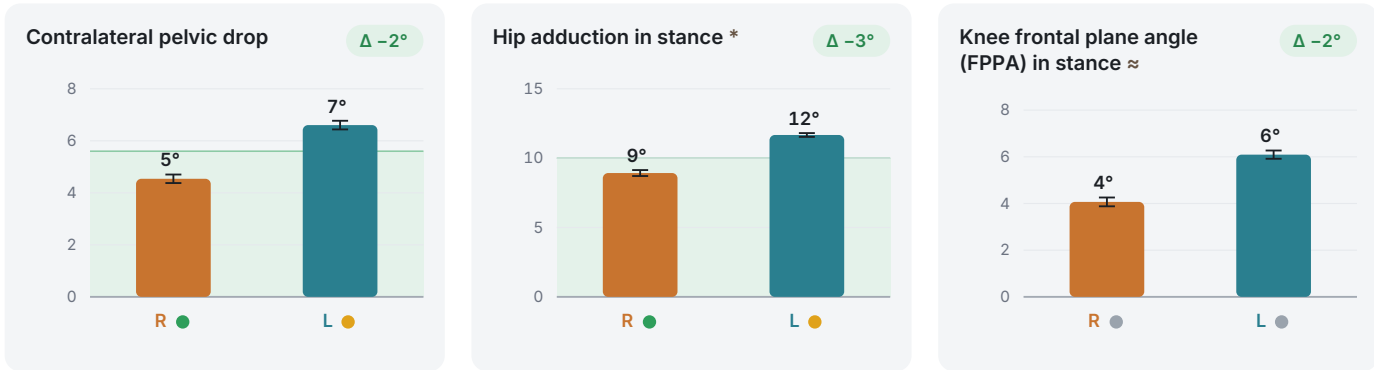
Results

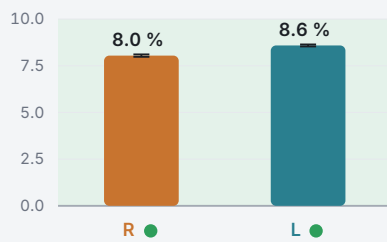
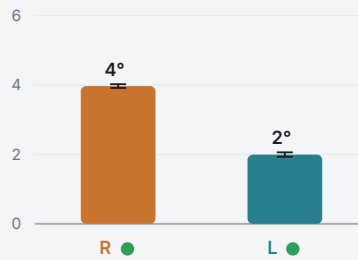
Metric	Right	Left	Asymmetry LSI · R – L	Reference
Contralateral pelvic drop	● 5° ± 0.2	● 7° ± 0.2	● -2°	0–6° Bramah 2018; Dingenen 2018
Hip adduction in stance *	● 9° ± 0.2	● 12° ± 0.1	● -3°	0–10° Dingenen 2019; Bramah 2019
Knee frontal plane angle (FPPA) in stance ≈	● 4° ± 0.2	● 6° ± 0.2	● -2°	No 2D norm: compare sides and progress Dingenen 2018; Maykut 2015
Foot-to-midline distance (crossover) *	● 8.0 % ± 0.1	● 8.6 % ± 0.1	● -0.5 % LL	≥ 0.0 % · Negative = foot crosses the midline (proposal)
Lateral trunk sway ≈	● 4° ± 0.1	● 2° ± 0.1	● +2°	No 2D norm: compare sides and progress

● within reference ● borderline ● outside reference ● no norm (compare sides)
* threshold proposed from published mean ± SD (to be validated)
≈ no reliable 2D norm: compare sides and track over time
Asymmetry: LSI = smaller side ÷ larger side × 100 %; or difference R – L (right – left).
Values: mean ± SD of valid repetitions/cycles.

