creyos

Condition-Based Research Guide

Research linking Creyos cognitive tasks to health conditions.

Quickly gain validated and powerful brain health insights.

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Background, Introduction, and Instructions

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Where to find what you're looking for.

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Conditions	• Alzheimer's (Early) • Dementia (Non-Alzheimer's) • Menopause • Mild Cognitive Impairment (MCI) (Age-Related Decline) • Sleep • Stress	• ADHD • Autism • Dyslexia	• COVID-19 • Epilepsy • Fibromyalgia • Huntington's Disease • Lyme Disease • Multiple Sclerosis • Parkinson's Disease	• Chronic Pain • Concussion • Frontal Lobe • Stroke • Temporal Lobe	• Addiction & Drug Abuse • Alcohol Abuse • Anxiety • Bipolar Disorder • Cannabis • Depression • PTSD • Schizophrenia	• Abbreviated Battery • Youth Battery
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B - Introduction

Using this guide

Many health conditions have cognitive symptoms. This guide summarizes research on the connection between key conditions and each Creyos cognitive task.

What this guide may be useful for:

- Finding research on the association between cognition and a particular health condition.
- Determining if a patient's cognitive deficits are typical of a diagnosis.
- Hypothesizing about which conditions or lifestyle factors to focus on in order to explain or treat specific cognitive deficits.
- Narrowing down a battery of tasks to the ones most likely to improve as a result of treating a known diagnosis.

Creyos recommends administering as many tasks as possible in order to gain a full picture of a patient's health, determine if deficits are specific to certain cognitive domains, and identify strengths as well as weaknesses. For example, when a patient has taken all of the Creyos cognitive tasks, then a clinician may note if the patient's weakest scores match up with areas typically impaired by a suspected diagnosis. A shorter battery may be appropriate, however, when more information is already known about the patient, or administering a longer battery is impractical.

This guide should *not* be solely relied upon for diagnosing a condition based on cognitive symptoms. Each individual's pattern of cognitive strengths and weaknesses is determined by multiple factors. Most conditions cannot be diagnosed based on cognitive deficits alone, and require additional patient information to be gathered, such as self-reported symptoms, patient interviews, physical tests, and direct observation.

Interpreting the research

Research is represented in tables linking each condition with each Creyos cognitive task.

A checkmark indicates that scientific studies have shown a difference between people diagnosed with the condition compared to people not diagnosed with the condition.

Additional details are included in the tables:

- **A green checkmark** ✔ indicates that individuals with the condition perform differently from controls on the Creyos task.
- **A blue checkmark** ✔ indicates that individuals with the condition perform differently from controls in the area of cognition measured by the Creyos task (but no research used the Creyos task specifically).
- **A blank entry with an X** ☒ indicates that there is research involving individuals with the condition, but they do not perform differently from controls in the area of cognition measured by the Creyos task.
- **A blank entry** ☐ indicates that no research could be found linking the condition with the area of cognition.

Footnotes provide clarification on some entries.

References supporting each entry are included in Section III below, which can also be reached by clicking on the name of a condition within a table. When possible, research focuses on meta-analyses and reviews aggregating results from multiple studies to confirm or rule out a connection between the condition and the area of cognition.

Many cognitive symptoms are also dependent on age, context, comorbidities, and other factors. The tables below can be thought of as the areas of cognition likely to be associated with a condition across a wide range of patients. Additional information to help interpret connections between each condition and cognition are included alongside the references in Section III.

Finding more information

For additional information on each cognitive task, including example everyday activities that may be affected by deficits, see Creyos Cognitive Task Descriptions and Example Activities.

