

Introduction

- Forced pace cycling has been shown to improve global motor function among individuals with Parkinson's Disease (PD) compared to self-pace cycling.
- Tandem cycling is an alternate means to achieve high cadences, but many individuals with PD do not have access to trained partners.
- Preliminary studies support that technology-assisted cycling can replicate the benefits shown from human-paced tandem cycling.

Purpose:

- Determine whether technology-assisted forced pace cycling can mitigate PD motor symptoms including gait speed and balance.
- Assess whether technology-assisted cycling is feasible and effective.

Methods

Participants: Twelve adults with PD enrolled, Hoehn and Yahr Stage II, 50% Female, mean age 65.2 years, recruited between 2015 – 2018.

Randomization: Participants were randomly assigned to forced pace or self-pace, as well as immediate or delayed start groups.

	(Enrolled/Completed)	
	Immediate start	Delayed start
Forced pace	1/0	5/2
Self-pace	4/4	2/2

Intervention: 8-week technology-assisted exercise program (3 x/week, 50 min) using a Theracycle™ set at 90 RPM (goal speed 13 – 15 mph) vs self-selected pace.

Fidelity: Vital signs, Karvonen Formula heart rate, Borg Rating of Perceived Exertion Scale (13 – 16).

Feasibility: Recruitment and retention, exit interviews.

Outcome Measures:

- Mini-Balance Evaluation Systems Test (Mini-BESTest)
- MDS-UPDRS Part III: Motor Examination
- 10 Meter Walk Test (10MWT): self-selected and fast-paced
- 6 Minute Walk Test (6MWT) Distance
- Falls Efficacy Scale



Efficacy Results

KEY FINDINGS:

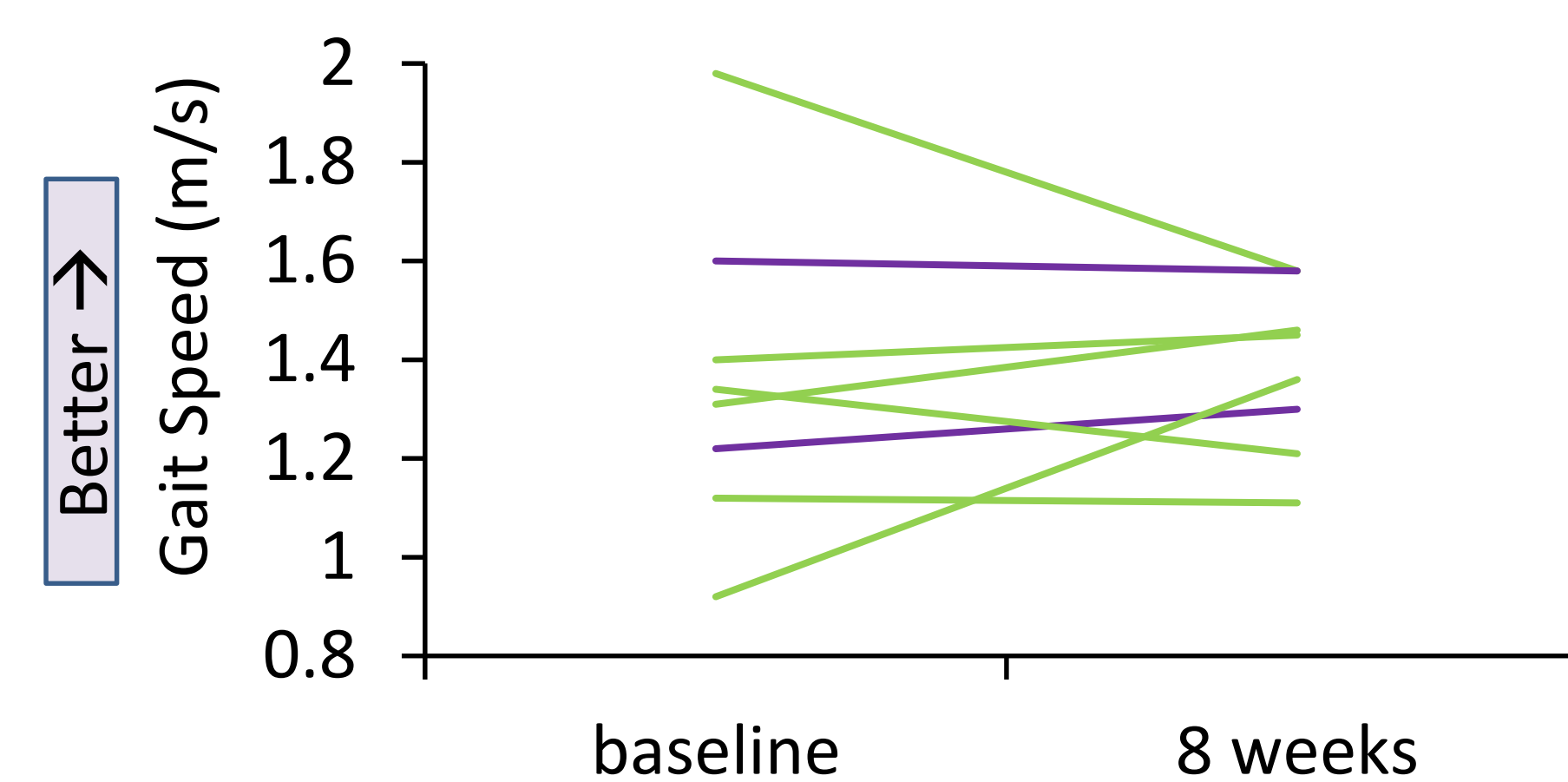
- Technology-assisted forced pace cycling may be no more effective than self-pace in mitigating PD symptoms.
- High dropout rate of forced pace participants suggests that technology-based forced exercise may have limited feasibility.