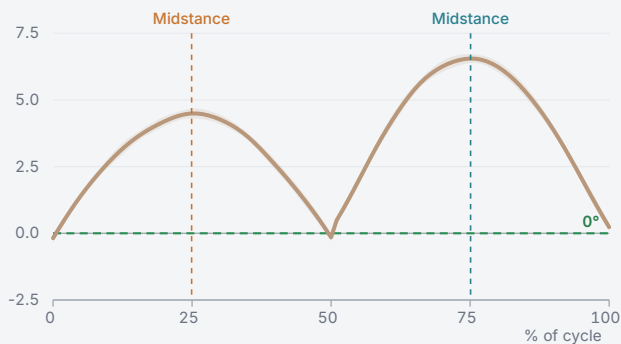
Right vs left

Right Left Reference range



Foot-to-midline distance
(crossover) * $\Delta -0.5\%$ LLLateral trunk sway $\approx$ $\Delta +2^\circ$ 

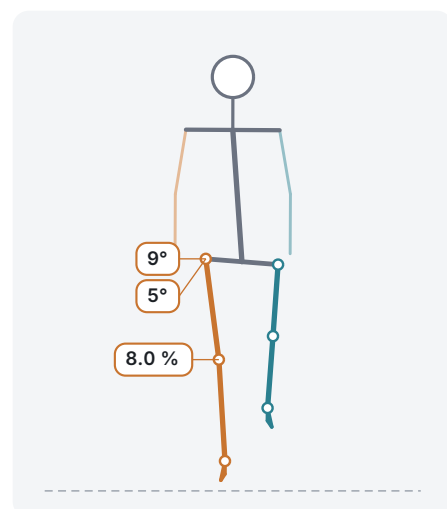
Throughout the movement

— Overall — mean $\pm$ SD - - - reference limitPelvic drop when running (right stance, then left) ($^\circ$)

Key positions

Front view: the client's right side appears on the left of the image.

Running, front view: midstance Right leg



Running, front view: midstance Left leg



- Foot-to-midline distance (crossover) · R: 8.0 %
- Hip adduction in stance · R: 9 $^\circ$
- Contralateral pelvic drop · R: 5 $^\circ$

- Foot-to-midline distance (crossover) · L: 8.7 %
- Hip adduction in stance · L: 12 $^\circ$
- Contralateral pelvic drop · L: 7 $^\circ$

TASK 2 OF 2

Running: right and left side views

Keep an eye on

Speed: 10.0 km/h

CAPTURE QUALITY

Valid cycles: R 14 · L 14 · Tracking 100 % · 120 fps

Results

Metric	Right	Left	Asymmetry LSI · R – L	Reference
Cadence	168 spm		—	165–185 spm van Oeveren 2019; Heiderscheit 2011
Ground contact time ≈	258 ms ± 2	255 ms ± 2	LSI 99 %	200–300 ms Dunn 2018
Duty factor ≈	36 %		—	30–40 % van Oeveren 2024
Foot strike angle	12° ± 0.6	12° ± 0.7	0°	Rearfoot > 8° · midfoot –1.6 to 8° · forefoot < –1.6° Altman & Davis 2012
Shank angle at initial contact *	2° ± 0.2	7° ± 0.3	–5°	2–10° Whitney 2022; Souza 2016
Heel-to-centre-of-mass distance ≈	14 % ± 0.3	21 % ± 0.2	–7 % LL	No 2D norm: compare sides and progress Wille 2014
Knee flexion at initial contact *	18° ± 0.4	16° ± 0.5	+1°	10–23° Whitney 2022; Bramah 2018
Peak knee flexion in stance ≈	41° ± 0.2	45° ± 0.3	–5°	35–45°
Peak hip extension ≈	3° ± 0.3	1° ± 0.3	+2°	10–20°
Heel recovery in swing ≈	100° ± 0.2	103° ± 0.3	–3°	No 2D norm: compare sides and progress
Forward trunk lean	6°		—	2–11° Whitney 2022; Teng & Powers 2015
Vertical oscillation ≈	6.1 %		—	5.0–10.0 % Folland 2017

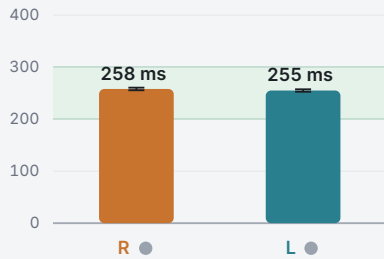
● within reference ● borderline ● outside reference ● no norm (compare sides)
* threshold proposed from published mean ± SD (to be validated)
≈ no reliable 2D norm: compare sides and track over time
Asymmetry: LSI = smaller side ÷ larger side × 100 %; or difference R – L (right – left).
Values: mean ± SD of valid repetitions/cycles.