Other resources that may complement this guide include:

- Creyos Health Report Interpretation Guide
- Creyos Brain Regions Guide
- Creyos Science Overview

Section II

Conditions, Disorders, and Protocols

C - Aging and Lifestyle

Condition	Digit Span	Double Trouble	Feature Match	Grammatical Reasoning	Number Ladder	Odd One Out	Paired Associates	Polygons	Rotations	Spatial Planning	Spatial Span	Token Search
Alzheimer's Disease (Early)	✓	✓	✓	✓	✓		✓	✓			✓	
Dementia (Non-Alzheimer's)	✓		✓		✓		✓	✓		✓	✓	
Menopause	✗	✓	✗		✗	✓	✓	✗	✗	✓	✗	✗
Mild Cognitive Impairment & Age-Related Decline	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sleep	✗	✓	✗	✓	✗	✓	✗	✓	✓	✓	✗	✓
Stress	✗	✓*	✓		✓*		✓*					✓*

✗ Not related with condition

☐ Unknown; insufficient research

✓ Individuals with the condition perform differently from controls on the Creyos task

✓ Individuals with the condition perform differently from controls in the area of cognition measured by the Creyos task

* In some cases, milder stress can *improve* performance

D - Developmental Disorders

Condition	Digit Span	Double Trouble	Feature Match	Grammatical Reasoning	Number Ladder	Odd One Out	Paired Associates	Polygons	Rotations	Spatial Planning	Spatial Span	Token Search
Attention Deficit Hyperactivity Disorder	✓	✓	✓	✗	✓	✗		✗	✓	✓	✓	✓
Autism	✓*	✓		✓	✓	✓			✓*	✓		✓
Dyslexia	✓	✓		✓		✓						

✗ Not related with condition

☐ Unknown; insufficient research

✓ Individuals with the condition perform differently from controls on the Creyos task

✓ Individuals with the condition perform differently from controls in the area of cognition measured by the Creyos task

* Patients with autism may score *higher* on this task, depending on factors such as sex and context

E - Diseases and Neurological Disorders

Condition	Digit Span	Double Trouble	Feature Match	Grammatical Reasoning	Number Ladder	Odd One Out	Paired Associates	Polygons	Rotations	Spatial Planning	Spatial Span	Token Search
COVID-19	✗	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	
Epilepsy		✓		✓		✓						
Fibromyalgia	✗	✓	✓	✗	✓		✗	✗	✓	✗	✓	✓
Huntington's Disease		✓	✓							✓	✓	✓
Lyme Disease	✗	✗	✗	✗	✗		✗	✗			✗	✗
Multiple Sclerosis	✗	✓	✓	✗	✓		✓	✓	✓	✓	✗	✓
Parkinson's Disease		✓	✓	✓			✓	✓		✓	✓	✓

✗ Not related with condition

☐ Unknown; insufficient research

✓ Individuals with the condition perform differently from controls on the Creyos task

✓ Individuals with the condition perform differently from controls in the area of cognition measured by the Creyos task

F - Injury and Pain

Condition	Digit Span	Double Trouble	Feature Match	Grammatical Reasoning	Number Ladder	Odd One Out	Paired Associates	Polygons	Rotations	Spatial Planning	Spatial Span	Token Search
Brain Injury: Frontal Lobe		✓		✓		✓	✓			✓	✓	✓
Brain Injury: Temporal Lobe							✓					✓
Chronic Pain	✗	✓	✓		✓	✗	✗	✓	✗	✗	✗	✓
Concussion		✓	✓		✓	✓	✓			✓	✓	✓
Stroke		✓		✓	✓		✓	✓				✓

✗ Not related with condition

☐ Unknown; insufficient research

✓ Individuals with the condition perform differently from controls on the Creyos task

✓ Individuals with the condition perform differently from controls in the area of cognition measured by the Creyos task

G - Mental Health and Addiction

Condition	Digit Span	Double Trouble	Feature Match	Grammatical Reasoning	Number Ladder	Odd One Out	Paired Associates	Polygons	Rotations	Spatial Planning	Spatial Span	Token Search
Addiction & Drug Abuse	✗	✓	✓		✓		✓	✓		✓		✓
Alcohol Abuse	✓	✓	✓				✓	✓			✓	✓
Anxiety	✗	✗	✗	✗	✓	✗	✗	✗	✗	✓	✓	✓
Bipolar Disorder	✓	✓	✗		✓	✓	✓	✓	✓	✓	✓	✓
Cannabis Abuse	✗	✓	✓				✓	✗		✓	✗	✓
Depression	✓	✓		✓		✓	✓			✓		✓
Post-Traumatic Stress Disorder	✓	✓		✓		✓						✓
Schizophrenia	✓	✓				✓				✓	✓	✓

✗ Not related with condition

☐ Unknown; insufficient research

✓ Individuals with the condition perform differently from controls on the Creyos task

