



WIRELESS INSOLES TO MEASURE GROUND REACTION FORCES: STEP-BY-STEP VALIDITY IN HOPPING, WALKING, AND RUNNING

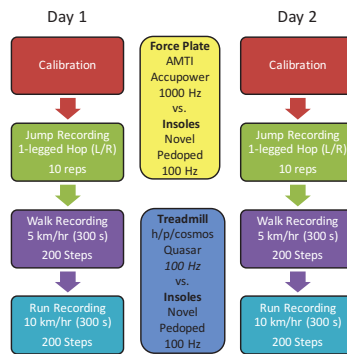
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BACKGROUND

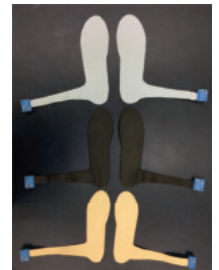
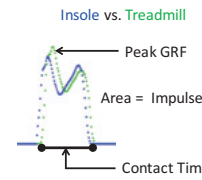
- Magnitude and temporal measures of ground reaction forces (GRF) are common components of gait analysis¹
- Traditional measurement methods²⁻⁸: Force plates, instrumented runways, instrumented treadmills
- Need: field-based measurement tools⁹
- Novel Pedoped Insoles: wireless GRF measurement¹⁰

Question: Are wireless insoles valid research tools for running and walking GRF measurements?



STUDY

13 Subjects:
Self-identified runners
8 Male/5 Female, 23±4 yrs



Step-by-step Analysis

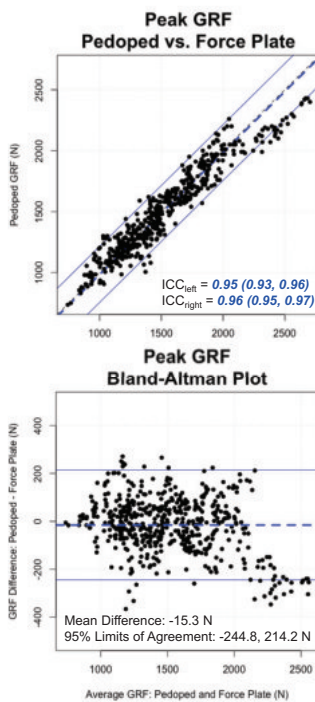
Novel Pedoped: 3 sizes

- Mean Difference
- 95% Limit of Agreement
- Zero Difference

Intraclass Correlation Coefficient¹¹

- Poor: < 0.59
- Moderate: 0.60-0.75
- Good: 0.75-0.89
- Excellent: ≥ 0.90

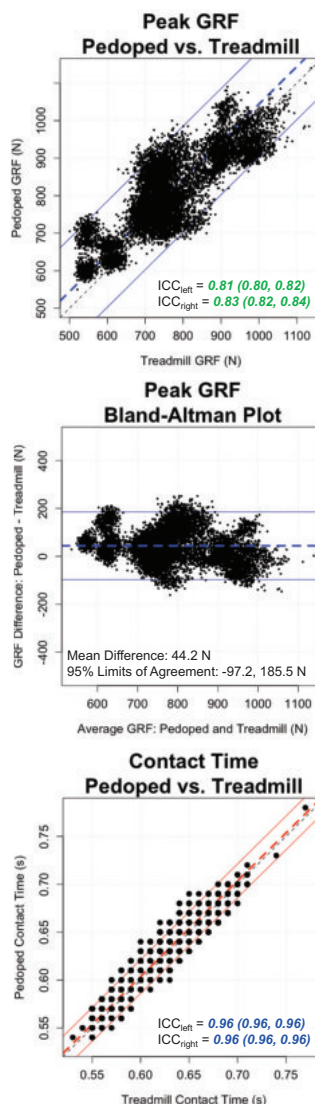
HOPPING



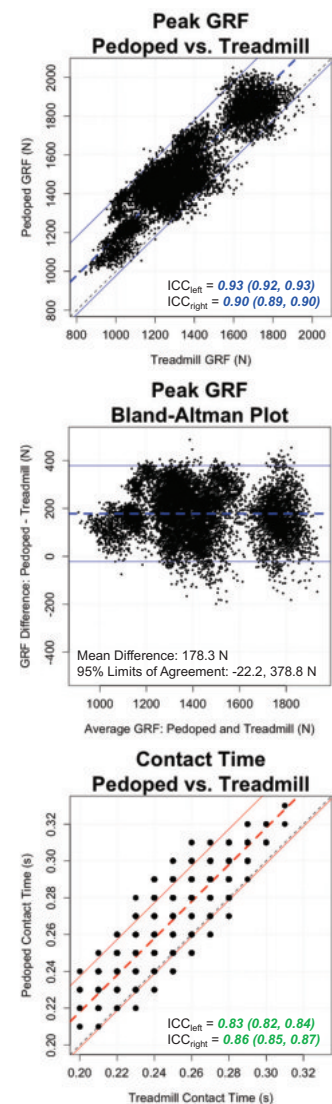
Impulse (not shown):

- Walking: ICC_{left} = 0.94 (0.94, 0.94)
ICC_{right} = 0.93 (0.92, 0.93)
- Running: ICC_{left} = 0.89 (0.88, 0.90)
ICC_{right} = 0.85 (0.85, 0.86)

WALKING



RUNNING



SUMMARY

1. Force Plate: Excellent agreement (ICC = 0.95)
100 Hz sampling rate is sufficient
2. Treadmill: Good/Excellent agreement
GRF: Walking (0.82); Running (0.91)
Contact Time: Walking (0.96); Running (0.85)
Impulse: Walking (0.93); Running (0.87)
3. Opportunity for future exploration
Overground running analyses outdoors
Stride-to-stride dynamics throughout activity
4. Takeaway: Novel Pedoped wireless insoles are a valid tool for measuring ground reaction forces in running and walking

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