Right vs left

Right Left Reference range

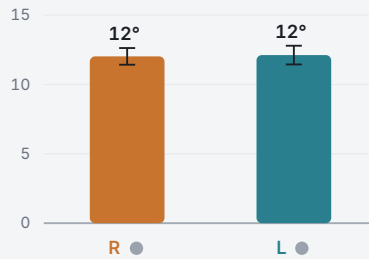
Ground contact time ≈

LSI 99 %



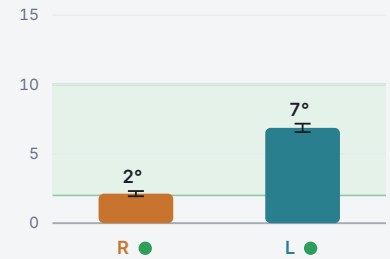
Foot strike angle

Δ 0°



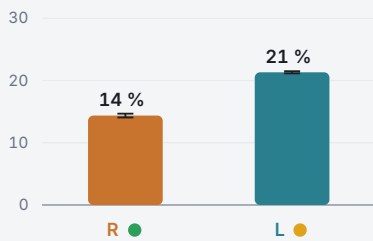
Shank angle at initial contact *

Δ -5°



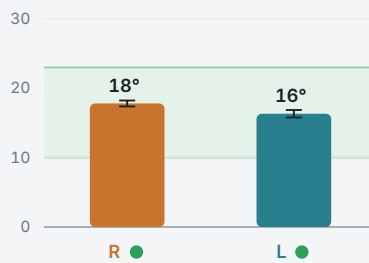
Heel-to-centre-of-mass distance ≈

Δ -7 % LL



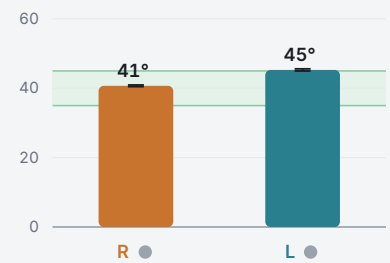
Knee flexion at initial contact *

Δ +1°



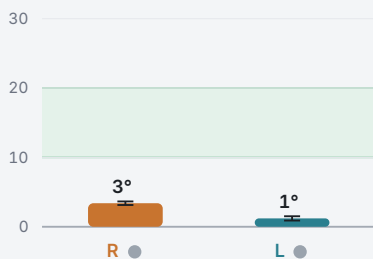
Peak knee flexion in stance ≈

Δ -5°



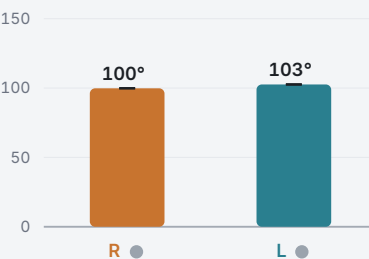
Peak hip extension ≈

Δ +2°



Heel recovery in swing ≈

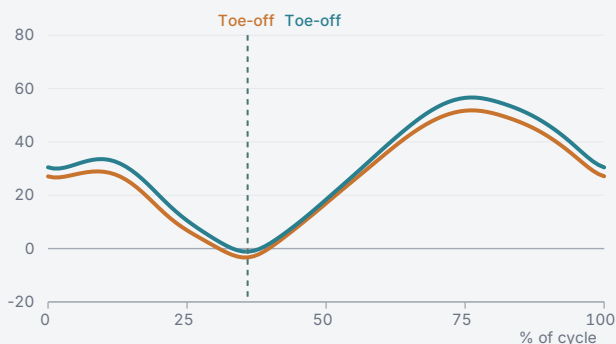