✓ Individuals with the condition perform differently from controls in the area of cognition measured by the Creyos task

H - Situation-Specific Protocols

Condition	Digit Span	Double Trouble	Feature Match	Grammatical Reasoning	Number Ladder	Odd One Out	Paired Associates	Polygons	Rotations	Spatial Planning	Spatial Span	Token Search
Abbreviated Battery	✓	✗	✗	✓	✓	✓	✓	✗	✓	✗	✗	✗
Youth Battery	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓

✗ Not included in battery

✓ Included in the battery

Section III

Additional Information and References

I - Additional Information and References

References supporting the connections between cognition and each condition are listed below, by condition, in alphabetical order. Notes about details, exceptions, or nuances related to each connection are also included.

Abbreviated Battery

The abbreviated battery contains tasks closely aligned with the short-term memory, reasoning, and verbal ability domains of cognition. It can be used when administering all 12 tasks is not practical, but a broad assessment of various domains of cognition is still needed. This set of tasks has been called the “CBS-6” in several scientific studies, where it has been used in patients where fatigue may be an issue, such as critical illness survivors, and found to be feasible to administer to these populations. Note that the abbreviated battery does not contain any attention-specific tasks.

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- Paleczny, S. G. (2023). Neuropsychological outcomes after cardiac surgery: A pilot feasibility study. *Electronic Thesis and Dissertation Repository, 9460.* https://ir.lib.uwo.ca/etd/9460

Addiction & Drug Abuse

Research focuses on the relationship between cognition and addiction, characteristics of people in treatment for addiction, chronic drug abuse and substance use disorder. In general, drug addiction may most commonly affect functions of inhibitory control, working memory and decision making. For alcoholism or cannabis use, see the separate entries in this guide. Self-report data can also be gathered to complement cognitive assessments using the Drug Abuse Screening Test (DAST-10), also available in Creyos Health.

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Alcoholism

Research focuses on cognitive effects of long-term alcohol abuse, overuse, and performance of those in treatment for alcoholism. Research indicates widespread effects on most aspects of core cognition, including memory, attention, and executive function. However, for many deficits, recovery may be possible with continued sobriety. Self-report data can also be gathered to complement cognitive assessments using the Alcohol Use Disorders Identification Test (AUDIT), also available in Creyos Health.

- Haberstroh, C., Weider, S., Flemmen, G., Loe, H., Andersson, H. W., Hallgren, M., & Mosti, M. P. (2022). The effect of high-intensity interval training on cognitive function in patients with substance use disorder: Study protocol for a two-armed randomized controlled trial. *Frontiers in Sports and Active Living, 4,* 470. https://doi.org/10.3389/fspor.2022.954561
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Alzheimer's Disease

Alzheimer's disease is sometimes seen as a problem with memory, but it can affect a wide variety of cognitive domains. Early signs of Alzheimer's disease may manifest as a decline in any domain, but the tasks listed here have demonstrated a clear association in studies. See separate entries on non-Alzheimer's dementia and mild cognitive impairment for related research. The Instrumental Activities of Daily Living (IADL) questionnaire, also available in Creyos Health, can be used to gather self-report or informant data that complement cognitive assessments when examining patients concerned with age-related cognitive decline.

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Anxiety

Anxiety here refers to generalized anxiety disorder. For post-traumatic stress disorder or temporary high stress, see the separate entries in this guide. The relationship between anxiety and cognition can be subtle or context-dependent, but some areas of cognition do seem to be consistently impaired in individuals with high trait anxiety. Self-report data can also be gathered using the General Anxiety Disorder (GAD-7) questionnaire, also available in Creyos Health, to complement cognitive assessments.

