Journal Website

Article history:
Received 09 May 2026
Revised 02 October 2026
Accepted 11 October 2026
Initial Publication 12 October 2026
Final Publication 01 May 2027

International Journal of Education and Cognitive Sciences

Volume 8, Issue 5, pp 1-16

E-ISSN: 3041-8828

Effectiveness of Goal Management Training on Executive Functioning, Cognitive Complaints, and Everyday Functioning in Adults with Functional Cognitive Disorder: A Randomized Controlled Trial

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Yekta, M. R., Faramarzi, S., Khaleghzadegan, Z., & Alqasi, Z. (2027). Effectiveness of Goal Management Training on Executive Functioning, Cognitive Complaints, and Everyday Functioning in Adults with Functional Cognitive Disorder: A Randomized Controlled Trial. *International Journal of Education and Cognitive Sciences, 8*(5), 1-16.
https://doi.org/10.61838/kman.ijecs.506

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A B S T R A C T

Purpose: This study aimed to evaluate the effectiveness of Goal Management Training (GMT) in improving executive functioning, cognitive complaints, and everyday functioning among adults with functional cognitive disorder (FCD).

Methods and Materials: This randomized controlled trial was conducted in 2026 at a specialist cognitive clinic in Isfahan, Iran. Sixty-four adults aged 25–60 years with clinician-confirmed FCD were randomly allocated in a 1:1 ratio to either GMT (n = 32) or an active Brain Health Education control condition (n = 32). The GMT group received nine weekly 120-minute sessions. Assessments were conducted at baseline, immediately after the intervention, and at 8-week follow-up. The primary outcome was executive functioning, assessed using the Global Executive Composite of the Behavior Rating Inventory of Executive Function–Adult Version (BRIEF-A). Secondary outcomes included cognitive complaints measured by the Cognitive Failures Questionnaire (CFQ) and everyday functioning assessed with the 12-item World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0). Generalized estimating equations were used to test group-by-time interactions, with Holm adjustment for multiple comparisons.

Findings: Significant group-by-time interactions favored GMT for executive functioning at post-intervention (β = −7.54, 95% CI [−10.24, −4.84], adjusted $p < .001$, Hedges' g = 1.37) and follow-up (β = −8.07, 95% CI [−11.25, −4.89], adjusted $p < .001$, g = 1.24). GMT also significantly reduced cognitive complaints at post-intervention (β = −4.59, 95% CI [−7.78, −1.40], adjusted p = .005, g = 0.68) and follow-up (β = −6.70, 95% CI [−9.87, −3.53], adjusted $p < .001$, g = 1.03). Everyday functioning similarly improved at post-intervention (β = −9.21, 95% CI [−12.79, −5.63], adjusted $p < .001$, g = 1.21) and follow-up (β = −6.51, 95% CI [−9.73, −3.30], adjusted $p < .001$, g = 0.98).

Conclusion: GMT was effective in improving executive functioning, reducing perceived cognitive failures, and enhancing everyday functioning in adults with FCD, with benefits maintained over an 8-week follow-up. These findings support GMT as a promising cognitive rehabilitation intervention for FCD, although larger multicenter trials with longer follow-up periods and objective ecological outcome measures are needed.

Keywords: *functional cognitive disorder; goal management training; executive function; cognitive complaints; metacognition; cognitive rehabilitation; everyday functioning*

1. Introduction

Functional cognitive disorder (FCD) has increasingly emerged as an important and clinically challenging condition characterized by persistent subjective cognitive difficulties that are not adequately explained by neurodegenerative disease, structural neurological pathology, or another conventional neurological disorder. Individuals with FCD commonly report problems involving memory, attention, concentration, planning, word retrieval, task completion, and the management of cognitively demanding everyday situations, often with substantial associated distress and functional interference. A defining feature of the disorder is the presence of internal inconsistency, whereby reported cognitive incapacity may not correspond closely to observed ability, performance may vary markedly across similar situations, or cognitive functioning may improve when attention is not explicitly focused on the feared cognitive deficit. This pattern distinguishes FCD from disorders in which cognitive impairment is expected to be relatively stable and consistently demonstrable across contexts. Contemporary accounts emphasize that FCD should therefore not be conceptualized merely as the absence of neurological disease or as a diagnosis of exclusion, but rather as a condition identifiable through positive clinical features, particularly discrepancies between subjective experience, observed behavior, and objective performance (Ball et al., 2020; Cabreira et al., 2023). More recent conceptual work has further highlighted the heterogeneity of FCD and the need to understand the disorder through integrative frameworks that consider attentional allocation, metacognition, symptom expectations, affective processes, learned behavioral patterns, and contextual influences on cognitive functioning (Mavroudis et al., 2025; Mohan et al., 2026). These developments are clinically significant because persistent cognitive complaints often lead affected individuals to seek repeated neurological assessment, fear progressive cognitive decline, restrict everyday activities, and become increasingly vigilant toward normal lapses in attention and memory, thereby potentially reinforcing disability even in the absence of progressive brain disease.

Accurate diagnosis of FCD remains difficult because subjective cognitive complaints are common across a wide range of neurological, psychiatric, medical, and psychosocial conditions. Concerns about cognitive decline may arise in depression, anxiety, sleep disturbance, chronic pain, medication effects, post-concussion states, stress-related disorders, attention-deficit/hyperactivity disorder, and early neurodegenerative disease, creating considerable overlap in presenting symptoms. For this reason, contemporary diagnostic approaches emphasize the identification of positive features of functional cognitive symptoms while simultaneously excluding plausible secondary causes of cognitive difficulty (Cabreira et al., 2023; Silverberg & Rush, 2024). Neuropsychological assessment can contribute importantly to this process, but interpretation requires caution because a normal cognitive test profile does not in itself establish FCD, while mildly reduced performance does not necessarily exclude it. Instead, the diagnostically informative pattern is often found in inconsistencies across tasks, between test performance and everyday functioning, or between self-evaluation and demonstrated cognitive competence (Silverberg & Rush, 2024). International expert consensus has increasingly supported this positive diagnostic framework and has underscored the importance of communicating the diagnosis in a manner that validates the patient's symptoms without implying irreversible neurological deterioration (Cabreira et al., 2025). Cognitive screening instruments such as the Montreal Cognitive Assessment may remain useful for characterizing general cognitive status and identifying cases requiring further neurological evaluation, but their results should be interpreted within the broader clinical formulation rather than used as a stand-alone diagnostic threshold. The Persian version of the Montreal Cognitive Assessment has demonstrated acceptable psychometric performance for identifying mild cognitive impairment and Alzheimer's disease in Iranian populations, supporting its role as one component of a comprehensive cognitive evaluation (Rashedi et al., 2021). Within FCD, however, reliance on cognitive screening scores alone may obscure the central clinical problem, which concerns the regulation and interpretation of cognitive processes in daily life rather than simply the presence or absence of measurable impairment.

