# Cognitive remediation in adults living with psychosocial disability: Evidence snapshot

Version 1.1 – March 2023

Research and Evaluation Branch

**ndis.gov.au**

# Contents

# 1. About the Research and Evaluation Branch

The Research and Evaluation Branch is responsible for ensuring that NDIA policies, practices and priorities are informed by trustworthy and robust evidence so that decisions can be based on an understanding of what works, what doesn't and the benefit to participants and the Agency.

## 1.1 This document

This report presents research findings on Cognitive remediation in adults living with psychosocial disability.

## 1.2 Disclaimer

Material in this report is made available on the understanding that the National Disability Insurance Agency is not providing professional advice. Before relying on any of the material in this report, users should obtain appropriate professional advice.

Views and recommendations of third parties, which may also be included in this report, do not necessarily reflect the views of the National Disability Insurance Agency, or indicate a commitment to a particular course of action.

## 1.3 Acknowledgements

The NDIA acknowledges the Traditional Owners and Custodians throughout Australia and their continuing connection to the many lands, seas and communities. The NDIA pays respect to Elders past and present, and extends this acknowledgement and respect to any Aboriginal and Torres Strait Islander people who may be reading this Report.

The Research and Evaluation Branch would like to acknowledge the broader NDIA team NDIS participants who assisted in the development of this research project.

The Branch gratefully acknowledges the NDIS participants, carers, family members and NDIS service delivery staff who participated and shared their experiences.

Suggested citation: National Disability Insurance Agency 2022. ‘Cognitive remediation in adults living with psychosocial disability; an evidence snapshot’. Prepared by A Lampit, E Ghezzi.

Enquiries about this publication should be addressed to:

National Disability Insurance Agency. Email: research@ndis.gov.au

# 2. Introduction

People living with psychosocial disabilities often experience difficulties in memory, concentration or other cognitive abilities. Cognitive impairment is extremely common in people with psychosocial disabilities, and has pervasive effects on everyday functioning, wellbeing and recovery. The most common evidence-based intervention is cognitive remediation, defined as "a behavioural training intervention targeting cognitive deficit (attention, memory, executive function, social cognition, or metacognition), using scientific principles of learning, with the ultimate goal of improving functional outcomes".[1] Given its strong recovery focus, cognitive remediation has been previously identified as a potential capacity building support in the NDIS.[2] This brief report summarises the most recent evidence for cognitive remediation, with a focus on key factors that appear to be essential for supporting high-quality cognitive remediation for NDIS participants.

## 2.1 What is cognitive remediation?

Cognitive remediation combines computerised cognitive training exercises with other techniques aiming to achieve cognitive gains and generalise them into everyday life. A recent expert panel report[1] defined four **core components** of effective, evidence based cognitive remediation for people with schizophrenia:

1. **Cognitive remediation therapists:** Facilitating the cognitive remediation process, supporting the administration of cognitive training exercises, applying techniques to maintain motivation and translate cognitive improvement into better everyday function.
2. **Cognitive training exercises:** Repeated practice on computerised (or, less commonly, pencil-and-paper) drill-and-practice exercises that challenge specific cognitive processes (domains) to improve their underlying neural networks and reduce cognitive deficits. Training typically targets multiple cognitive domains, adapts to individual needs, and provides the person with comprehensive feedback on progress. The most common training programs target core cognitive abilities (e.g. memory, attention, processing speed and executive functions), but could also tap into other areas of impairment such as social cognition or attentional bias. *This is the most time-consuming but fundamental component of cognitive remediation*.
3. **Development of cognitive strategies:** Explicit teaching of problem-solving and 'meta-cognitive' strategies that help with performance of the cognitive exercises and their use in everyday activities (e.g. associating items with their location in a warehouse).
4. **Facilitation of transfer to everyday functioning:** Techniques that augment the real-life value of training such as goal setting, psychoeducation and understanding how the training experience can be generalised to cope with barriers at work, home or with others.

Ideally the components and specific techniques used in a cognitive remediation program should be tailored to the individual participant's needs and recovery goals. These could be:

- restorative (reduction of cognitive impairment),
- rehabilitative (regaining functional skills that have been lost),
- habilitative (acquisition of new cognitive or functional skills),
- compensatory (learning how to cope with cognitive difficulties)
- or a combination of these.

## 2.2 How can it support a person's recovery?

As depicted in figure 1 below (based on a 2014 review of the National Institute of Mental Health[3]), cognitive remediation can be thought of as a process where:

1. Carefully targeted exercises improve neural systems (neuroplasticity), which leads to
2. Improvement in the underlying cognitive domains, thereby
3. Removing cognitive barriers for community functioning and recovery.

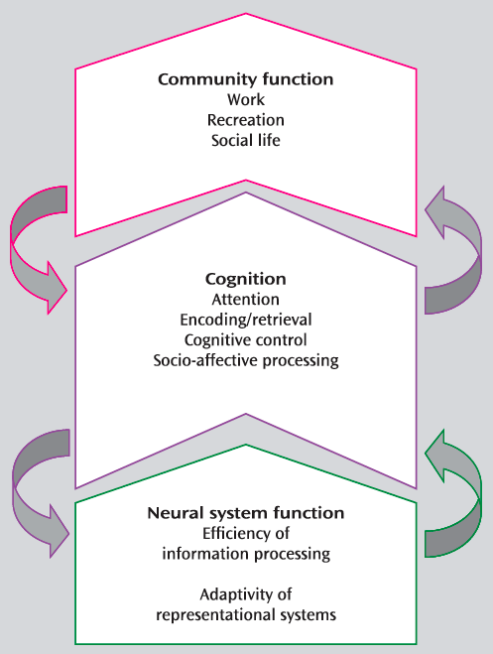


**Figure 1: Cognitive remediation**

## 2.3 How is it delivered?

Cognitive remediation is a structured process, offered as a stand-alone intervention or as part of a larger treatment program such as supported employment or functional training.[4-6] It is usually delivered in groups or in a one-on-one format by trained facilitators. Facilitators

have no formal training requirements, but are usually psychologists, nurses, social workers or occupational therapists who have undergone practical cognitive rehabilitation facilitation training using therapist guides[7] or completion of online courses (such as those offered by Columbia University). Ideally facilitators should be supported by a specialist (usually a mental health neuropsychologist) to aid with individual intervention plans, support implementation and ensure service quality, especially at the interface between community and clinical services.[8]

A typical course of cognitive remediation would entail 2-3 sessions per week, 1-2 hours per session over 10-30 weeks, although these vary across settings, especially if more components are provided[7, 9-11]. At least 50% of intervention time will be devoted to computerised cognitive training exercises, and some programs provide homework assignments aiming to practice the new skills in everyday life situations or to reflect on progress. The entire program, conceptualised as a 3-phase process, is summarised in figure 2 based on a report of the Cognitive Remediation to Promote Recovery (CR2PR), a successful state-wide implementation project in New York.[8]

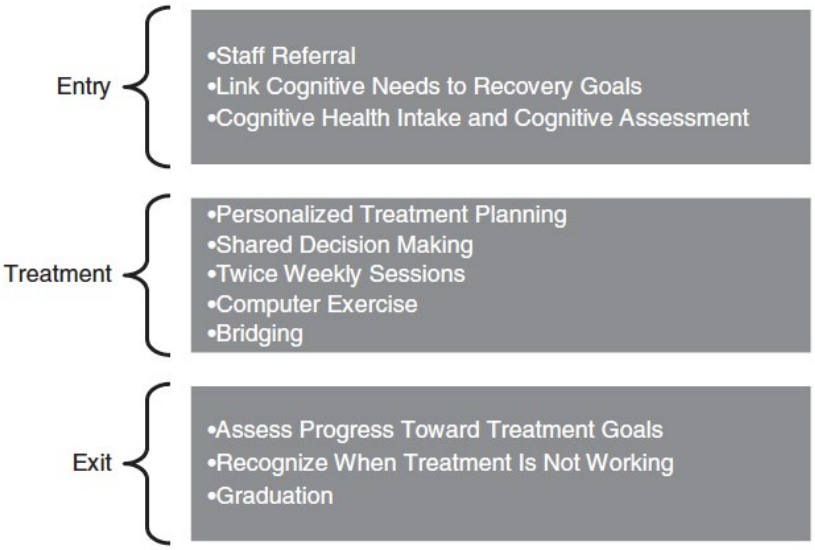


**Figure 2: Cognitive remediation program**

## 2.4 What is the evidence base?

Over the past two decades, hundreds of clinical trials have investigated the effects of different forms of cognitive remediation in people living with schizophrenia spectrum disorders. These have been summarised in several high-quality systematic reviews, which examined not only what benefits should be expected but also what treatment factors might be related to better outcomes.

Two meta-analyses published in 2021 synthesised the results of 73-143 clinical trials, encompassing a total of 4594-8851 participants with schizophrenia spectrum disorders.[9, 10] Both meta-analyses reported clinically meaningful positive effects on general cognition,

individual cognitive domains and social cognition, as well as improvement in positive and negative symptoms. Critically, both meta-analyses reported improvements in overall functioning (e.g. work, independence) – the ultimate goal of cognitive remediation. For example, cognitive rehabilitation as adjacent to supported employment has been repeatedly shown to be more effective for employment outcomes in people with severe mental illness than supported employment alone.[11] As demonstrated in large, high-quality clinical trials, the addition of cognitive remediation on top of employment support more than doubles the likelihood employment 1-3 years after training over and above employment support alone, as well as higher retention, working hours and wages.[11]

One meta-analysis[10] examined the effects of cognitive remediation on functional capacity and recovery. These outcomes were reported by only 16 studies, and results were mixed and not statistically significant, meaning we still do not know whether we should expect meaningful improvements on functional capacity and recovery. Finally, compensatory cognitive training (training that included elements from components 3&4 above) may be effective as well.[12] This strengthens the notion that these techniques may provide additional benefit as part of a comprehensive cognitive remediation program.

**Other populations**

Recent systematic reviews have provided inconclusive evidence on the possible effects of cognitive remediation in people with bipolar disorder,[13] autism spectrum disorder[14] and ADHD.[15] However, it is likely that the current lack of strong evidence is due to a lack of clinical trials rather than an indication that cognitive remediation is less effective in these populations than it is with schizophrenia.

## 2.5 What factors relate to better response?

Importantly, cognitive remediation is not a single intervention but an array of possible techniques, delivered in different formats, doses and settings. For this reason, apart from investigating whether cognitive remediation is effective and for what outcomes, systematic reviews have used statistical techniques to investigate what strategies work better than others by comparing results across different designs. The key factors that seem to be related to larger effect sizes are summarised in the table below. For brevity, the table focuses only on factors that were associated with cognitive or functional response. Note that for other factors (e.g. age and group vs individual therapy), we can assume that no association was found in the current evidence. Crucially, all these associations are based on simple regressions, and the associations may be driven by, or interact with, other factors that are yet to be examined in the literature.

