Individualized Cognitive Stimulation Therapy in Neurodegenerative Disorders: Clinical Effectiveness and Predictive Factors

Chiara Lombardo[1] , Alberto Mario Chiarandon[2], Fausto Roveta[2], Aurora Cermelli[2], Silvia Boschi[2], Elisa Rubino[1,2], Innocenzo Rainero[1,2]

1. Department of Neuroscience and Mental Health, AOU Città della Salute e della Scienza di Torino, Turin, Italy
2. Aging Brain and Memory Clinic, Department of Neuroscience "Rita Levi-Montalcini", University of Turin, Turin, Italy.

BACKGROUND

The clinical and social relevance of neurodegenerative diseases has led the scientific community to adopt multidimensional care strategies aimed at addressing their complexity. These disorders, including Alzheimer's disease and related dementias, are associated with progressive decline, high care demands, and a substantial societal and family burden. Although recent improvements have been made, pharmacological interventions alone offer limited long-term benefits compared to integrated approaches that include non-pharmacological strategies [1,2,3]. This study aimed to evaluate the effectiveness of an individualized Cognitive Stimulation Therapy (CST) protocol in patients with neurodegenerative disorders referred to the tertiary Memory Clinic of the University of Torino. A secondary objective was to explore whether baseline clinical and caregiver- related measures, such as perceived burden, quality of life, and cognitive/functional performance, could predict disease progression over time.

METHODS

We enrolled 39 cognitively impaired patients, 31 of whom classified based on CSF biomarkers (AT[N]) [4], plasma tests and clinical criteria for neurodegenerative disorder. Inclusion criteria required Mini Mental State Examination (MMSE) 14–30; Clinical Dementia Rating (CDR) 0.5–1.

The intervention consisted of 12 weekly individual sessions combining multimedia-based cognitive exercises (Brainer software ®) and reality orientation, delivered in person or remotely. Assessments were conducted at baseline (T0), 3 months (T1), and 6 months (T2) including cognitive, functional, neuropsychiatric outcomes, quality of life, and caregiver burden, which was assessed using the Zarit Burden Interview (ZBI), a tool used to evaluate the perceived impact of caregiving on family members. 17 patients completed the full protocol; 5 dropped out, others are currently in follow-up.

Longitudinal and correlation analyses were conducted to assess changes over time and test–retest reliability. A linear model explored associations between caregiver burden and disease.

RESULTS

Analyses were conducted on 17 patients (5 females, 12 males; mean age = 67.8 ± 7.4 years; education = 13.6 ± 3.9 years; 15 patients with Alzheimer's Disease (AD), 2 patients with non-AD neurodegenerative disorder) who completed the full intervention and follow-up.

Friedman tests showed significant effects ($p < 0.05$) on six measures, including MMSE, Montreal Cognitive Assessment (MoCA), CDR, Instrumental Activity of Daily Leaving (IADL), fluencies and ZBI. However, post-hoc Wilcoxon analysis showed a significant reduction only in caregiver burden (Zarit scores) from T0 to T1 ($p = 0.004$), with stable values between T1 and T2 (Fig. 1).

Non-significant cognitive or functional changes emerged, suggesting overall longitudinal stability. This interpretation was supported by non-significant Wilcoxon tests and strong test–retest correlations, indicating reliable performance over time, a clinically relevant outcome in progressive conditions.

Finally, a logistic model confirmed Zarit scores as significant predictors of AD diagnosis and advanced disease stage (CDR=1) (both $p < 0.0001$), but not of MCI ($p = 0.81$), suggesting their potential as proxy indicators of clinical severity.

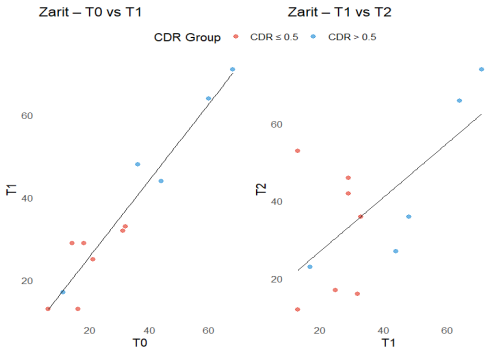

Fig.1 ***Changes in caregiver burden across treatment and follow-up***
Left: Individual trajectories of Zarit scores from baseline (T0) to post-intervention (T1) show a significant reduction in caregiver burden (p = 0.004), more pronounced in patients with advanced clinical stage (CDR = 1).Right: Stability of Zarit scores from T1 to follow-up (T2) across both CDR groups suggests maintenance of reduced burden over time

DISCUSSION AND CONCLUSIONS

The cognitive stimulation protocol here presented and analyzed was associated with a significant reduction in caregiver burden (T0–T1) and stable cognitive and functional scores over time. While no broad cognitive gains emerged, the observed stability, supported by non-significant Wilcoxon tests and strong test–retest correlations, suggests potential maintenance effects. Zarit scores were significantly associated with AD and CDR = 1 diagnoses, reinforcing their value as clinical proxies of disease severity. These findings support the feasibility and potential clinical utility of this individualized CST approach in neurodegenerative disorders, although further analysis on larger samples are needed to confirm these preliminary results.

1. Luxton D, Thorpe N, Crane E, et al. Systematic review of the efficacy of pharmacological and non-pharmacological interventions for improving quality of life of people with dementia. The British Journal of Psychiatry 2025:1-13.
2. Wang S, Xu H, Liu G, Chen L. Non-pharmacological treatment of Alzheimer's disease: an update. Frontiers in aging neuroscience 2025;17:1527242.
3. Spector A, Thorgrimsen L, Woods B, Royan L, Davies S, Butterworth M, Orrell M. Efficacy of an evidence-based cognitive stimulation therapy programme for people with dementia: randomised controlled trial. The British Journal of Psychiatry 2003; 183:248-54.
4. Jack CR Jr, Andrews JS, Beach TG, Buracchio T, Dunn B, Graf A, Hansson O, Ho C, Jagust W, McDade E, Molinuevo JL, Okonkwo OC, Pani L, Rafii MS, Scheltens P, Siemers E, Snyder HM, Sperling R, Teunissen CE, Carrillo MC. Revised criteria for diagnosis and staging of Alzheimer's disease: Alzheimer's Association Workgroup. Alzheimer's & dementia: the journal of the Alzheimer's Association 2024:5143-5169.

24-28 Ottobre 2025
Padova Congress
55° CONGRESSO SOCIETÀ ITALIANA DI NEUROLOGIA