- Afshari, B., Jafarian Dehkordi, F., Asgharnejad Farid, A. A., Aramfar, B., Balagabri, Z., Mohebi, M., Mardi, N., & Amiri, P. (2022). Study of the effects of cognitive behavioral therapy versus dialectical behavior therapy on executive function and reduction of symptoms in generalized anxiety disorder. *Trends in Psychiatry and Psychotherapy, 44.* https://doi.org/10.47626/2237-6089-2020-0156

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Attention Deficit Hyperactivity Disorder (ADHD)

Attention deficits are a defining feature of ADHD, but aspects of executive function may also be impaired. Research on ADHD often focuses on children, but deficits may continue into adulthood. Creyos Health contains additional features to assist with assessing ADHD that go beyond overall cognitive task scores. Self-report data and questionnaires from parents or teachers can also be used to complement cognitive assessments. The Adult ADHD Self-Report Scale (ASRS v1.1 Part A), Strengths and Weaknesses of ADHD Symptoms and Normal Behavior Scale (SWAN) and Vanderbilt ADHD Diagnostic Rating Scale (VADRS) are also available in Creyos Health.

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Autism

Consistent deficits and strengths in autistic patients can be difficult to identify, as individuals with autism spectrum disorders represent a heterogenous group. A wide range of verbal skills, social skills, and comorbidities (especially ADHD) can be found in people diagnosed with autism. Sex differences may also arise when comparing individuals with autism to typically developing controls —for example, mental rotation is typically higher in males, but this difference may not exist among autistic individuals. Similarly, some differences seen in younger individuals with autism may disappear when assessing older individuals. Therefore, the general connections with autism identified in this guide's table should be considered tentative links that may not apply to a specific patient. Self-report data can also be gathered using the Autism Spectrum Quotient (AQ) questionnaire, also available in Creyos Health, to complement cognitive assessments.

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Bipolar Disorder

Research on bipolar disorder was focused on patients in a euthymic state (i.e., a stable period). Cognitive deficits seen in bipolar disorder tend to be non-specific and/or heterogeneous, affecting multiple domains. The Mood Disorder Questionnaire (MDQ), also available in Creyos Health, can be used to gather self-report data that complement cognitive assessments.

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Brain Injury: Frontal Lobe

Cognitive deficits due to brain injury can depend on the nature, severity, and location of the injury. Most of the Creyos cognitive tasks recruit frontal regions, and have been used to study the role of

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Brain Injury: Temporal Lobe

Cognitive deficits due to brain injury can depend on the nature, severity, and location of the injury. While many of the Creyos cognitive tasks recruit frontal regions, temporal lobe injuries can affect different tasks or different aspects of each task. The Rivermead Post-Concussion Symptoms Questionnaire (RPQ) is also available in Creyos Health, and can be used to gather self-report data that complement cognitive assessments for patients with head injuries.

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Cannabis Use

Research focuses on the effects of long-term, chronic cannabis use on cognitive function. Most studies have reported widespread effects on neurocognitive function, although some report no substantial relationship. Greater adverse effects may be associated with cannabis use in adolescence.

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Chronic Pain

The relationship between pain and cognition can be complex. Chronic pain may have a variety of causes, but pain is often considered a disease in itself. Where possible, this summary focuses on the direct cognitive effects of chronic pain, rather than related factors such as medication side effects. However, medication effects cannot be ruled out in every study.

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Concussion

Cognitive deficits due to brain injury can depend on the nature, severity, and location of the injury, especially when examining acute or short-term effects. Long-term effects tend to be more subtle, but can be detected in some cognitive tasks, such as the Creyos Double Trouble measure of response inhibition. The Rivermead Post-Concussion Symptoms Questionnaire (RPQ) is also available in Creyos Health, and can be used to gather self-report data that complement cognitive assessments.

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COVID-19

Results focus on the long term effects of a previous COVID infection, known as post-COVID or long COVID. The COVID-19 pandemic is recent, ongoing, and evolving as of the time of this writing, so all research must be considered early results that may change with further research.

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Dementia (Non-Alzheimer's)

This research focuses on non-Alzheimer's dementia—primarily Lewy body dementia. See separate entries on Alzheimer's and mild cognitive impairment for related research. The Instrumental Activities of Daily Living (IADL) questionnaire, also available in Creyos Health, can be used to gather self-report or informant data that complements cognitive assessments when examining patients concerned with age-related cognitive decline.

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Depression

Depression is linked with several areas of cognition. Research has shown that not only does depression lead to cognitive deficits, but cognitive deficits may be a risk factor for depression as well. The Patient Health Questionnaire (PHQ-9), also available in Creyos Health, can be used to gather self-report data about depressive symptoms that complement cognitive assessments.