Figure Key: 8 Completers

— forced pace — self pace

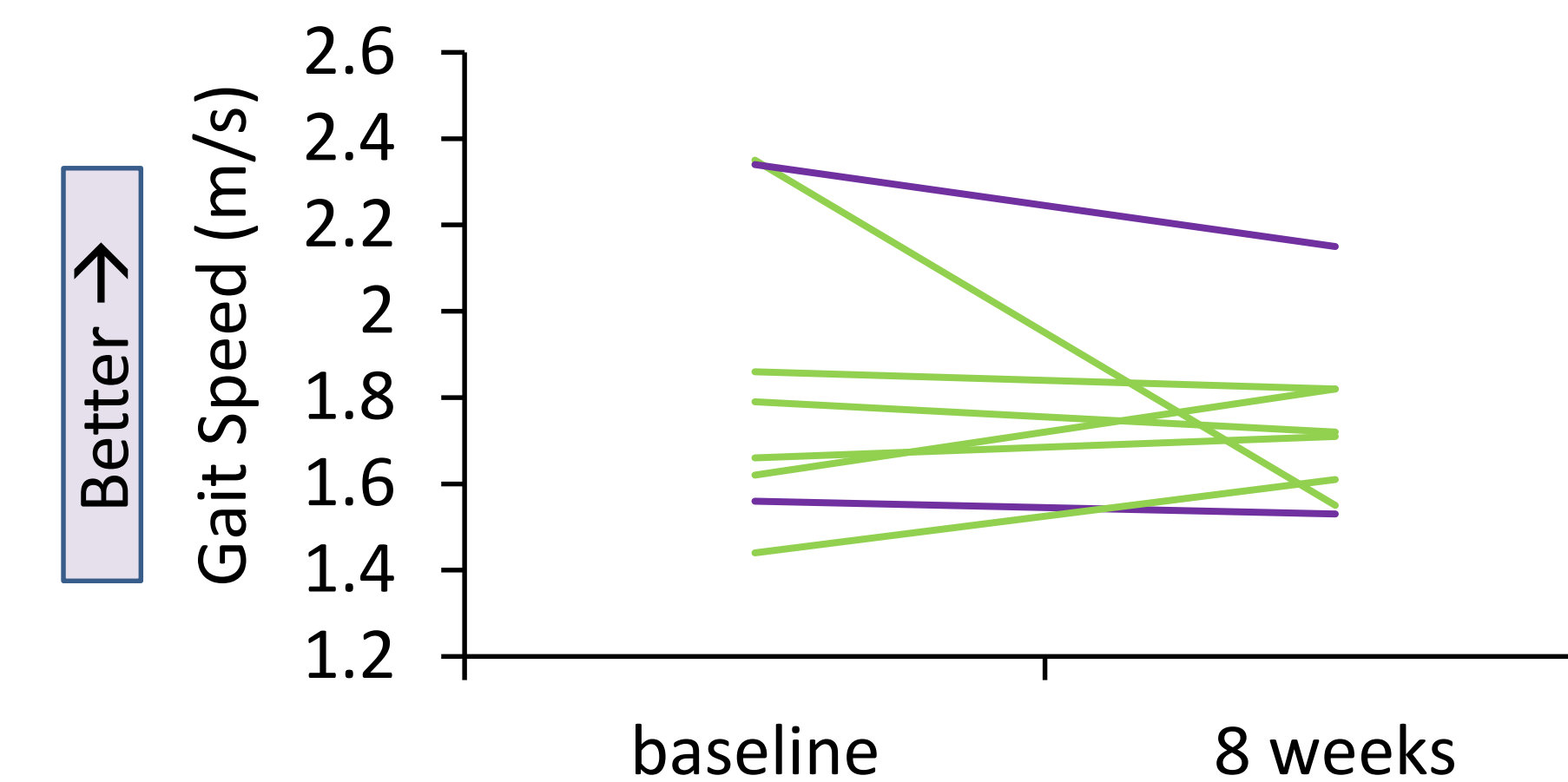
Minimal Detectable Change (MDC) presented for PD norms