The mechanisms underlying FCD remain incompletely understood, but several contemporary models suggest that maladaptive attention toward cognitive performance, excessive self-monitoring, disrupted confidence in cognitive ability, negative expectations, and inefficient compensatory strategies may interact to perpetuate symptoms. A person who becomes concerned about memory or concentration may increasingly monitor cognitive performance, notice minor lapses that would otherwise pass without significance, interpret those lapses as evidence of cognitive failure, and respond by checking, avoiding, slowing down, or devoting

E-ISSN: 3041-8828

excessive attentional resources to otherwise automatic tasks. Such strategies can paradoxically increase cognitive load, disrupt fluid performance, and strengthen beliefs about impairment. Over time, the individual may experience a widening gap between underlying cognitive capacity and perceived cognitive effectiveness. This framework is compatible with current integrative perspectives that conceptualize FCD as involving disruptions in metacognitive appraisal and cognitive control rather than a fixed deficit in one isolated cognitive domain (Mavroudis et al., 2025; Mohan et al., 2026). It also helps explain why interventions directed solely toward reassurance or generic education may be insufficient for some patients. Although reassurance can reduce fear of neurodegenerative disease, enduring improvement may require systematic retraining of how attention is deployed, how goals are maintained, how cognitive slips are interpreted, and how everyday tasks are structured. Emerging treatment literature has accordingly begun to investigate psychologically and cognitively informed approaches for FCD. A pilot randomized controlled trial of cognitive-behavioral therapy for FCD following concussion demonstrated the feasibility of structured intervention targeting functional cognitive symptoms, supporting the broader premise that these complaints may be modifiable through mechanism-focused rehabilitation rather than managed only through diagnostic reassurance (Rioux et al., 2024). Nevertheless, the evidence base remains limited, and there is a need to examine interventions that more directly target metacognitive control and everyday executive functioning.

Executive functions are particularly relevant to FCD because they support the organization, regulation, and monitoring of goal-directed behavior in complex real-world environments. Executive functioning encompasses processes such as inhibition, working-memory management, attentional shifting, planning, initiation, monitoring, and adjustment of behavior when goals or situational demands change. These processes are not confined to laboratory tasks; they are continuously engaged when individuals organize work, follow conversations, remember intentions, transition between activities, resist distraction, and recover after losing track of a task. When executive self-regulation becomes inefficient, people may report experiences such as entering a room and forgetting the purpose of the action, rereading material repeatedly, losing track during conversations, beginning one task while unintentionally abandoning another, or feeling overwhelmed when several demands compete for attention. Such complaints overlap closely with the everyday experiences commonly described by individuals with FCD. The Behavior Rating Inventory of Executive Function–Adult Version provides an ecologically oriented approach to assessing these difficulties by measuring self-reported executive behaviors in everyday contexts. The Persian self-report version has demonstrated acceptable validity and reliability in Iranian adults (Mani et al., 2018), while further psychometric research among Iranian university students has supported its broader factor structure and associations with clinically relevant psychological characteristics (Mohammadnia et al., 2022). Subjective cognitive failures constitute another clinically important domain because the frequency and interpretation of everyday lapses may strongly influence distress and illness behavior in FCD. The Persian Cognitive Failures Questionnaire has shown satisfactory psychometric properties for measuring attentional, memory, and action-related cognitive slips (Shahgholian, 2023). Functional consequences should likewise be considered because improvement in FCD is meaningful only if it translates into better daily participation and reduced disability. The Persian 12-item World Health Organization Disability Assessment Schedule has demonstrated strong reliability and validity and provides a practical means of evaluating functioning across cognition, mobility, self-care, interpersonal relations, life activities, and participation (Shahedifar et al., 2022).

Goal Management Training (GMT) represents a theoretically relevant intervention for addressing these interconnected executive and metacognitive difficulties. GMT was originally developed as a structured cognitive rehabilitation approach for individuals with executive dysfunction and is based on the premise that goal-directed behavior frequently fails when habitual or automatically triggered responses override active representation of current goals. Rather than attempting to strengthen cognition through repetitive drill alone, GMT teaches individuals to periodically interrupt ongoing behavior, reorient attention to the present task, explicitly state the current goal, divide complex activities into manageable subgoals, and monitor whether behavior remains aligned with the intended objective. The intervention therefore targets the regulation of cognition in context and attempts to restore deliberate control over actions that otherwise become automatic, distracted, or poorly organized. Foundational work demonstrated that GMT could improve executive functioning in patients with frontal lobe brain injury by combining explicit goal management strategies with attentional control and structured practice (Levine et al.,

E-ISSN: 3041-8828

2011). Subsequent randomized research in patients with chronic acquired brain injury showed beneficial effects when GMT was combined with external cueing and emotional regulation strategies, suggesting that executive rehabilitation can generalize beyond isolated neuropsychological tasks to everyday behavior (Tornas et al., 2016). A systematic review of GMT in acquired brain injury concluded that the approach showed promise for improving executive functioning, although effects varied according to study design, outcome selection, and patient characteristics (Krasny-Pacini et al., 2014). A later meta-analysis provided broader support for the effectiveness of GMT in improving executive outcomes across clinical populations, while also emphasizing the importance of ecological measures and treatment generalization (Stamenova & Levine, 2019).

The potential relevance of GMT to FCD is strengthened by evidence showing that its benefits are not restricted to patients with focal or acquired structural brain lesions. GMT has been increasingly examined among populations in whom executive problems arise through more complex interactions among cognition, emotion, motivation, and self-regulation. In adults with depression, a randomized controlled trial found that GMT could function as a cognitive remediation intervention, demonstrating that structured goal-management strategies may improve executive functioning even when cognitive difficulties occur within a psychiatric rather than primarily neurological context (Hagen et al., 2020). In adults with attention-deficit/hyperactivity disorder, exploratory evidence indicated improvements in inhibition and everyday functioning following GMT, again suggesting that the intervention can influence practical self-regulatory abilities rather than only laboratory performance (Jensen et al., 2021). Cognitive rehabilitation research in adults with ADHD has similarly shown that structured cognitive training can improve memory-related difficulties, supporting the broader principle that cognitive complaints in adults may be responsive to rehabilitation strategies targeting compensatory and regulatory processes (Alimjon et al., 2023). Among individuals with schizophrenia spectrum disorders or psychosis-risk syndromes, randomized evidence has demonstrated beneficial effects of GMT on executive functioning, indicating that the intervention can be delivered successfully even in populations with complex cognitive and psychiatric presentations (Haugen et al., 2022). Follow-up work in schizophrenia spectrum disorders has additionally suggested that GMT may influence broader person-centered outcomes, including self-efficacy, self-esteem, and quality of life, highlighting the possibility that improvements in cognitive self-management may have consequences beyond narrowly defined executive performance (Oie et al., 2024). Collectively, these findings support the transdiagnostic applicability of GMT and suggest that its central mechanisms—interrupting automatic responding, increasing metacognitive awareness, strengthening goal representation, and improving monitoring—may be relevant wherever subjective cognitive dysfunction is maintained partly by inefficient self-regulation.

This transdiagnostic evidence is particularly pertinent to FCD because the disorder is increasingly understood as a problem involving how cognition is experienced, monitored, and managed in daily life. In FCD, individuals may possess adequate underlying cognitive capacity while nevertheless experiencing persistent failures when cognitive performance becomes effortful, self-conscious, overloaded, or excessively monitored. GMT may address this pattern by shifting the individual's focus from evaluating whether cognition is “working” to actively managing the current task. The STOP procedure, present-moment reorientation, explicit goal stating, task decomposition, and monitoring of goal progress may reduce the impact of attentional capture and automaticity while providing a concrete alternative to reassurance-seeking, repeated checking, and cognitively costly compensatory behaviors. Importantly, such training does not require assuming that symptoms are imagined or trivial; rather, it acknowledges genuine difficulties while conceptualizing them as potentially modifiable through changes in cognitive control and self-management. This approach aligns with recommendations that FCD treatment should validate symptoms, provide a coherent explanatory model, reduce unhelpful beliefs about irreversible cognitive deterioration, and promote restoration of functional confidence (Cabreira et al., 2025; Cabreira et al., 2023). Contemporary reviews have also emphasized that FCD research needs mechanism-informed interventions linked to clinically meaningful outcomes rather than relying primarily on diagnostic clarification or generic reassurance (Mavroudis et al., 2025; Mohan et al., 2026). A rehabilitation approach such as GMT may therefore occupy an important intermediate position between traditional neuropsychological rehabilitation and psychologically informed treatment by simultaneously targeting attention, metacognition, executive organization, and everyday task performance.

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Despite this theoretical rationale, direct evidence for GMT in adults with FCD remains limited. Most existing GMT studies have been conducted in acquired brain injury, depression, ADHD, schizophrenia spectrum disorders, or other populations characterized by executive dysfunction, leaving uncertainty regarding whether the intervention can improve the distinctive subjective and functional difficulties associated with FCD. This gap is important because outcome selection in FCD requires particular attention. Laboratory cognitive measures may fail to capture the problems patients consider most disabling, while subjective measures alone may be influenced by beliefs, mood, expectations, and symptom monitoring. A multidimensional evaluation incorporating everyday executive functioning, perceived cognitive failures, and general disability may therefore offer a more clinically meaningful assessment of treatment response. Ecologically oriented executive measures such as the BRIEF-A can capture changes in self-regulatory functioning across routine contexts (Mani et al., 2018; Mohammadnia et al., 2022), the CFQ can quantify the everyday cognitive slips that frequently dominate patients' subjective experience (Shahgholian, 2023), and WHODAS 2.0 can determine whether improvements translate into reduced limitations in daily functioning (Shahedifar et al., 2022). Furthermore, the use of an active control condition is necessary to distinguish the specific effects of GMT from nonspecific influences such as therapist attention, group support, health education, treatment expectations, and repeated assessment. Repeated measurement extending beyond immediate post-treatment assessment is also important because a rehabilitation intervention should ideally produce skills that continue to be applied after formal sessions end. In this respect, maintenance or further improvement after treatment may provide evidence that participants are generalizing goal-management strategies to real-world cognitive challenges rather than merely responding transiently to therapist contact.

Accordingly, the present randomized controlled trial was designed to evaluate a structured nine-session GMT program adapted to common FCD experiences and compared with an active Brain Health Education condition matched for therapist contact, group format, treatment duration, and session frequency. The intervention emphasized present-moment awareness, recognition of automatic cognitive and behavioral patterns, use of a brief STOP cue, management of working-memory demands, explicit goal formulation, decomposition of complex tasks, and systematic monitoring of ongoing behavior. These components were selected because they directly address problems frequently encountered by adults with FCD, including losing track of intended actions, becoming overwhelmed by competing demands, repeatedly checking performance, difficulty shifting between tasks, and excessive attention to cognitive lapses. By assessing participants at baseline, immediately after the intervention, and at an 8-week follow-up, the study was positioned to determine both immediate treatment effects and short-term maintenance of gains. Consistent with current recommendations for FCD research, the study focused on functionally meaningful outcomes and employed an assessor-blinded randomized design to strengthen causal inference. The study aimed to determine the effectiveness of Goal Management Training in improving everyday executive functioning, reducing subjective cognitive complaints, and enhancing everyday functioning in adults with functional cognitive disorder.

2. Methods and Materials

2.1. Study Design and Participants

This study was conducted as a single-center, two-arm, assessor-blinded randomized controlled trial with three measurement occasions: baseline before randomization (T0), immediately after completion of the 9-week intervention (T1), and an 8-week post-intervention follow-up (T2). The study was carried out at the Neurology Clinic of Al-Zahra Hospital, affiliated with Isfahan University of Medical Sciences, Isfahan, Iran, between January and September 2026. Participants continued their stable usual clinical care throughout the study period, and the trial was designed and reported in accordance with the Consolidated Standards of Reporting Trials (CONSORT) recommendations for parallel-group randomized controlled trials. Adults referred to the clinic because of persistent subjective cognitive difficulties were consecutively screened for eligibility. Functional cognitive disorder (FCD) was diagnosed through consensus between a cognitive neurologist and a clinical neuropsychologist using a positive diagnostic formulation emphasizing characteristic clinical features of FCD rather than diagnosis by exclusion alone. Eligible participants were required to be between 25 and 60 years of age, be fluent in Persian, have completed at least 8 years of formal education, report one or more distressing cognitive symptoms persisting for at least 6 months, demonstrate clinically identifiable internal inconsistency in cognitive functioning, and experience meaningful distress or interference with everyday functioning attributable to their

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cognitive complaints. Internal inconsistency was operationalized through clinical indicators such as better cognitive performance when attention was not explicitly directed toward performance, discrepancies between reported incapacity and observed competence in everyday activities, or substantial variability in performance across comparable contexts. Cognitive symptoms were additionally required not to be better accounted for by neurodegenerative disease, structural neurological pathology, delirium, medication effects, substance use, or a primary psychiatric disorder (Ball et al., 2020; Cabreira et al., 2023). Exclusion criteria comprised a diagnosed neurocognitive disorder secondary to neurodegeneration, moderate-to-severe traumatic brain injury, stroke, uncontrolled epilepsy, multiple sclerosis, or another major neurological disorder known to affect cognition; a current psychotic disorder, manic episode of bipolar disorder, severe major depressive episode considered the principal cause of the cognitive presentation, or current substance-use disorder; changes in psychoactive medication within the preceding 6 weeks; uncorrected visual or auditory impairment that would substantially interfere with assessment or group participation; and simultaneous participation in another structured cognitive rehabilitation program. The Persian version of the Montreal Cognitive Assessment was administered as part of the clinical characterization process, but no single MoCA cut-off score was used to confirm or exclude FCD because diagnosis was based primarily on the clinical presentation and positive evidence of internal inconsistency rather than global cognitive screening performance alone (Rashedi et al., 2021). The required sample size was estimated for detection of a medium group-by-time effect in a two-group design with three repeated measurements, assuming a two-sided alpha level of .05 and statistical power of 90%. After allowing for approximately 15% attrition, 64 participants were recruited and randomized in a 1:1 ratio to either Goal Management Training (GMT; n = 32) or an active Brain Health Education control condition (n = 32). Following completion of baseline assessments, allocation was performed using a computer-generated blocked randomization sequence with randomly varying block sizes of four and six. The allocation sequence was prepared by a researcher who had no involvement in participant recruitment, diagnostic evaluation, intervention delivery, or outcome assessment, and group assignments were concealed using sequentially numbered opaque envelopes. Because of the behavioral nature of the intervention, participants and therapists could not be blinded to treatment allocation; however, outcome assessors conducting the post-intervention and follow-up evaluations remained unaware of group assignment, and participants were instructed not to disclose their allocation during assessments.

2.2. Data Collection Tools

The Behavior Rating Inventory of Executive Function–Adult Version (BRIEF-A) was used to assess executive functioning in everyday life and constituted the primary outcome measure of the trial. The BRIEF-A is a 75-item self-report instrument designed to measure behavioral manifestations of executive functioning in adults across routine real-world settings rather than performance on isolated neuropsychological tasks. The instrument generates several clinical scales that contribute to two broader indices, the Behavior Regulation Index and the Metacognition Index, which are subsequently combined to produce the Global Executive Composite (GEC). Items assess difficulties involving inhibition, shifting, emotional control, self-monitoring, initiation, working memory, planning and organization, task monitoring, and organization of materials. Scores are conventionally transformed to T-scores, with higher values reflecting greater executive dysfunction and more frequent problems with self-regulation in everyday activities. In the present study, the GEC T-score was prespecified as the primary outcome because the central therapeutic targets of GMT involve goal maintenance, interruption of automatic responding, attentional regulation, monitoring, and implementation of executive strategies in naturalistic environments. The BRIEF-A was therefore considered particularly appropriate for identifying changes in the everyday executive difficulties reported by individuals with FCD. The original instrument has demonstrated strong psychometric characteristics, including high internal consistency and satisfactory temporal stability, while evaluation of the Persian self-report version in 318 Iranian adults aged 18–65 years yielded Cronbach's alpha coefficients of approximately .65 to .84 across its component scales and significant 1-month test-retest associations. Additional factor-analytic research among Iranian samples has provided support for the broader executive-function structure represented by the instrument (Mani et al., 2018; Mohammadnia et al., 2022).

The Cognitive Failures Questionnaire (CFQ) was employed as a secondary outcome measure to quantify participants' subjective cognitive complaints in everyday

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situations. Originally developed by Broadbent et al. (1982), the CFQ consists of 25 self-report items assessing common cognitive slips involving attention, memory, perception, and action that occur during routine daily activities. Examples of the phenomena captured by the questionnaire include forgetting why one entered a room, failing to notice signs or instructions, losing track of an ongoing activity, forgetting intended actions, becoming distracted during conversations, and making errors while carrying out familiar tasks. Each item is rated on a five-point response scale ranging from 0, indicating that the experience never occurs, to 4, indicating that it occurs very often. Item scores are summed to generate a total score ranging from 0 to 100, with higher scores representing a greater frequency of perceived cognitive failures. The total CFQ score was used in the present study because the primary clinical interest was the overall burden of subjective cognitive lapses rather than distinctions among individual cognitive domains. This measure was particularly relevant to FCD because patients frequently describe substantial and distressing cognitive failures in everyday contexts even when conventional neuropsychological test performance is relatively preserved or inconsistent. A contemporary psychometric evaluation of the Persian CFQ supported the construct validity of the translated instrument and demonstrated acceptable internal consistency for the total questionnaire and its derived dimensions, with Cronbach's alpha coefficients ranging approximately from .65 to .81 (Shahgholian, 2023).

The 12-item World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0-12) was administered as the secondary measure of everyday functioning and disability. WHODAS 2.0 was developed within the World Health Organization framework as a diagnosis-independent measure of difficulties in performing everyday activities and participating in society. The abbreviated 12-item version samples six major domains of functioning, including cognition, mobility, self-care, interpersonal relationships, life activities, and participation in community and social life. Participants rate the extent of difficulty they have experienced in each area, allowing the measure to capture the functional consequences of health-related problems without assuming a specific disease mechanism. In the present investigation, raw WHODAS 2.0 scores were transformed to a 0–100 metric, with higher scores indicating greater disability and poorer everyday functioning. This outcome complemented the executive and cognitive complaint measures by assessing whether changes following GMT extended beyond subjective cognitive experiences to broader day-to-day functioning. Such an outcome was particularly important because clinically meaningful treatment of FCD should ideally reduce the extent to which cognitive concerns interfere with occupational, domestic, interpersonal, and community activities rather than merely improve perceived cognitive efficiency. Psychometric evaluation of the Persian 12-item WHODAS 2.0 has demonstrated excellent reliability, including a Cronbach's alpha coefficient of .93 and test-retest reliability of ICC = .97, with a 95% confidence interval of .92 to .98. Factor analysis of the Persian version additionally identified a four-factor structure accounting for approximately 86% of the total variance, supporting its use as a reliable measure of disability and functioning in Iranian populations (Shahedifar et al., 2022).

The Persian version of the Montreal Cognitive Assessment (MoCA-P) was administered during the diagnostic assessment to characterize participants' general cognitive status and inform the clinical formulation of FCD. The MoCA is a brief cognitive screening instrument that samples several domains, including attention and concentration, executive functioning, memory, language, visuospatial abilities, abstraction, calculation, and orientation. Persian validation studies have supported its usefulness in identifying mild cognitive impairment and mild Alzheimer's disease among Iranian adults (Rashedi et al., 2021). In the present study, however, the MoCA-P was not treated as an efficacy outcome and was not used as an isolated criterion for establishing or excluding FCD. This approach reflected the clinical principle that FCD cannot be reliably differentiated from neurological cognitive disorders solely through a single screening-test threshold. Instead, MoCA-P performance was interpreted alongside the participant's history, symptom course, observed behavior during clinical examination, functional status, and evidence of internal inconsistency between reported difficulties and demonstrated cognitive capacity. Accordingly, both relatively high and relatively low screening scores could be compatible with FCD when the broader clinical presentation supported the diagnosis and alternative neurological or psychiatric explanations had been appropriately considered.

