

Six-Week Changes in Mobility and Dual-Task Performance in Rock Steady Boxing Participants With Parkinson’s Disease

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Objective

To evaluate six-week changes in standard Timed Up and Go (TUG), dual-task TUG, and serial-subtraction accuracy among adults with Parkinson’s disease who continued participating in community-based Rock Steady Boxing.

Background

- Parkinson’s disease impairs gait automaticity, dynamic balance, and divided attention during cognitive-motor tasks.¹
- Rock Steady Boxing (RSB) combines noncontact boxing with conditioning, agility, and rotational footwork.²⁻⁴
- Short-term objective data evaluating whether standard mobility gains generalize to dual-task performance remain limited.

Methods

Design	Prospective, two-site longitudinal observational study
Participants	Adults with Parkinson's disease currently participating in RSB at Melbourne, FL and Las Cruces, NM
Assessments	Week 1 and Week 6 standard TUG, followed by dual-task TUG with serial subtraction by threes
Analysis	Paired t tests and Wilcoxon signed-rank tests. Non-normal paired deltas (Shapiro–Wilk p < 0.001) established Wilcoxon as the primary inference. Positive change denotes faster Week 6 performance. Spearman correlation assessed concordance.

36	25	11	6 weeks
paired participants	Florida	New Mexico	follow-up

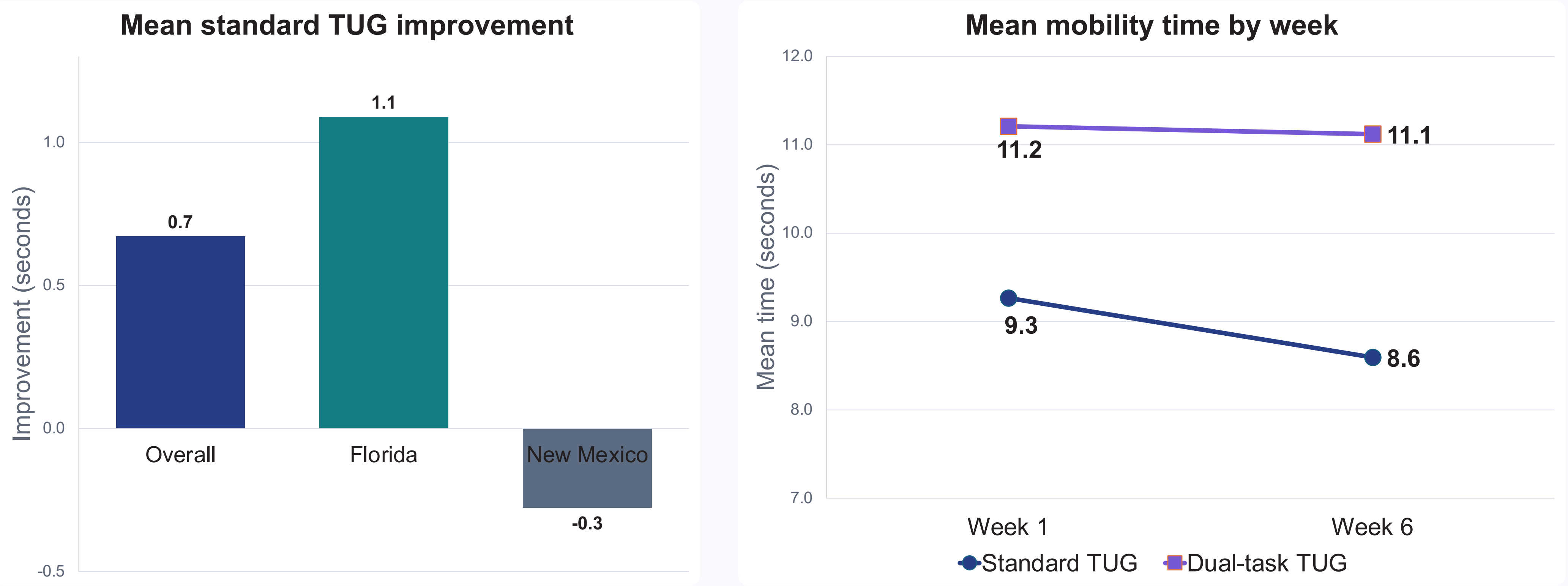
TUG protocol

1 Rise from chair	Dual task: complete the same sequence while
2 Walk 3 meters and turn	subtracting by 3s.
3 Return and sit	