Self-Selected Gait Speed (10MWT)



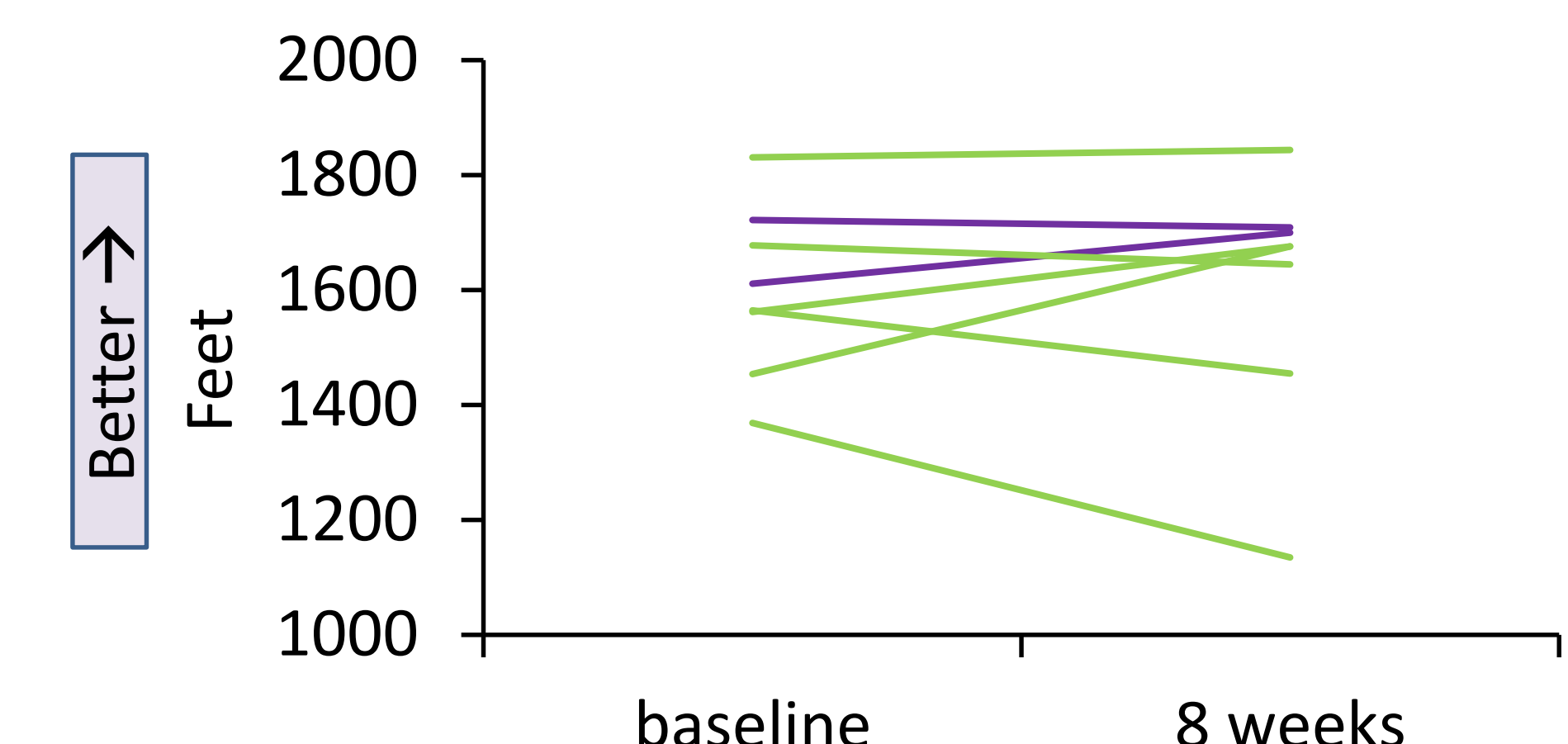
1 self pace participant improved by MDC 0.18 m/s. 1 self pace participant declined.

Fast-Paced Gait Speed (10MWT)



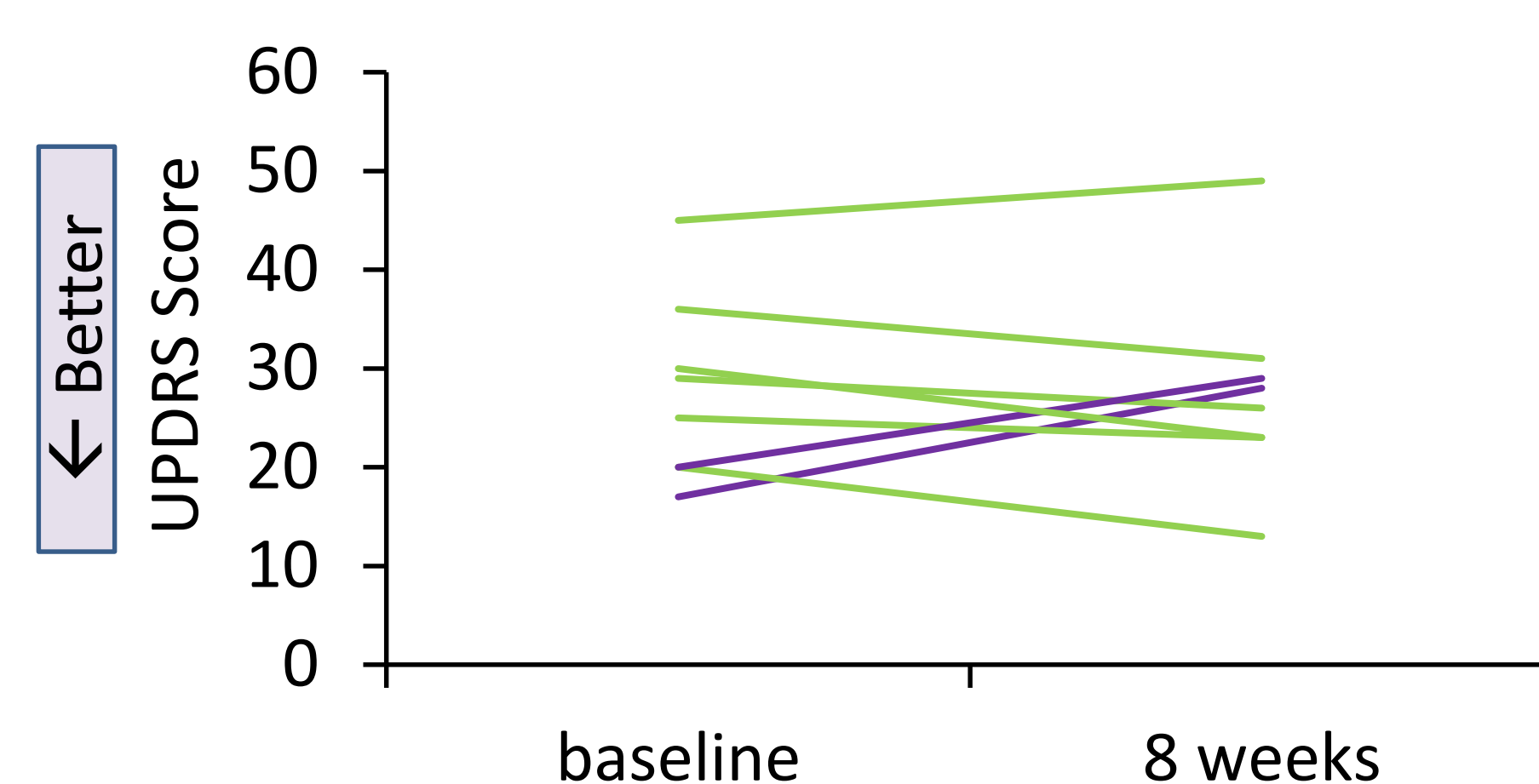
No participants improved by MDC 0.25 m/s. 1 self pace participant declined.

Walking Endurance (6MWT)



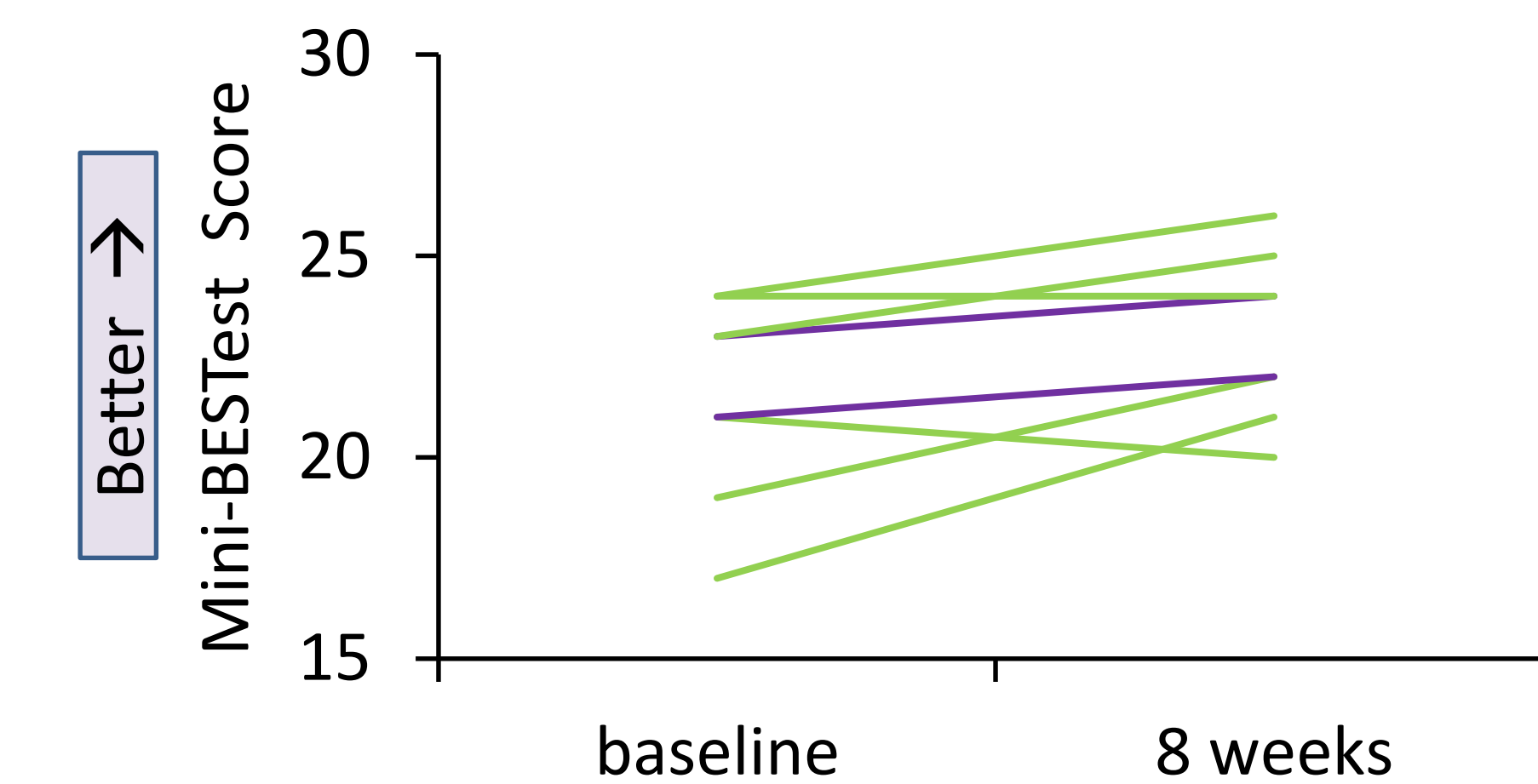
No participants improved by MDC 269 feet. No participants declined.

