AUT SPORT RESEARCH INSTITUTE NEW ZEALAND

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The use of the Alter-G in Return to Running

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The Return-to-Running Challenge

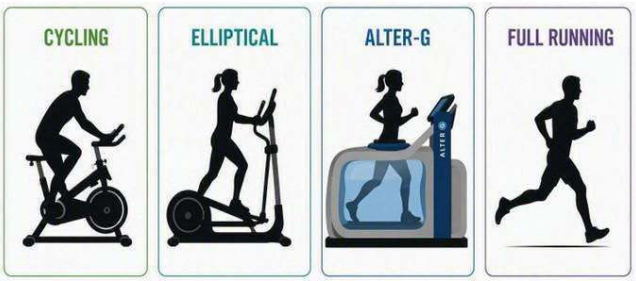
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Challenges

- Running = 2-3× body weight
- Tissue capacity lags behind cardiovascular fitness
- Traditional cross-training lacks running-specific loading.
- Clinicians need a way to progressively reload running tissues.

How Alter-G Helps

- Fills the gap between non-running cross training and overground running.
- Running-specific movement pattern
- Adjustable body-weight support (can take up to 80% of body weight)
- Allows progressive tissue loading.



(Doyle et al. 2025, Fohrmann et al. 2025, Gabbett & Oetter 2025, Jiang et al. 2024)

Effects of Increasing Body-Weight Support

Temporal spatial responses:
↓ Cadence
↓ Vertical CoG displacement
↓ Ground contact time
↑ Stride length
↑ Flight time

Kinematic responses:
↓ Peak knee flexion
↓ Peak ankle dorsiflexion
↑ Plantarflexion at contact

Loading responses:
↓ Ground reaction force
↓ Heel force
↓ Achilles tendon load
↓ Tibial shock



More unloading = lower tissue loading, but progressively greater changes in running mechanics.

(Alexeev et al., 2025, Fohrmann et al. 2025, Neal et al. 2016, Pohlman et al., 2023. Thomson et al. 2021, Vincent al. 2022)

Speed is the biggest driver of loading on the Alter-G

Increasing speed produces a substantially larger rise in peak force than increasing body weight at a fixed speed *(Thompson et al. 2017)*

Table 1. Maximum plantar force (BW multiples (SD)) at the different combinations of indicated percentage BW (50–100%), and speed of running/walking (km · hr^{-1}).

Speed \ Bodyweight	50%	60%	70%	80%	90%	100%
6 km/hr	1.0170 [.2095]	1.0260 [.2080]	1.0670 [.1865]	1.1440 [.1830]	1.1775 [.1780]	1.2095 [.1900]
8 km/hr	1.3675 [.2350]	1.4230 [.2580]	1.4945 [.2290]	1.5380 [.2245]	1.6570 [.2685]	1.7160 [.2415]
10 km/hr	1.5585 [.2255]	1.6940 [.2160]	1.7695 [.2045]	1.8880 [.2165]	1.9785 [.2290]	2.0115 [.2230]
12 km/hr	1.6415 [.2070]	1.8010 [.2150]	1.8775 [.2075]	1.9845 [.2205]	2.1095 [.2130]	2.1475 [.2240]
14 km/hr	1.6925 [.2405]	1.8195 [.1855]	1.9560 [.1995]	2.0770 [.2180]	2.1875 [.2365]	2.2495 [.2240]
16 km/hr	1.7665 [.2085]	1.8715 [.1950]	1.9860 [.1930]	2.1140 [.2085]	2.2230 [.2240]	2.3090 [.2195]

1.0170 Minimum
1.6630
1.8783
1.9860
2.0506
2.0937
2.3090 Maximum

CLINICAL TAKEAWAY

Progress **body weight** before **speed** when tissue load is the limiting factor.

LOAD PROGRESSION HIERARCHY

1 **BODY WEIGHT** Restore load capacity first → 2 **DURATION** Increase time under controlled load → 3 **SPEED** Last to progress – largest loading driver

Indications and Entry Criteria

Indications	Criteria to begin Alter-G running
Bone stress injuries	✅ 2 weeks pain-free walking
Achilles tendinopathy or post-rupture repair	✅ Walking tolerance > 30 mins
Post-operative lower extremity	✅ Single calf raise > 15
General graded return-to-running after overuse injury.	✅ Pain-free bulgarian split squat > 15
	✅ No increase in symptoms with daily activities

Progression Principles

1. Increase body weight before speed
2. Increase one variable at a time
3. Progress by 5-10% body-weight increments
4. Monitor 24-hour symptom response
5. Transition to overground running once higher body-weight % are tolerated

50% BW → 60% BW → 70% BW → 80% BW → 90% BW

Alter-G Practical

3 aims of the practical:

1. Experience unloading:

- Walk and run at 60% and 80% BW
- Compare perceived effort

2. Observe biomechanics:

- Cadence and stride length
- Flight time
- Foot strike pattern
- Knee and ankle mechanics
- Overall gait strategy

3. Discuss application:

- Which injuries would benefit?
- When would you introduce Alter-G?
- What progression would you use?

Notes:
