

What's a “Cognitive” Intervention? The PICC-M Framework to Distinguish Cognitive Remediation, Stimulation, Training, Therapy, and Rehabilitation



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ABSTRACT

Psychosocial interventions targeting cognition improve objective cognitive test performance, strategy use, emotional well-being, and quality of life in individuals with mild cognitive impairment and early dementia. These interventions have been labeled as cognitive training, cognitive remediation, cognitive rehabilitation, cognitive stimulation, and overlap with cognitive (psycho)therapy. The inconsistent labeling of the interventions has resulted in ambiguity of what a cognitive intervention entails and limits the translation of interventions into clinical practice. To address this, we propose a new framework, “PICC-M”, that classifies cognitive interventions based on five active ingredients or the mechanisms resulting in clinically significant change. These ingredients are psychotherapeutic support (P), individualized patient goals (I), cognitive exercises (C), compensatory strategies (C), and metacognitive strategies (M). We examine three intervention programs to illustrate how this framework clarifies each intervention's active ingredients and their relation to cognitive, psychological, and functional outcomes. The PICC-M framework lays the foundation for dismantling studies to isolate and test the effectiveness of specific active ingredients and ultimately support clinical delivery of evidence-based interventions for older individuals with neurocognitive deficits.

Key words: mild cognitive impairment, psychosocial interventions, cognitive dysfunction, cognitive training, behavior therapy, psychotherapy

INTRODUCTION

Psychosocial interventions are beneficial for individuals with neurocognitive disorders, including mild neurocognitive disorder, more commonly known as mild cognitive impairment (MCI). Group-based interventions have been shown to improve cognitive functions, social interactions, and subjective quality of life in individuals at risk for, or

living with, MCI and early dementia.⁽¹⁾ A Canadian example is the Memory and Aging Program (MAP), developed for healthy older adults, including those with subjective cognitive complaints.⁽²⁾ Through a combination of psychoeducation, compensatory memory strategies, and psychotherapeutic interventions, MAP has been shown to increase memory strategy use, promote healthier lifestyle behaviors such as stress management and physical activity,^(2,3) and demonstrate cost-efficiency in Ontario's publicly funded health-care system.⁽⁴⁾ Further development of effective, cost-efficient psychosocial interventions such as MAP is urgently needed in Canada for individuals with MCI and dementia.

Psychosocial interventions for individuals at risk for and with neurocognitive disorders are often poorly operationalized.^(1,5) The “cognitive” components of these interventions are inconsistently defined, and the term cognitive itself is loosely applied to a range of approaches with overlapping goals and methods, including cognitive stimulation, cognitive training, cognitive rehabilitation, cognitive remediation, and cognitive (psycho)therapy. Cognitive stimulation refers to interventions which aim to slow cognitive decline rather than improve specific cognitive functions, such as group discussions, games, and creative tasks.^(6,7,8) Cognitive training refers to standardized tasks designed to maintain or improve specific cognitive functions such as complex attention or working memory. These repetitive exercises differ in modality (paper-and-pencil, computerized) and sometimes involve strategy-based training or other efforts to generalize the skills.^(5,7,8,9) Cognitive therapy refers to interventions that shift maladaptive thought patterns to improve psychological wellness and functioning.⁽¹⁰⁾ The distinctions between interventions become increasingly unclear with the terms cognitive rehabilitation, which is typically defined as goal-oriented compensatory, and metacognitive interventions designed to improve everyday functions rather than isolated cognitive abilities,^(5,6,7,8,11) in addition to cognitive remediation which refers to interventions containing structured cognitive exercises (like “cognitive training”), and metacognitive interventions (like “cognitive rehabilitation”)

with the aim to enhance cognitive processes which can subsequently lead to functional improvements. Whereas cognitive rehabilitation directly addresses daily challenges through compensatory strategies and other individualized interventions, cognitive remediation presumes that improving specific cognitive processes with structured cognitive exercises will generalize to improvements in daily life.⁽¹²⁾ To complicate matters further, some frameworks categorize cognitive remediation as an umbrella term encompassing cognitive training, rehabilitation, and stimulation.⁽⁸⁾

As evidenced above, the label and defining of “cognitive” in psychosocial interventions is inconsistent. This is not merely an issue of semantics; the amorphous labeling of psychosocial interventions obscures meaningful differences between interventions and prevents an understanding of the active ingredients or mechanisms of change in successful interventions.^(1,5) Such ambiguity may limit replicability and translation into clinical care. To remedy this, we offer and apply a framework to define psychosocial interventions targeting cognition.

Illustrative Case Examples of Cognitive Psychosocial Interventions

Below, we examine three cognitive intervention studies for individuals with neurocognitive disorders to highlight the need for greater clarity in defining intervention components.

The Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER) employed a “multicomponent intervention approach” which resulted in improvements in participants’ global cognition (particularly executive functions and processing speed) over 24 months.⁽⁹⁾ The intervention included nutritional adjustments, a physical exercise regimen, and “cognitive training,” the latter delivered through both individual and group sessions.⁽⁹⁾ The “cognitive training” component consisted of psychologist-facilitated group educational sessions on age-related cognition, memory, and everyday reasoning strategies, along with 72 independently completed computer-based training sessions each of a 15-minute duration. These computer-based tasks targeted complex attention, relational and spatial memory, and processing speed. In this study, “cognitive training” referred to group-based sessions with psychoeducation and metacognitive strategies alongside computerized cognitive programming.

The Healthy Action to Benefit Independence and Thinking (HABIT[®]) program was designed for individuals with amnesic MCI (aMCI) and their care partners.⁽¹³⁾ Over a 10-day period, participants were assigned to five components, each requiring 45–60 minutes of daily participation: 1) Hatha yoga; 2) computerized cognitive training (CCT) using BrainHQ[®] (<https://www.brainhq.com>; Posit Science, San Francisco, CA); 3) group lectures on MCI management and brain health; 4) support groups with trained facilitators providing emotional support and education for both patients and partners; and 5) memory support system (MSS) training focused on compensatory strategies such as calendar use and notetaking. The program significantly improved quality of

life, objective cognitive performance, and functional outcomes in individuals with aMCI. The authors categorized computerized “cognitive training” and MSS as “cognitive rehabilitation,” and further subcategorized cognitive training as “cognitive remediation”.

In the randomized clinical trial PACT-MD, older adults with remitted Major Depressive Disorder (rMDD) and/or MCI were followed for 48–87 months and randomized to receive either an active intervention (Cognitive Remediation [CR]+ Transcranial Direct Current Stimulation [tDCS]), or a control intervention (sham CR + sham tDCS); the interventions involved five sessions per week for eight weeks and were followed by five-day booster sessions every six months.⁽¹⁴⁾ The “cognitive remediation” intervention consisted of 2-hours of daily group activities involving didactic presentations (role-play, use of props), repetitive computerized exercises with dynamic difficulty adjustment, strategic monitoring where participants reflected on and refined their problem-solving strategies (i.e., targeting metacognition). These interventions were accompanied by an interventionist who facilitated discussions on transferring cognitive skills to participants’ daily life. The intervention slowed global cognitive decline for up to six years among participants with rMDD or MCI.⁽¹⁴⁾
















A New Framework for Cognitive Interventions




The above studies illustrate both the value of continued research into psychosocial interventions with “cognitive” components and the variability in how these interventions are defined. It is unclear given the overlapping components why FINGER’s cognitive intervention should be labeled as “cognitive training”, HABIT’s intervention as “cognitive rehabilitation”, and PACT-MD’s intervention as “cognitive remediation”.

Fortunately, a similar issue has been addressed in psychotherapy research. Comparative studies of different therapeutic modalities, such as psychodynamic versus cognitive therapies, have shown that clinical improvements are attributable to nonspecific common factors shared across approaches. These include the therapeutic alliance, building genuine connections with clients, understanding their goals, and fostering positive expectations about change.⁽¹⁰⁾ We believe that the cognitive intervention field would similarly benefit from focusing on the shared intervention components that lead to clinical improvements, or interventions’ active ingredients. This approach allows for better comparisons across studies, supports dismantling research, and can guide clinical recommendations.

Based on both clinical expertise and our literature review, we propose the PICC-M framework, which consists of five active ingredients that contribute to outcomes across three domains: objective cognition (e.g., learning and memory, executive functions), psychological factors (e.g., subjective cognition, emotional well-being, self-efficacy, mood symptoms), and daily functioning (e.g., self-care, social participation, and independence in instrumental activities of daily living). These active ingredients are defined in Table 1 and summarized below.

TABLE 1.
Intervention active ingredients

Active Ingredient	Definitions	Expected Outcomes		
		Objective Cognition (on standardized measures such as attention, memory, executive functions, social cognition, language, processing speed, etc.)	Psychological Factors (subjective cognition, emotional well-being, self-efficacy, anxiety & mood symptoms)	Daily Functions (self-care, social participation, and instrumental activities of daily living)
Psychotherapeutic support	Humanistic or relational interventions Example: Empathetic responses, validation, normalization			
Individual Patient Goals	The degree which the intervention targets individuals' goals Example: client expresses desire to not forget items when they go grocery shopping and are given a strategy to support this			
Cognitive Exercises	Repeated structured tasks designed to target cognitive function(s) Example: participants use a computer/iPad to place words into categories under a time-limit			
Compensatory Strategies	Strategies (internal and external) designed to improve cognitive performance Example: use of associations (internal strategy) & calendars (external strategy)			
Metacognitive Strategies	Techniques to improve individual's awareness, control, and/or approach to tasks Example: STOP-STATE-SPLIT cycle used in Goal Management Training™			

 Improves  May Improve  Does Not Improve

Psychotherapeutic support involves relational techniques that address the therapeutic relationship, psychological well-being, and/or psychopathology. Critically, client improvements stem from the elimination of psychological barriers which interfere with functioning, including negative impacts on cognitive processes (i.e., attention), rather than changes in objective cognitive abilities or task approaches.^(10,15)

Individual patient goals refer to the extent which an intervention addresses participants' self-identified priorities or goals. Interventions incorporating individuals' goals are expected to result in greater participant motivation and engagement, and be more efficacious.⁽¹²⁾

Cognitive exercises are repeated, structured tasks targeting specific cognitive functions such as complex attention and working memory. Cognitive exercises improve objective cognition for the targeted cognitive functions, and

may enhance psychological well-being through improved self-efficacy and behavioral activation. Generally, the impact on daily functioning is limited due to poor transfer beyond the practiced tasks.⁽¹⁶⁾

Compensatory strategies are internal (e.g., mnemonics) and external aids (e.g., calendars). Compensatory strategies may support objective cognition through an improved task approach, though the impact is more strongly seen on psychological factors like self-efficacy and daily functioning.⁽¹⁷⁾

Metacognitive strategies target individuals' awareness, control, and approach to tasks. Objective cognition can be improved through better complex attention and self-monitoring or higher-order executive functions. Psychologically, these strategies may support improved self-efficacy. In daily functioning, they may improve task efficiency and participation through cognitive and psychological effects.⁽¹⁸⁾

Framework Utility

In Table 2, we apply the PICC-M framework to the above three studies and link each intervention’s active ingredients to the observed outcomes. The FINGER intervention did not include compensatory strategies, but incorporated cognitive exercises, metacognitive strategies, psychotherapeutic support, and some non-cognition focused individualized elements known to affect psychological well-being and modify the trajectory of cognitive decline (e.g., tailored nutrition and exercise plans).⁽¹⁹⁾ Cognitive exercises likely targeted specific cognitive skills, metacognitive strategies supported better task approach and strategy use for daily functioning, and psychologist-led sessions contained a psychotherapeutic component which further contributed to the sustained cognitive gains. The HABIT intervention included all the active ingredients except metacognitive strategies and individual patient goals, though individualized plans were provided for nutrition and exercise. Cognitive exercises improved objective cognition, particularly psychomotor speed and attention. Compensatory strategies, delivered through psychotherapeutic support, contributed to improvements in psychological well-being, daily memory-related activities, confidence, and memory self-efficacy.⁽¹³⁾ The PACT-MD intervention contained metacognitive strategies and cognitive exercises, with some degree of psychotherapeutic support and unclear inclusion of individual patient goals. These active ingredients correspond with observed outcomes in slowed global cognitive decline among individuals with either rMDD or MCI. Data are unavailable on PACT-MD intervention’s impact on psychological factors or daily functioning. It is notable that individual patient goals

are the least clearly defined active ingredient across the three studies, despite past research showing the importance of this active ingredient in promoting participant engagement and transfer of intervention skills into daily functioning.⁽¹²⁾

Limitations

The PICC-M framework aims to support researchers and clinicians in isolating and evaluating the active ingredients within their psychosocial interventions for individuals at risk for or with neurocognitive disorders. The framework does not preclude active ingredients having synergistic interactions which enhance an intervention’s effectiveness. For example, pairing metacognitive strategies with cognitive exercises has shown additive benefits on cognitive performance and mood-related symptoms in individuals with MCI.⁽⁷⁾ Additionally, interventions delivered by more effective therapists (e.g., better psychotherapeutic support) amplify the effectiveness of other active ingredients and intervention generalization.^(7,11) In psychosocial interventions this could be seen with better modeling and reinforcing of metacognitive strategies in real time, tailoring of cognitive exercises to individuals’ abilities, and supporting the everyday implementation of compensatory strategies.⁽⁸⁾

The PICC-M framework’s combination of active ingredients does not equate all the ingredients. For example, it may be that metacognitive strategies have a stronger impact across clinical populations; one example, the Goal Management Training[®] intervention which focuses on metacognitive strategies, has been effective in younger and older adults with acquired brain injuries and other neurological conditions.⁽²⁰⁾ Similarly, while PICC-M specifies active ingredients across

TABLE 2.
Ingredients-centered analysis of FINGER, HABIT, PACT-MD

	Active Ingredients					Outcomes			
	Cognitive Intervention	Metacognitive Strategy	Cognitive Exercises	Compensatory Strategies	Psychotherapeutic support	Individual Patient Goals	Objective Cognition	Psychological Factors	Daily Functions
FINGER ⁽⁹⁾ Described as “cognitive training”	●	●	●	■	●	▲ ^a	●	▲	▲
HABIT ⁽¹³⁾ Described as “cognitive rehabilitation”	■	●	●	●	●	■	●	●	●
PACT-MD ⁽¹⁴⁾ Described as “cognitive remediation”	●	●	■	▲ ^b	▲ ^c	▲	●	▲	▲

● Observed ▲ Partly observed or unclear ■ Not observed

^aIndividualization was present for the nutritional and physical exercise components of the intervention.

^b“Interventionists” were present to administer CR and tDCS and facilitate discussions on transference of cognitive gains to daily life.

^cThe PACT-MD CR intervention provided a standard number of computer exercises delivered in a group setting with individualized difficulty, followed by a component focused on guiding participants to apply the learned strategies and skills to their own personal goals and daily lives, rather than tailoring exercises based on pre-expressed individual goals.

interventions, it does not preclude intervention-unique mechanisms. An example in the psychotherapy literature is how both Cognitive Behavioral Therapy (CBT) and Acceptance and Commitment Therapy (ACT) involve bringing awareness to thoughts, while only CBT involves reframing thoughts.⁽¹⁰⁾

The PICC-M framework excludes non-cognition related educational content which is common in psychosocial interventions for individuals with neurocognitive disorders; for example, education related to nutrition or exercise.^(2,13) The exclusion of educational content unrelated to cognition focuses the framework on cognition, but does not diminish the importance of these elements. The PICC-M framework outlines core cognition-related active ingredients and certainly does not capture all the complexities present in psychosocial interventions targeting cognition which ongoing research will elucidate.

Conclusion & Future Directions

Ambiguous labels obscure meaningful distinctions across psychosocial interventions targeting cognition for older adults at risk for, and with, cognitive impairment. We believe moving towards a shared language of active ingredients is essential to advance both research and practice in psychosocial interventions for individuals with neurocognitive disorders. The simple PICC-M framework focuses on five active ingredients, and offers a practical solution for comparing studies, guiding dismantling research, and clinical implementation.

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We have read and understood the *Canadian Geriatrics Journal's* Policy on disclosing conflicts of interest and declare that we have none.

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REFERENCES

- McDermott O, Charlesworth G, Hogervorst E, Stoner C, Moniz-Cook E, Spector A, *et al.* Psychosocial interventions for people with dementia: a synthesis of systematic reviews. *Aging Ment Health.* 2019 Apr 3;23(4):393–403.
- Vandermorris S, Au A, Gardner S, Troyer AK. Initiation and maintenance of behaviour change to support memory and brain health in older adults: a randomized controlled trial. *Neuropsychol Rehabil.* 2022 Apr 21;32(4):611–28.
- Yusupov Rose I, Lass JW, D'Amico D, Zhu L, Rich JB, Levine B, *et al.* A self-guided e-learning program improves metamemory outcomes in healthy older adults: a randomized controlled trial. *Age Ment Health.* 2025 Jun 3;29(6):1090–99. Epub 2024 Dec 13.
- Baker S, Vandermorris S, Verhoeff NP, Troyer AK. A cost-benefit analysis of a group memory intervention for healthy older adults with memory concerns. *Can J Aging.* 2022 Dec;41(4):531–39.
- Bahar-Fuchs A, Clare L, Woods B. Cognitive training and cognitive rehabilitation for persons with mild to moderate dementia of the Alzheimer's or vascular type: a review. *Alzheimer's Res Ther.* 2013 Aug 7;5(4):35.
- Aguirre E, Woods RT, Spector A, Orrell M. Cognitive stimulation for dementia: a systematic review of the evidence of effectiveness from randomised controlled trials. *Age Res Rev.* 2013 Jan 1;12(1):253–62.
- Kasper E, Ochmann S, Hoffmann W, Schneider W, Cavedo E, Hampel H, *et al.* Cognitive Rehabilitation in Alzheimer's Disease - A Conceptual and Methodological Review. *J Prev Alzheimer's Dis.* 2015 Jan 1;2(2):142–52.
- Tulliani N, Bissett M, Fahey P, Bye R, Liu KPY. Efficacy of cognitive remediation on activities of daily living in individuals with mild cognitive impairment or early-stage dementia: a systematic review and meta-analysis. *System Rev.* 2022 Aug 02; 11(1):156.
- Ngandu T, Lehtisalo J, Solomon A, Levälähti E, Ahtiluoto S, Antikainen R, *et al.* A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (FINGER): a randomised controlled trial. *The Lancet.* 2015 Jun 6;385(9984):2255–63.
- Wampold BE. How important are the common factors in psychotherapy? An update. *World Psychiatry.* 2015 Oct;14(3):270–77.
- Cicerone KD, Goldin Y, Ganci K, Rosenbaum A, Wethe JV, Langenbahn DM, *et al.* Evidence-based cognitive rehabilitation: systematic review of the literature from 2009 through 2014. *Arch Phys Med Rehabil.* 2019 Aug 1;100(8):1515–33.
- Bowie CR, Bell MD, Fiszdon JM, Johannesen JK, Lindenmayer J, McGurk SR, *et al.* Cognitive remediation for schizophrenia: An expert working group white paper on core techniques. *Schizophr Res.* 2020 Jan 1;215:49–53.
- Levy S, Smith G, De Wit L, DeFeis B, Ying G, Amofa P, *et al.* Behavioral interventions in mild cognitive impairment (MCI): lessons from a multicomponent program. *Neurotherapeutics.* 2022 Jan 1;19(1):117–31.
- Rajji TK, Bowie CR, Herrmann N, Pollock BG, Lanctôt KL, Kumar S, *et al.* Slowing cognitive decline in major depressive disorder and mild cognitive impairment: a randomized clinical trial. *JAMA Psychiatry.* 2025 Jan 1;82(1):12–21.
- Ying G, Perez-Lao A, Marsiske M, Levy S, Smith GE. Multimodal cognitive and behavioral interventions for patients with MCI: a systematic review and meta-analysis on cognition and mood. *Front Aging Neurosci.* 2024 Apr 30;16:1390699.
- Simons DJ, Boot WR, Charness N, Gathercole SE, Chabris CF, Hambrick DZ, *et al.* Do “brain-training” programs work? *Psychol Sci.* 2016 Oct;17(3):103–86.
- Tomaszewski Farias S, Schmitter-Edgecombe M, Weakley A, Harvey D, Denny KG, Barba C, *et al.* Compensation strategies in older adults: association with cognition and everyday function. *Am J Alzheimers Dis Other Demen.* 2018 May;33(3):184–91.
- Sella E, Carbone E, Vincenzi M, Toffalini E, Borella E. Efficacy of memory training interventions targeting metacognition for older adults: a systematic review and meta-analysis. *Aging Ment Health.* 2023 Apr 3;27(4):674–94.
- Dhabhi W, Briki W, Heissel A, Schega L, Dergaa I, Guelmami N, *et al.* Physical activity to counter age-related cognitive decline:

- benefits of aerobic, resistance, and combined training—a narrative review. *Sports Med—Open*. 2025 May 17;11(1):56.
20. Stamenova V, Levine B. Effectiveness of goal management training® in improving executive functions: a meta-analysis. *Neuropsychol Rehabil*. 2019;29(10):1569–99.

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