2.3. Interventions

Participants assigned to GMT received nine weekly group sessions, each lasting approximately 120 minutes, delivered to groups of six to eight participants by a clinical neuropsychologist trained in cognitive rehabilitation with

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assistance from a psychology co-facilitator. The intervention preserved the central principles of GMT while adapting examples and exercises to the characteristic cognitive experiences of adults with FCD, including losing track during conversations, forgetting intended actions, repeatedly checking completed tasks, rereading material because of uncertainty, becoming overwhelmed when switching between activities, and experiencing cognitive inefficiency in busy or distracting environments. The first session introduced the distinction between attentive and automatic modes of functioning, provided psychoeducation concerning attention and everyday cognitive slips, normalized common lapses without dismissing participants' experiences, and introduced brief present-moment awareness exercises. The second session focused on identifying and mapping cognitive failures by examining antecedents, situational triggers, emotional responses, and behavioral consequences, with particular attention to distinguishing reduced cognitive capacity from breakdowns in attention or goal management. The third session addressed "automatic pilot" behavior and helped participants recognize habitual behavioral sequences, competing intentions, and situations in which ongoing actions continued after the relevant goal had changed. The fourth session introduced the core STOP strategy, through which participants learned to interrupt ongoing behavior, pause briefly, redirect attention to the present moment, and consciously ask themselves what they were currently doing and what they intended to accomplish. From this session onward, participants were encouraged to use the STOP cue at least three times daily in naturalistic situations. The fifth session introduced the metaphor of a "mental blackboard" to illustrate working-memory limitations and emphasized reducing unnecessary multitasking, protecting task-relevant information from distraction, using external supports strategically, and avoiding excessive compensatory checking. The sixth session trained participants to formulate clear and concrete goals, distinguish overarching goals from immediate subgoals, establish priorities, and resolve competition among simultaneous intentions. The seventh session taught participants to divide complex or avoided activities into manageable, sequential steps, identify suitable starting points and stopping rules, and anticipate obstacles that might disrupt completion. The eighth session integrated the principal GMT components into the sequence STOP-STATE-SPLIT-CHECK, emphasizing repeated comparison between ongoing behavior and the intended goal, early detection of goal neglect or task drift, use of implementation intentions, and proportionate deployment of external cues. The ninth session consolidated previously learned strategies, reviewed successful applications, addressed difficulties such as excessive self-monitoring or relapse into automatic behavior, and supported development of an individualized 8-week maintenance plan. Between-session practice focused on application of strategies to personally meaningful daily activities rather than repetitive computerized cognitive exercises. Intervention fidelity was supported using a structured session checklist corresponding to the predefined GMT components; the treating therapist completed the checklist after every session, while the co-facilitator independently evaluated a randomly selected 20% of sessions. Attendance was prospectively recorded, and participants attending at least seven of the nine sessions were classified as treatment completers for adherence reporting. Participants allocated to the active Brain Health Education condition attended nine weekly 120-minute group sessions matched to GMT for frequency, duration, group format, and therapist contact. The control program provided evidence-informed education concerning cognition and normal cognitive variability, sleep, physical activity, stress management, nutrition, medication safety, social engagement, communication with healthcare professionals, and healthy daily routines. General health-related goal setting and group discussion were permitted; however, the program deliberately excluded the treatment-specific mechanisms of GMT, including systematic STOP cueing, structured metacognitive monitoring, mindfulness-based attentional reorientation, explicit goal-hierarchy training, and formal task-splitting exercises. When feasible, participants assigned to the control condition were offered access to GMT after completion of the 8-week follow-up assessment.

2.4. Data Analysis

Statistical analyses were performed using procedures compatible with the R statistical environment. Baseline demographic and clinical variables were summarized using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Baseline comparability between the GMT and Brain Health Education groups was examined descriptively and, where appropriate, using Welch's independent-samples t tests for continuous variables and chi-square tests for categorical variables. The principal efficacy analyses were conducted using generalized estimating equations (GEE), which allowed all available repeated observations to contribute to

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estimation while accounting for correlations among measurements obtained from the same participant over time. Separate GEE models were estimated for BRIEF-A Global Executive Composite scores, CFQ total scores, and WHODAS 2.0 scores using a Gaussian distribution, identity link function, exchangeable working correlation structure, and robust standard errors. Each model included fixed terms for intervention group, assessment time, and the group-by-time interaction, with the active Brain Health Education condition and baseline measurement serving as the respective reference categories. The group-by-time interaction constituted the primary test of intervention effectiveness because it quantified whether the magnitude of change from baseline differed between GMT and the active control condition at post-intervention and follow-up. Because higher scores on all three outcome measures represented poorer executive functioning, more frequent cognitive failures, or greater disability, negative interaction coefficients indicated greater improvement in the GMT group relative to the active control group. The GEE approach incorporated all available repeated observations rather than restricting the primary analysis to participants with complete data at all three time points, thereby reducing loss of information associated with post-randomization attrition. Complete-case sensitivity analyses were additionally planned to determine whether conclusions remained stable when analyses were restricted to participants with complete follow-up observations. To control inflation of the family-wise Type I error rate resulting from multiple efficacy comparisons, p values for the six prespecified post-baseline interaction contrasts, representing three outcomes evaluated at two post-baseline measurement points, were adjusted using the sequential Holm procedure. Between-group standardized effect sizes for change from baseline were expressed as Hedges' g and calculated using pooled change-score standard deviations with the small-sample correction applied; effect-size magnitudes were oriented so that positive values represented an advantage for GMT irrespective of the original direction of the outcome scale. Effect estimates were reported with 95% confidence intervals, and statistical significance was defined using a two-sided Holm-adjusted p value below .05. The primary marginal models were additionally checked against independently generated model specifications to verify the stability and reproducibility of the inferential results.

3. Findings and Results

A total of 91 adults were screened for eligibility, of whom 27 were excluded because they did not meet the positive diagnostic criteria for functional cognitive disorder (n = 12), had a primary psychiatric condition considered sufficient to explain the cognitive complaints (n = 6), had an exclusionary neurological condition (n = 4), or declined participation (n = 5). Accordingly, 64 eligible participants were randomized equally to the Goal Management Training (GMT) group (n = 32) and the active Brain Health Education control group (n = 32). One participant from each group did not complete the post-intervention assessment, and one additional participant from each group was unavailable at the 8-week follow-up, resulting in available outcome data for 62 participants at post-intervention and 60 participants at follow-up. Mean attendance was 8.2 of the nine planned sessions in the GMT group and 8.0 sessions in the active control group, indicating high intervention adherence in both conditions. Baseline demographic and clinical characteristics were comparable between the two groups. Participants had a mean age of approximately 42 years, approximately 14.5 years of formal education, and a mean duration of cognitive symptoms of about 19 months. In the GMT group, 19 participants were women and 13 were men, whereas the active control group included 18 women and 14 men. No statistically significant between-group differences were observed for age, $t = 0.17$, $p = .865$; sex distribution, $\chi^2 = 0.06$, $p = .800$; years of education, $t = 0.87$, $p = .386$; symptom duration, $t = 0.24$, $p = .807$; or baseline MoCA-P scores, $t = 1.41$, $p = .162$. These findings indicated satisfactory baseline equivalence between the randomized groups before initiation of the intervention.

E-ISSN: 3041-8828

Table 1

Outcome Scores by Group and Assessment Time

Outcome	GMT Baseline	GMT Post-intervention	GMT Follow-up	Active Control Baseline	Active Control Post-intervention	Active Control Follow-up
BRIEF-A GEC T-score	68.71 (6.24), n = 32	59.90 (5.49), n = 31	59.40 (5.48), n = 30	68.41 (6.91), n = 32	67.11 (5.76), n = 31	67.34 (5.61), n = 30
CFQ total	46.82 (6.45), n = 32	38.06 (4.42), n = 31	35.94 (6.95), n = 30	47.87 (5.90), n = 32	43.73 (5.77), n = 31	43.80 (5.95), n = 30
WHODAS 2.0-12, 0–100	33.12 (4.66), n = 32	23.79 (5.89), n = 31	23.06 (5.96), n = 30	32.41 (7.24), n = 32	32.44 (7.31), n = 31	29.17 (7.62), n = 30

Descriptive outcome patterns showed that the two groups began the trial with broadly comparable levels of everyday executive dysfunction, cognitive complaints, and disability. Following the intervention, the GMT group demonstrated a pronounced reduction in BRIEF-A GEC scores, declining from 68.71 at baseline to 59.90 at post-intervention and remaining at 59.40 at follow-up, whereas the active control group showed only a small reduction from 68.41 to 67.11 and 67.34 across the same assessment points. A similar pattern was observed for subjective cognitive complaints. Mean CFQ scores in the GMT group decreased from 46.82 at baseline to 38.06 after treatment and to 35.94 at follow-up, whereas scores in the active control group decreased more modestly from 47.87 to 43.73 and 43.80. Everyday functioning also improved substantially following GMT, with mean WHODAS 2.0 scores decreasing from 33.12 at baseline to 23.79 post-intervention and 23.06 at follow-up. By comparison, the active control group showed little immediate change, with scores of 32.41 at baseline and 32.44 post-intervention, followed by a more modest decrease to 29.17 at follow-up. Overall, the descriptive findings suggested that GMT was associated with larger and more sustained improvements across all three outcome domains than the active control condition.

Table 2

Generalized Estimating Equation Group-by-Time Effects

Outcome	Time Contrast	β	SE	95% CI	Holm-adjusted p	Hedges' g
BRIEF-A GEC	Post-intervention vs baseline	-7.54	1.38	-10.24 to -4.84	< .001	1.37
BRIEF-A GEC	Follow-up vs baseline	-8.07	1.62	-11.25 to -4.89	< .001	1.24
CFQ	Post-intervention vs baseline	-4.59	1.63	-7.78 to -1.40	.005	0.68
CFQ	Follow-up vs baseline	-6.70	1.62	-9.87 to -3.53	< .001	1.03
WHODAS 2.0-12	Post-intervention vs baseline	-9.21	1.83	-12.79 to -5.63	< .001	1.21
WHODAS 2.0-12	Follow-up vs baseline	-6.51	1.64	-9.73 to -3.30	< .001	0.98

The generalized estimating equation analyses confirmed significant group-by-time effects favoring GMT across all primary and secondary outcomes. For the BRIEF-A Global Executive Composite, GMT was associated with an additional 7.54-point reduction relative to the active control at post-intervention, β = -7.54, SE = 1.38, 95% CI [-10.24, -4.84], Holm-adjusted p < .001, with a large standardized effect size of Hedges' g = 1.37. This advantage was maintained at the 8-week follow-up, where the differential reduction reached 8.07 points, β = -8.07, SE = 1.62, 95% CI [-11.25, -4.89], adjusted p < .001, g = 1.24. Significant effects were also observed for cognitive complaints. Compared with the active control condition, GMT produced an additional 4.59-point reduction in CFQ scores at post-intervention, β = -4.59, SE = 1.63, 95% CI [-7.78, -1.40], adjusted p = .005, g = 0.68, and an additional 6.70-point reduction at follow-up, β = -6.70, SE = 1.62, 95% CI [-9.87, -3.53], adjusted p < .001, g = 1.03, indicating that the treatment advantage increased over the follow-up period. For everyday functioning, GMT yielded a 9.21-point greater reduction in WHODAS 2.0 scores at post-intervention, β = -9.21, SE = 1.83, 95% CI [-12.79, -5.63], adjusted p < .001, g = 1.21, and a 6.51-point greater reduction at follow-up, β = -6.51, SE = 1.64, 95% CI [-9.73, -3.30], adjusted p < .001, g = 0.98. Thus, the intervention demonstrated statistically significant and clinically substantial benefits for executive self-regulation, perceived cognitive failures, and day-to-day functioning. Complete-case sensitivity analyses restricted to participants with data at all three assessment points produced the same direction and significance pattern as the primary marginal models. Given the low and balanced attrition

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across conditions, the robustness of the observed group-by-time effects was supported.

4. Discussion and Conclusion

The present randomized controlled trial examined the effectiveness of Goal Management Training (GMT) for adults with functional cognitive disorder (FCD), with particular attention to everyday executive functioning, subjective cognitive complaints, and general day-to-day functioning. The findings showed a consistent pattern of benefit in favor of GMT across all three outcomes. Compared with the active Brain Health Education control condition, participants receiving GMT demonstrated substantially greater reductions in BRIEF-A Global Executive Composite scores immediately after treatment and at the 8-week follow-up, indicating improvement in everyday executive self-regulation. The magnitude of the between-group effects was large at both time points, suggesting that the intervention influenced clinically meaningful aspects of behavior rather than producing only minor statistical change. GMT also resulted in significantly greater reductions in Cognitive Failures Questionnaire scores, with a moderate effect at post-intervention that increased to a large effect at follow-up. This pattern suggests that participants not only experienced fewer perceived cognitive failures after training but may also have continued to consolidate and generalize the strategies after formal treatment ended. Everyday disability, as measured by WHODAS 2.0, also improved substantially in the GMT group, with large between-group effects at both post-intervention and follow-up. Although some delayed improvement was observed in the active control group, participants receiving GMT retained a clear functional advantage. Taken together, these results indicate that a structured intervention targeting goal regulation, attentional control, metacognitive monitoring, and strategic task management can produce broad benefits in adults with FCD across executive, subjective cognitive, and functional domains.

The strong improvement in everyday executive functioning is particularly consistent with the theoretical basis of GMT. FCD is increasingly conceptualized as a disorder in which subjective cognitive difficulty may reflect disruptions in attentional deployment, self-monitoring, cognitive confidence, and the regulation of goal-directed behavior rather than a fixed loss of cognitive capacity (Ball et al., 2020; Cabreira et al., 2023; Mohan et al., 2026). From this perspective, the large reduction in BRIEF-A GEC scores may reflect improved ability to maintain task goals, inhibit automatic responses, manage competing intentions, monitor performance, and recover after attentional drift. These are precisely the processes targeted by the core GMT sequence of stopping ongoing behavior, reorienting to the present moment, explicitly stating the current goal, decomposing complex activities, and checking whether performance remains aligned with that goal. The observed findings therefore support the idea that at least some of the executive difficulties reported in FCD are modifiable through structured cognitive rehabilitation. This interpretation is also compatible with evidence from acquired brain injury, where GMT has repeatedly been shown to improve executive functioning and real-world self-regulation (Levine et al., 2011; Tornas et al., 2016). Systematic review and meta-analytic findings have similarly concluded that GMT can improve executive outcomes, particularly when interventions emphasize strategy application in everyday contexts rather than relying only on decontextualized cognitive exercises (Krasny-Pacini et al., 2014; Stamenova & Levine, 2019). The present results extend this evidence to a population in which executive complaints occur without a primary structural neurological lesion and therefore broaden the apparent transdiagnostic relevance of GMT.

The improvement in BRIEF-A scores also aligns with studies showing that GMT can be effective in psychiatric and neurodevelopmental conditions characterized by executive inefficiency. Hagen et al. demonstrated that GMT could serve as a cognitive remediation intervention in depression, with improvements in executive functioning despite the absence of a focal brain lesion (Hagen et al., 2020). Jensen et al. similarly reported improvements in inhibition and everyday functioning among adults with attention-deficit/hyperactivity disorder after GMT (Jensen et al., 2021). In schizophrenia spectrum disorders and psychosis-risk syndromes, GMT has also produced favorable effects on executive functioning, indicating that the intervention can be applied across heterogeneous conditions involving cognitive control difficulties (Haugen et al., 2022). These findings are relevant because they support the interpretation that GMT acts on general mechanisms of executive control and self-regulation rather than on disorder-specific cognitive deficits alone. The present results are therefore consistent with a transdiagnostic model in which impairments in goal maintenance, attentional control, and monitoring can be addressed through explicit strategy training. This may be particularly useful for

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FCD, where the individual's difficulties are often most evident in demanding or self-monitored everyday situations rather than under all forms of cognitive testing.

The significant reduction in subjective cognitive complaints represents another important finding. Participants receiving GMT reported fewer attentional, memory, and action-related slips after treatment than those receiving the active control condition, and the between-group effect became larger by follow-up. This delayed strengthening of effect is notable because it suggests that the intervention may have initiated a process of continued skill application beyond the structured treatment period. Rather than merely producing immediate relief through therapist contact or psychoeducation, GMT may have enabled participants to apply strategies independently in daily life, gradually reducing the frequency or salience of cognitive failures. This interpretation is especially plausible given the intervention's emphasis on repeated use of the STOP cue, one-task-at-a-time strategies, explicit goal formulation, and structured monitoring in personally meaningful activities. In FCD, subjective cognitive failures may be amplified by excessive attention to performance and by catastrophic interpretation of minor lapses. Contemporary accounts of FCD emphasize that symptom persistence can involve maladaptive metacognitive processes in which ordinary lapses are monitored closely, interpreted negatively, and followed by compensatory behaviors that increase cognitive load (Mavroudis et al., 2025; Mohan et al., 2026). By teaching participants to redirect attention away from global judgments about whether their cognition is “working” and toward the immediate structure of the task, GMT may reduce both the occurrence of goal-management failures and the degree to which inevitable minor lapses are experienced as evidence of cognitive incapacity.

The reduction in cognitive complaints also fits with the broader evidence that cognitive rehabilitation can alter subjective cognitive experience in populations with nondegenerative cognitive difficulties. Cognitive rehabilitation training has been associated with improvement in memory-related difficulties among adults with ADHD (Alimjon et al., 2023), while psychologically informed intervention has shown feasibility and potential benefit in individuals with FCD after concussion (Rioux et al., 2024). Although the therapeutic models differ, these studies converge on the idea that subjective cognitive symptoms can respond to structured intervention even when they are not attributable to a progressive neurodegenerative process. This is clinically significant because patients with FCD may otherwise become trapped in repeated assessment cycles, reassurance seeking, or avoidance of cognitively demanding activities. The present findings suggest that treatment targeting cognitive self-management may offer a more active alternative. The use of the CFQ is also relevant in this context because the measure captures cognitive slips as they are experienced in everyday life. Its validated Persian version provides a culturally appropriate way to quantify these changes (Shahgholian, 2023). The improvement observed in this study therefore likely reflects change in the kinds of everyday cognitive experiences that are directly meaningful to patients.

The finding that the effect on cognitive complaints was larger at follow-up than immediately after treatment deserves particular attention. One possible explanation is that the acquisition of metacognitive strategies may precede their full integration into daily routines. During the intervention period, participants were learning to identify cognitive triggers, interrupt automatic behavior, state goals, split tasks, and monitor progress. These strategies may initially require conscious effort and may not immediately reduce perceived cognitive slips. With continued use after treatment, however, the strategies may become more efficient and better integrated into everyday behavior, leading to greater perceived improvement. A similar logic has been proposed in cognitive rehabilitation more broadly, where generalization to naturalistic contexts may emerge progressively rather than immediately after training. The emphasis in GMT on repeated real-world practice and personally relevant goals is consistent with this mechanism (Krasny-Pacini et al., 2014; Levine et al., 2011). The follow-up pattern observed here may therefore reflect consolidation rather than simple persistence of treatment effects.

The large improvement in WHODAS 2.0 scores further strengthens the clinical importance of the results. In FCD, symptom reduction is meaningful only if it translates into improved participation in everyday activities, because the disorder is defined not simply by the presence of cognitive complaints but also by associated distress and functional interference. The GMT group showed a substantial reduction in disability immediately after treatment and retained a marked advantage at follow-up. This suggests that improved goal management and cognitive self-regulation may have facilitated better functioning across domains such as daily activities, social participation, and cognitively demanding tasks. The pattern is consistent with the broader goal of cognitive rehabilitation, which is not merely to improve test performance but to increase effective functioning in real-

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world settings. Previous GMT research has reported improvements in everyday functioning among adults with ADHD (Jensen et al., 2021) and in broader person-centered outcomes among individuals with schizophrenia spectrum disorders (Oie et al., 2024). These findings support the interpretation that GMT may influence functioning through mechanisms extending beyond narrow executive performance. When individuals become better able to structure tasks, reduce multitasking, manage competing goals, and recover from cognitive drift, they may also become more willing and able to resume activities previously limited by fear of cognitive failure.

The functional findings are also compatible with the contemporary understanding of FCD as a potentially reversible or modifiable disorder when appropriate explanatory and therapeutic frameworks are applied. International expert work has emphasized that management should include clear communication of the diagnosis, validation of symptoms, attention to perpetuating factors, and interventions aimed at restoring confidence and function (Cabreira et al., 2025). The current findings suggest that GMT may fit well within such a framework because it provides patients with concrete strategies rather than reassurance alone. It neither assumes structural cognitive impairment nor dismisses the patient's experience. Instead, it acknowledges cognitive difficulties while reframing them as problems of regulation that can be actively managed. This approach may be particularly useful for reducing helplessness, because participants are given specific tools for dealing with situations in which cognition feels unreliable. The large changes in WHODAS 2.0 suggest that such a strategy-based intervention may have consequences for broader functioning and not merely for self-reported executive symptoms. The use of a validated Persian WHODAS version further supports the interpretability of these changes within the Iranian context (Shahedifar et al., 2022).

The present findings also have implications for how outcomes should be evaluated in FCD research. Traditional cognitive screening measures are useful for diagnostic characterization but may not adequately capture treatment-related change in a disorder defined partly by inconsistency and subjective-experiential features. In the current study, the principal outcomes were ecologically oriented measures of executive functioning, cognitive failures, and disability rather than changes in global cognitive screening scores. This approach is consistent with neuropsychological recommendations that FCD should not be understood solely through performance on brief objective tests (Silverberg & Rush, 2024). Measures such as the BRIEF-A may be especially useful because they capture executive difficulties in naturalistic contexts. The Persian BRIEF-A has demonstrated acceptable reliability and validity (Mani et al., 2018), and further research has supported its factor structure in Iranian populations (Mohammadnia et al., 2022). Similarly, although the Persian MoCA has established utility for characterizing mild cognitive impairment and Alzheimer's disease (Rashedi et al., 2021), its role in FCD is best understood as one component of a broader assessment rather than as a definitive diagnostic or treatment-response measure. The pattern of findings in the present trial therefore supports a multimethod and function-centered approach to evaluating intervention outcomes in FCD.

Another important strength of the findings is that GMT was compared with an active Brain Health Education condition rather than with a waitlist or no-treatment control. The control program was matched for therapist contact, group format, treatment duration, and general health-related discussion, which reduces the likelihood that the observed advantages of GMT can be attributed solely to nonspecific treatment factors such as attention, expectation, social support, or repeated engagement with healthcare professionals. The fact that significant group-by-time effects remained for all three outcomes suggests that the specific components of GMT contributed meaningfully to the observed improvements. These components included strategic interruption of automatic responding, attentional reorientation, explicit goal formulation, task decomposition, and performance monitoring. The active control group did show some improvement in cognitive complaints and functioning over time, which may reflect the benefits of education, normalization, behavioral goal setting, and general participation in a supportive intervention. However, the consistently larger gains in the GMT group indicate that more targeted cognitive-regulatory training provided additional value.

The pattern of effect sizes further supports the clinical relevance of the results. Large effects were observed for everyday executive functioning at both post-intervention and follow-up, while the effect on cognitive complaints increased from moderate to large over time. Everyday functioning also showed a large post-treatment effect that remained substantial at follow-up. These magnitudes compare favorably with the broader GMT literature, where improvements have varied according to population and outcome but have generally been strongest when measures

E-ISSN: 3041-8828

capture executive functioning in ecologically meaningful contexts (Stamenova & Levine, 2019). The maintenance of benefit at follow-up also distinguishes the intervention from approaches that produce only short-term symptom relief. Because FCD can become chronic when maladaptive cognitive and behavioral patterns are repeatedly reinforced, sustained change is particularly important. The current findings suggest that GMT may help participants develop durable strategies that continue to be used after the formal intervention ends.

Several limitations should be considered when interpreting these findings. First, the study was conducted at a single specialist cognitive clinic, which may limit generalizability to patients treated in primary care, psychiatric settings, or other neurological services. Second, the sample size was adequate for detecting medium group-by-time effects but remained relatively modest, reducing precision for subgroup analyses and limiting the ability to identify moderators of treatment response. Third, the follow-up period was restricted to 8 weeks, so the durability of improvement over longer periods remains uncertain. Fourth, all primary and secondary outcomes were self-report measures, which were appropriate for capturing everyday executive functioning, subjective cognitive failures, and disability but may also be influenced by expectancy, mood, treatment beliefs, and response style. Fifth, participants and therapists could not be blinded because of the behavioral nature of the intervention, creating the possibility of performance and expectancy effects despite assessor blinding and use of an active control condition. Sixth, the study did not include objective ecological measures such as performance-based instrumental activities, digital monitoring, informant ratings, or real-world prospective memory tasks. Finally, the trial was not designed to determine which individual GMT components were responsible for improvement, so the relative contribution of attentional reorientation, STOP cueing, goal decomposition, monitoring, and homework practice cannot be separated.

Future studies should replicate these findings in larger multicenter samples and include participants recruited from more diverse clinical settings to improve external validity. Longer follow-up periods of 6 to 12 months would help determine whether gains are maintained, attenuate, or continue to develop over time. Research should also incorporate multimethod outcomes, including informant reports, performance-based measures of everyday executive functioning, ecological momentary assessment, digital activity monitoring, and objective prospective memory tasks. Stratified analyses could examine whether treatment response differs according to symptom duration, baseline executive difficulty, anxiety, depression, health anxiety, metacognitive beliefs, or diagnostic subtype. Mechanism-focused trials could test whether improvements in attentional control, cognitive confidence, metacognitive awareness, or reduced symptom monitoring mediate functional gains. Dismantling designs may also help identify which components of GMT are essential for FCD and whether a shorter or digitally supported version can achieve comparable outcomes. Comparative studies against cognitive-behavioral therapy, psychoeducation alone, mindfulness-based interventions, or combined treatment models would further clarify the optimal rehabilitation pathway for this population.

In clinical practice, GMT may be considered as a structured rehabilitation option for adults with FCD who experience persistent executive difficulties, frequent cognitive complaints, and disruption of everyday functioning despite reassurance and stable medical management. Clinicians should present the intervention within a validating explanatory framework that emphasizes that symptoms are genuine while also highlighting the possibility of improvement through changes in attention, goal management, and self-regulation. Treatment should focus on personally meaningful situations such as losing track during conversations, forgetting intended actions, becoming overwhelmed by multitasking, repeatedly checking completed tasks, or abandoning complex activities. Regular homework and repeated use of simple cues may help transfer strategies from therapy sessions into naturalistic settings. Progress should be monitored using ecologically meaningful measures rather than relying exclusively on brief cognitive screening tests. Integration of GMT with broader multidisciplinary care may be particularly useful when patients also require support for sleep, mood, stress, medication management, or graded return to occupational and social activities.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

E-ISSN: 3041-8828

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We hereby thank all individuals for participating and cooperating us in this study.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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E-ISSN: 3041-8828