Δ -3°



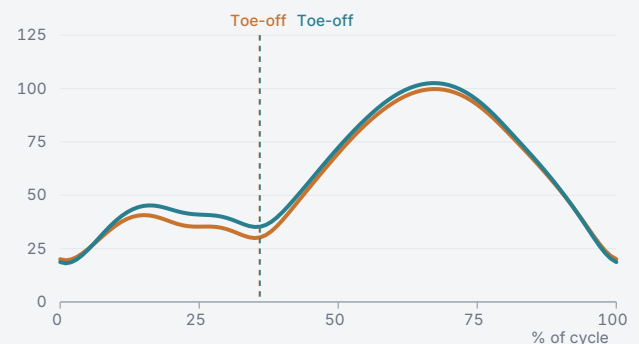
Throughout the movement

Right Left mean ± SD

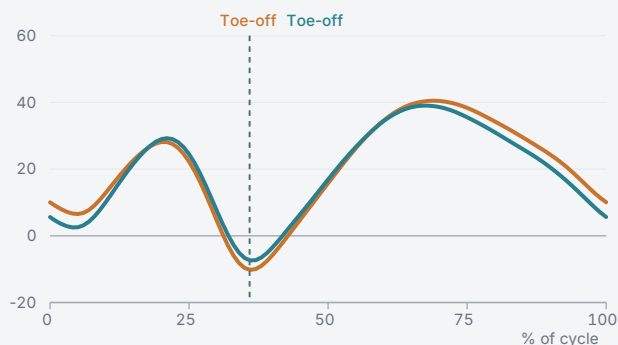
Hip: flexion (+) / extension (-) over the running stride (°)



Knee: flexion over the running stride (°)



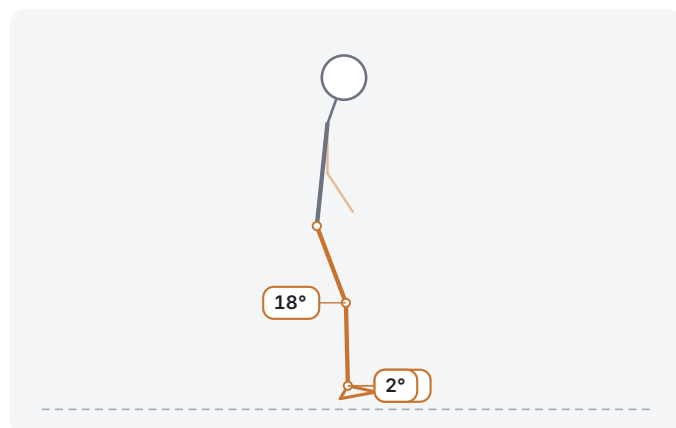
Ankle: dorsiflexion (+) / plantarflexion (-) when running (°)



Key positions

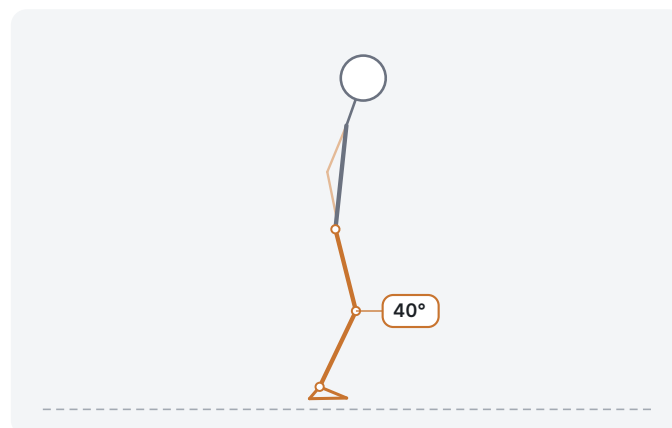
Side view, rebuilt from the detected joints (no photo).

Running: initial contact Right leg



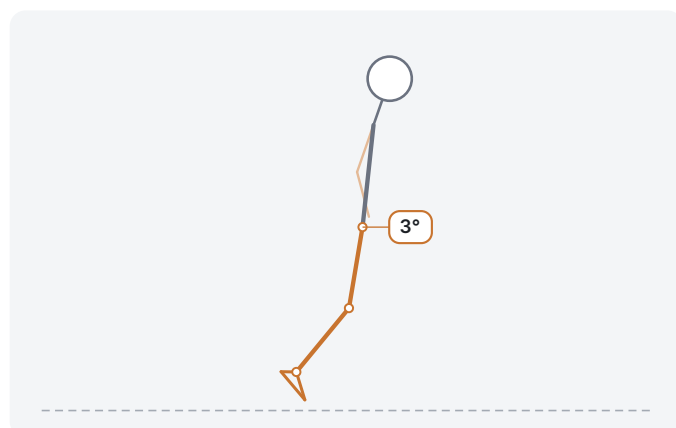
- Foot strike angle · R: 12°
- Knee flexion at initial contact · R: 18°
- Shank angle at initial contact · R: 2°