- **Paired Cohort (N = 36):** Community-dwelling adults with Parkinson’s disease across two clinical learning sites: Melbourne, FL (n = 25) and Las Cruces, NM (n = 11).
- **Baseline Standard TUG:** Overall: 9.27 ± 2.30 s | Florida: 9.58 ± 2.31 s | New Mexico: 8.56 ± 2.21 s
- **Baseline Dual-Task TUG:** Overall: 11.21 ± 4.04 s | Florida: 12.44 ± 4.54 s | New Mexico: 10.15 ± 2.68 s
- **Assistive Device Use:** 1 of 36 paired participants (2.8%) utilized assistive gait support (Florida: 1/25 [4.0%]; New Mexico: 0/11 [0.0%]; gait belt used by Participant 19).
- **Real-World Setting:** All participants were established boxers continuing ongoing weekly classes rather than exercise-naïve initiates. Findings reflect 6-week functional trajectories in an existing community wellness program.

Results

81%	29 of 36 participants completed the standard TUG faster at Week 6	29 of 36 participants completed the standard TUG faster at Week 6
		Median improvement: 0.96 s (Wilcoxon p = 0.003)



Standard TUG statistical summary

Cohort	n	Week 1, s	Week 6, s	Mean change, s (95% CI)	Paired t p	Wilcoxon p
Overall	36	9.27 ± 2.30	8.59 ± 3.12	0.67 (−0.07 to 1.41)	0.074	0.003
Florida	25	9.58 ± 2.31	8.49 ± 2.86	1.09 (0.29 to 1.89)	0.010	0.002
New Mexico	11	8.56 ± 2.21	8.83 ± 3.79	−0.28 (−1.96 to 1.41)	0.722	0.520

Complementary outcomes

Dual-task TUG	11.21 ± 4.04 to 11.12 ± 6.08 s Mean change 0.09 s, paired t p = 0.900	Subtraction accuracy	84.5% to 78.4% No statistically significant change
Concordance: standard & dual-task changes correlated		Spearman ρ = 0.67, p < 0.001 (gains moved together)	

Statistical interpretation
Because paired changes were non-normal (Shapiro–Wilk p < 0.001), the Wilcoxon signed-rank test provides the primary inference; paired t results are shown descriptively for mean change (0.67 s) and 95% CI (−0.07 to 1.41 s).

Discussion

Standard mobility improved for most participants

Twenty-nine of 36 participants (81%) completed the standard TUG faster after six weeks, with a median improvement of ~1 second (0.96 s). The moderate rank-biserial effect (r = 0.56) confirms that faster follow-up performance was broadly distributed across the cohort rather than driven by a small subset.

Mean and rank-based tests answer different questions

Wilcoxon testing demonstrated a consistent shift toward faster performance (p = 0.003). Non-normality of paired deltas and wide inter-individual variance widened the mean-based confidence interval in the paired t-test (p = 0.074), demonstrating why nonparametric testing was prespecified for primary inference.

Dual-task performance remained stable

Dual-task TUG duration and serial-subtraction accuracy showed no significant improvement. Six weeks of continued multimodal boxing may reinforce automated motor execution before altering complex cortical divided-attention pathways, or dual-task transfer may require targeted cognitive-motor training.

Strengths and limitations

Strengths	Paired within-participant design, two community sites, standardized mobility tasks, and concordant sensitivity analyses.
Limitations	Absence of a sedentary control group, precluding causal attribution to RSB; survivorship and selection bias (cohort comprised active boxers tolerating regular classes); unequal site sizes; potential stopwatch and learning effects; and unmeasured variations in medication timing ('on/off' states) and disease severity.

Conclusion

Six weeks of continued Rock Steady Boxing participation was associated with faster standard TUG performance across 81% of participants, while cognitive-motor dual-task measures showed no clear change. These real-world community findings support further randomized, controlled trials to test whether dual-task-integrated training can promote cognitive-motor transfer in Parkinson’s disease.

Acknowledgments

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