MDS-UPDRS: Motor Examination



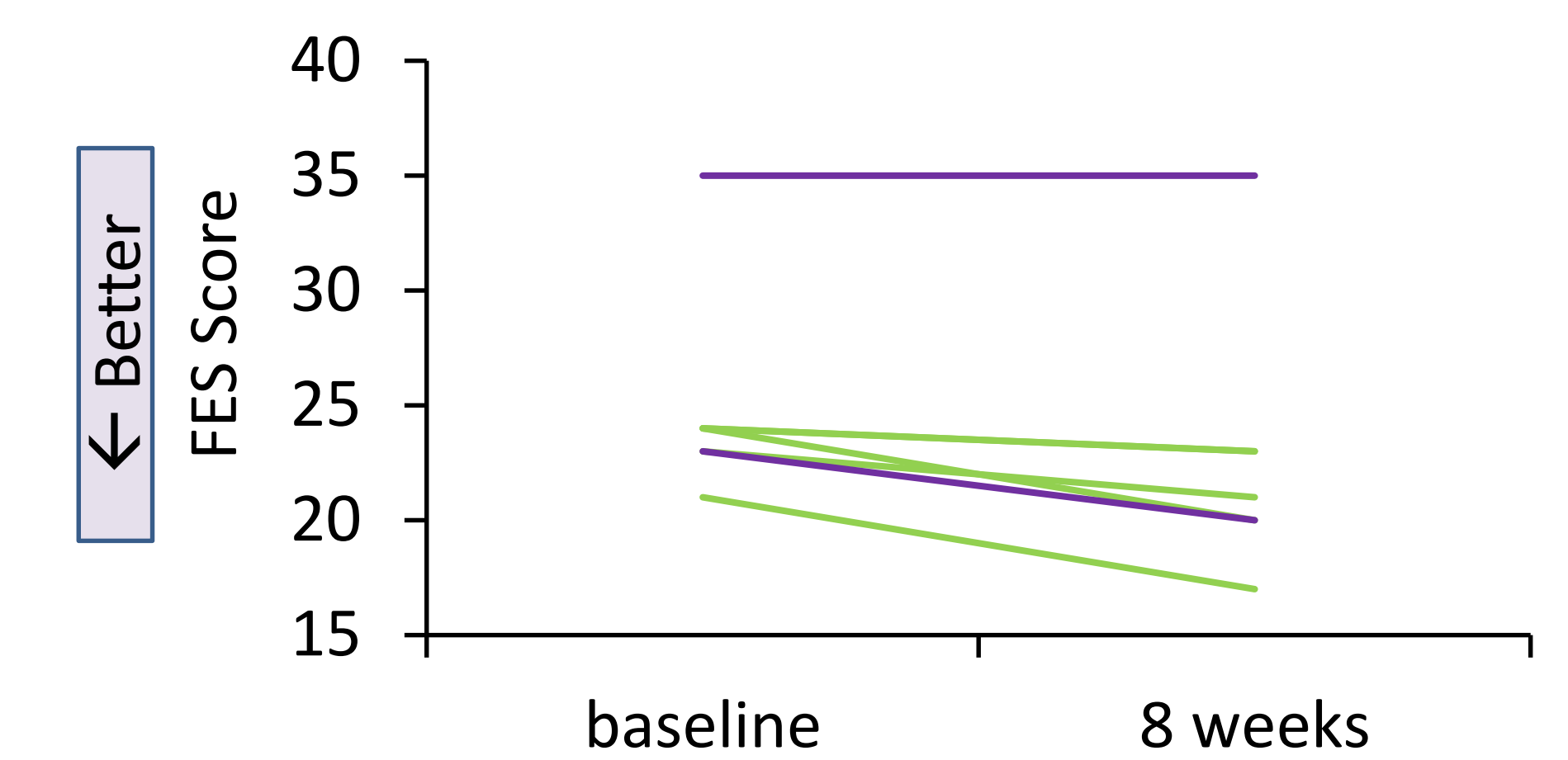
No participants improved. 1 forced pace participant declined by MDC 11.

Mini-BESTest



No participants improved by MDC 5.52. No participants declined.

Falls Efficacy Scale (FES)



n = 7
No MDC for this population.

Feasibility Results

- 4 of 6 forced paced participants withdrew due to reported inconvenience (n = 2), worsening symptoms (n = 1), lost to follow-up (n = 1).

Feasibility Limitations

- Slow recruitment led to small sample size for both groups.
- High drop-out rate of forced pace participants.

Summary and Conclusions

- Unable to deduce differences between forced and self-pace at conclusion of study due to small sample size.
- Technology-assisted cycling at forced or self-paced cadences may help some individuals with PD maintain gait and balance.
- Exercise preference and adherence should be considered when prescribing exercise interventions for individuals with PD.

Acknowledgements and References

- We thank the participants and our organization for facilitating this work.
- We would like to thank additional physical therapists who assisted with this project (Joe Harris, Kate Drolet, and Edita Dragusin).
- See QR code for references

