Impact of the TCI Mobile App on Functional Mobility in Constraint-Induced Movement Therapy for Chronic Stroke Survivors

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Objective

To assess the impact of the TCI Mobile App as an adjunct to Constraint-Induced Movement Therapy (CIMT) for lower extremities on functional mobility and adherence in chronic stroke survivors.

Desing & Setting

A randomized, controlled, two-arm trial, comparing CIMT alone with CIMT plus the TCI Mobile App.
Conducted at a Brazilian university-affiliated health service.

Participants

Twenty stroke survivors with chronic hemiparesis (over six months post-stroke) were randomized into CIMT with the TCI Mobile App (intervention) and CIMT alone (control). Inclusion required a minimum Mini-Mental State Examination score and ability to walk 8 meters with or without assistance.

Interventions

Both groups participated in CIMT for lower extremities (3 hours/day for 10 weekdays), including motor training and self-monitoring strategies. The intervention group also used the TCI Mobile App, which provided prompts, step tracking, daily reports, and motivational notifications. Push notifications were timed to encourage activity during sedentary periods.

Results

Functional mobility was evaluated using the Life Space Assessment (LSA), Timed Up and Go (TUG), 6-Minute Walk Test (6MWT), 10-Meter Walk Test (10MWT), and Lower Extremity Motor Activity Log (LE-MAL) and 5TSST (Five times sit-to-stand).
Statistical analyses using paired t-tests and mixed-effects models were applied to compare changes within and between groups. The intervention group showed significantly greater improvements in TUG (mean change: -22.1s, $p<0.05$) and 6MWT distance (+16.3 m, $p<0.05$). LE-MAL scores, reflecting spontaneous limb use, increased by 2.1 points, indicating enhanced functional ability. LSA scores also rose, showing broader community mobility. Participants in the TCI Mobile group reported higher motivation, achieving adherence to app-prompted tasks exceeding 90%.

Outcome	Group	Baseline Mean (SD)	Re-evaluation Mean (SD)	30-Day Follow-Up Mean (SD)	Interaction p-value	Partial η^2
LSA	Control	40.88 (13.72)	51.00 (16.39)	45.88 (21.09)	0.61	0.02
	TCI Mobile	47.56 (21.72)	56.13 (22.48)	59.44* (21.36)		
6MWT	Control	237.6 (108.78)	240.3 (116.46)	237.4 (119.77)	0.49	0.03
	TCI Mobile	206.5 (142.05)	232.7 (168.17)	243.4*† (135.59)		
10MWT	Control	0.95 (0.52)	0.81 (0.38)	0.91 (0.45)	0.56	0.02
	TCI Mobile	1.04 (0.42)	0.82 (0.43)	0.98 (0.41)		
LE-MAL	Control	7.26 (2.41)	7.44 (3.42)	7.99 (1.22)	0.40	0.05
	TCI Mobile	6.53 (1.29)	8.31 (1.34)	8.39 † (1.44)		
TUG	Control	31.48 (17.39)	24.40 (16.79)	25.33 (17.70)	0.49	0.03
	TCI Mobile	46.41 (78.51)	29.27* (11.47)	35.43* (54.67)		
5TSST	Control	20.13 (10.40)	20.71 (15.36)	16.28 (6.81)	0.49	0.03
	TCI Mobile	22.77 (24.67)	12.59 (5.41)	16.97* (15.66)		

Significant within-group improvement ($p < 0.05$); † Significant group × time interaction ($p < 0.05$)



Conclusion

Adding the TCI Mobile App to lower extremity CIMT improves functional outcomes in chronic stroke survivors. This digital health tool could extend CIMT accessibility, especially in settings with limited neurorehabilitation resources.

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References

Gomes, L., de Oliveira, N., dos Anjos, S., dos Santos, T., Filippo, T., & Pereira, N. (2022). Usability of the TCI Mobile app as a complement to the Constraint-Induced Therapy protocol. Archives of Physical Medicine and Rehabilitation, 103(12), e134.