| Factor | Cognitive effects | Functional effects |
|---|---|---|
| **Population characteristics** | Less years of education is associated with larger effects.[9, 10]<br>Lower cognitive performance is associated with larger effects.[9]<br>Greater baseline symptoms severity is associated with larger effects.[9] | More years of education is associated with smaller effects.[9]*<br>Lower cognitive performance is associated with larger effects.[9]<br>Greater baseline symptoms severity is associated with larger effects.[9] |
| **Treatment dose** | Longer training duration is associated with larger effects.[10] | Longer training duration is associated with larger effects.[9, 12]<br>Intensive interventions (>3hr per week) are less efficacious for employment rate than less intensive schedules.[11] |
| **Role of therapist and settings** | Supervision by a therapist results in approximately double the effect size.[9] | Supervision by a therapist results in approximately double the effect size.[9] |
| **Use of core components (page 2)** | Development of cognitive strategies results in approximately double the effect size.[9, 10]<br>Combination of all four core components results in approximately double the effect size.[9] | Focus on drill-and-practice (component #2) is associated with better employment results.[11]<br>Development of cognitive strategies results in approximately triple the effect size.[9]<br>Combination of all four core components results in approximately triple the effect size.[9]<br>Integration with cognitive rehabilitation results in approximately double the effect size.[9] |

* Note: Average years of education were a significant predictor of employment rate, wages and hours worked *between* but not necessarily *within* studies[11]

# 3. NDIA Perspective

## 3.1 Summary

There is strong evidence from recent high-quality systematic reviews and large clinical trials that cognitive remediation could be a safe and cost-effective strategy to support everyday functioning, work, independence and wellbeing for NDIS participants with psychosocial disability. Moreover, comparisons between studies suggest that these benefits are even more robust in people with more severe symptoms, less education and a lower cognitive performance, who are more likely to experience disability, and received supports from the NDIS. Importantly, cognitive remediation is mostly beneficial when combining several components as a single intervention package under the guidance of a therapist. Therefore, although some of the techniques are similar to those used in cognitive training, cognitive rehabilitation and cognitive therapy, these interventions are not interchangeable with cognitive remediation.

Cognitive remediation should be particularly important when cognitive impairments seem to interfere with engagement or outcomes of other capacity building supports. For example, difficulties in planning, memory or attention may create a cascade of objective and subjective barriers to employment, which limit the effectiveness of employment support. As demonstrated in large, high-quality clinical trials, the addition of cognitive remediation on top of employment support more than doubles the likelihood employment 1-3 years after training compared with employment support alone, as well as higher retention, working hours and wages.[11] Similarly, the body of evidence suggests benefits in other areas of capacity building such as social skills, community participation, education and wellbeing. Trained therapists should be able to adjust the specific components and cognitive remediation techniques to individual goals and changes thereof during the intervention period, as well as to offer additional 'booster' sessions after the initial intervention period to maintain cognitive and functional gains.

## 3.2 Current evidence gaps

Despite progress in the evidence base, we can improve our understanding of the cost-effectiveness of cognitive remediation in NDIS participants by closing several evidence gaps:

- Dose-response: What is the range of intensity and duration required to achieve and maintain meaningful gains for the most important functional outcomes?
- Are particular strategies and components more suited than others to NDIS participants with psychosocial disability?
- Who responds better to cognitive remediation?
- Do some people need different components or doses?
- How do we best measure progress, engagement in, and effects of training in light of personal goals?

- Are cognitive remediation methods useful for children and adolescents with psychosocial disability?

## 3.3 Limitations of this report

This report is informed by recent systematic reviews or large randomised controlled trials, recommendations from the June 2021 conference of the Cognitive Remediation in Psychiatry Society, and the author's experience as a clinical researcher in the field of cognitive interventions. This is not a systematic umbrella review, but a summary of key findings from recent systematic reviews with meta-analyses, which were judged by the author (an expert in evidence synthesis in the field) to be of at least moderate to high quality.

The evidence cited in support of cognitive remediation was generally robust to key sources of bias, most notably study quality, type of control and selective reporting. However, there was considerable variation across effect sizes, which may have not been adequately explained by the subgroup analyses (meta-regressions) summarised above. Such analyses can clarify what, for whom and how much cognitive remediation would be reasonable and necessary under the NDIS.

# 4. References


1. Bowie CR, Bell MD, Fiszdon JM, et al. Cognitive remediation for schizophrenia: An expert working group white paper on core techniques. *Schizophr Res*. Jan 2020;215:49-53. doi:10.1016/j.schres.2019.10.047
2. Hayes L, Brophy L, Harvey C, Tellez JJ, Herrman H, Killackey E. Enabling choice, recovery and participation: evidence-based early intervention support for psychosocial disability in the National Disability Insurance Scheme. *Australas Psychiatry*. Dec 2018;26(6):578-585. doi:10.1177/1039856218759407
3. Keshavan MS, Vinogradov S, Rumsey J, Sherrill J, Wagner A. Cognitive training in mental disorders: update and future directions. *Am J Psychiatry*. May 2014;171(5):510-22. doi:10.1176/appi.ajp.2013.13081075
4. McGurk SR, Mueser KT, Feldman K, Wolfe R, Pascaris A. Cognitive training for supported employment: 2-3 year outcomes of a randomized controlled trial. *Am J Psychiatry*. Mar 2007;164(3):437-41. doi:10.1176/ajp.2007.164.3.437
5. Bowie CR, McGurk SR, Mausbach B, Patterson TL, Harvey PD. Combined cognitive remediation and functional skills training for schizophrenia: effects on cognition, functional competence, and real-world behavior. *Am J Psychiatry*. Jul 2012;169(7):710-8. doi:10.1176/appi.ajp.2012.11091337
6. McGurk SR, Mueser KT, Xie H, et al. Cognitive Enhancement Treatment for People With Mental Illness Who Do Not Respond to Supported Employment: A Randomized Controlled Trial. *Am J Psychiatry*. Sep 1 2015;172(9):852-61. doi:10.1176/appi.ajp.2015.14030374
7. Medalia A, Herlands T, Saperstein A, Revheim N. *Cognitive Remediation for Psychological DisordersTherapist Guide: Therapist Guide*. Oxford University Press; 2017.
8. Medalia A, Saperstein AM, Erlich MD, Sederer LI. Cognitive remediation in large systems of psychiatric care. *CNS Spectr*. May 2 2018:1-11. doi:10.1017/S1092852918000822
9. Vita A, Barlati S, Ceraso A, et al. Effectiveness, Core Elements, and Moderators of Response of Cognitive Remediation for Schizophrenia: A Systematic Review and Meta-analysis of Randomized Clinical Trials. *JAMA Psychiatry*. Apr 20 2021;doi:10.1001/jamapsychiatry.2021.0620
10. Lejeune JA, Northrop A, Kurtz MM. A Meta-analysis of Cognitive Remediation for Schizophrenia: Efficacy and the Role of Participant and Treatment Factors. *Schizophr Bull*. Mar 27 2021;doi:10.1093/schbul/sbab022
11. van Duin D, de Winter L, Oud M, Kroon H, Veling W, van Weeghel J. The effect of rehabilitation combined with cognitive remediation on functioning in persons with severe mental illness: systematic review and meta-analysis. *Psychol Med*. Jul 2019;49(9):1414-1425. doi:10.1017/S003329171800418X
12. Allott K, van-der-El K, Bryce S, et al. Compensatory Interventions for Cognitive Impairments in Psychosis: A Systematic Review and Meta-Analysis. *Schizophr Bull*. Jul 8 2020;46(4):869-883. doi:10.1093/schbul/sbz134
13. Tamura JK, Carvalho IP, Leanna LMW, et al. Management of cognitive impairment in bipolar disorder: a systematic review of randomized controlled trials. *CNS Spectr*. Jan 28 2021:1-22. doi:10.1017/S1092852921000092
14. Dandil Y, Smith K, Kinnaird E, Toloza C, Tchanturia K. Cognitive Remediation Interventions in Autism Spectrum Condition: A Systematic Review. *Front Psychiatry*. 2020;11:722. doi:10.3389/fpsyt.2020.00722

15. Nimmo-Smith V, Merwood A, Hank D, et al. Non-pharmacological interventions for adult ADHD: a systematic review. *Psychol Med*. Mar 2020;50(4):529-541. doi:10.1017/S0033291720000069