Running: midstance Right leg



- Peak knee flexion in stance · R: 40°

Running: toe-off Right leg



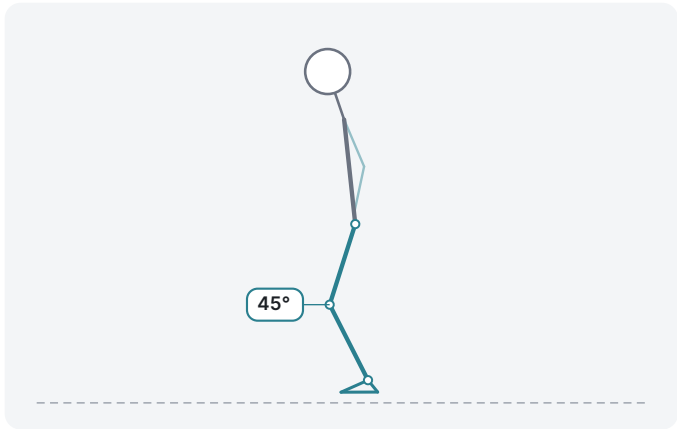
- Peak hip extension · R: 3°

Running: initial contact Left leg



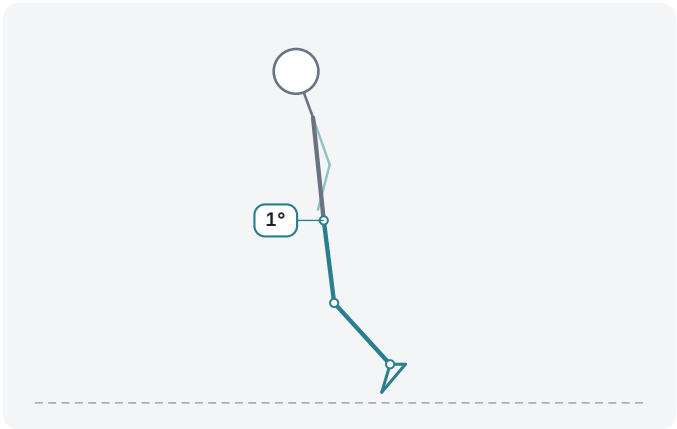
- Foot strike angle · L: 12°
- Knee flexion at initial contact · L: 17°
- Shank angle at initial contact · L: 7°

Running: midstance Left leg



● Peak knee flexion in stance · L: 45°

Running: toe-off Left leg



● Peak hip extension · L: 1°

Methods and references

How the assessment was done

The assessment used 2D video recorded on an iPhone. A pose-estimation model automatically detects the joints in every frame; angles, distances and times are the mean of the valid repetitions or cycles on each side. Curves show the mean $\pm$ standard deviation normalised to 0–100 % of the repetition or cycle (or in milliseconds after contact).

Limitations

Angles measured in 2D are projections onto the camera plane and depend on camera alignment and distance, clothing and lighting. Compared with reference 3D analysis, the typical error of 2D pose estimation is 4–7° (Stenum 2021). Differences between assessments smaller than the measurement error should be interpreted with caution.

How to read the results

Traffic light: green = within reference; amber = borderline, keep an eye on it; red = outside reference, to work on; grey = no reliable 2D norm — compare both sides and track over time. Asymmetry is given by the limb symmetry index (LSI = smaller side $\div$ larger side $\times$ 100 %) or by the right – left difference.

References: unmarked values are published norms; * = threshold proposed from published means $\pm$ standard deviation or measurement error (to be clinically validated); $\approx$ = no reliable 2D norm. References depend on sex and profile (athlete or general population).

This assessment is a movement screening, not a diagnosis. Results should be interpreted by the health professional together with the clinical history and physical examination.

References cited

1. Altman & Davis 2012. Gait Posture. doi:10.1016/j.gaitpost.2011.09.104
2. Bramah 2018. Am J Sports Med. doi:10.1177/0363546518793657
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