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- Desai, R., Charlesworth, G. M., Brooker, H. J., Potts, H. W., Corbett, A., Aarsland, D., & Ballard, C. G. (2020). Temporal relationship between depressive symptoms and cognition in mid and late life: a longitudinal cohort study. *Journal of the American Medical Directors Association, 21,* 1108-1113. https://doi.org/10.1016/j.jamda.2020.01.106
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Dyslexia

People with dyslexia may struggle with executive function tasks not directly related to reading. Most research on dyslexia involves children.

- Faccioli, C., Peru, A., Rubini, E., & Tassinari, G. (2008). Poor readers but compelled to read: Stroop effects in developmental dyslexia. *Child Neuropsychology, 14,* 277-283. https://doi.org/10.1080/09297040701290040
- Gray, S. (2006). The relationship between phonological memory, receptive vocabulary, and fast mapping in young children with specific language impairment. *Journal of Speech, Language, and Hearing Research, 49,* 955-969. https://doi.org/10.1044/1092-4388(2006/069)
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- Reiter, A., Tucha, O., & Lange, K. W. (2004). Executive functions in children with dyslexia. *Dyslexia, 11,* 116-131. https://doi.org/10.1002/dys.289

Epilepsy

Cognitive profiles in people with epilepsy differ by patient, so links identified here are tentative. Chronic epilepsy appears to impair cognition, but the nature of impairments may depend on the areas of the brain affected, as well as reorganization, behavioral compensation, and surgery.

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Fibromyalgia

Research on fibromyalgia and cognition is often inconsistent, but some domains do seem to be consistently impaired in patients. Pain is a defining feature of fibromyalgia, so there is overlap with the entry on chronic pain, but fibromyalgia may have unique cognitive symptoms. Note that most research involved female participants, as fibromyalgia is much more common in women than in men.

- Bell, T., Trost, Z., Buelow, M. T., Clay, O., Younger, J., Moore, D., & Crowe, M. (2018). Meta-analysis of cognitive performance in fibromyalgia. *Journal of Clinical and Experimental Neuropsychology, 40,* 698-714. https://doi.org/10.1080/13803395.2017.1422699

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- Jacobsen, H. B., Brun, A., Stubhaug, A., & Reme, S. E. (2023). Stress specifically deteriorates working memory in peripheral neuropathic pain and fibromyalgia. *Brain Communications, 5,* fcad194. https://doi.org/10.1093/braincomms/fcad194
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Huntington's Disease

Early versions of the Creyos tasks were used to identify specific deficits in patients with Huntington's disease.

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- Swerdlow, N. R., Paulsen, J., Braff, D. L., Butters, N., Geyer, M. A., & Swenson, M. R. (1995). Impaired prepulse inhibition of acoustic and tactile startle response in patients with Huntington's disease. *Journal of Neurology, Neurosurgery & Psychiatry, 58,* 192-200. https://doi.org/10.1136/jnnp.58.2.192

Lyme Disease

Lyme has been considered a neuropsychiatric condition, and recommended to be considered as part of mental health evaluations (Fallon & Neilds 1994). However, objective cognitive impairments can be inconsistent, with only a few areas of cognition verified to be impaired in patients with Lyme disease.

- Bechtold, K. T., Rebman, A. W., Crowder, L. A., Johnson-Greene, D., & Aucott, J. N. (2017). Standardized symptom measurement of individuals with early Lyme disease over time. *Archives of Clinical Neuropsychology, 32,* 129-141. https://doi.org/10.1093/arclin/acw098
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- Kaplan, R. F., Trevino, R. P., Johnson, G. M., Levy, L., Dornbush, R., Hu, L. T., ... & Klempner, M. S. (2003). Cognitive function in post-treatment Lyme disease Do additional antibiotics help? *Neurology, 60,* 1916-1922. https://doi.org/10.1212/01.WNL.0000068030.26992.25
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- Keilp, J. G., Corbera, K., Slavov, I., Taylor, M. J., Sackeim, H. A., & Fallon, B. A. (2006). WAIS-III and WMS-III performance in chronic Lyme disease. *Journal of the International Neuropsychological Society, 12,* 119-129. https://doi.org/10.1017/S1355617706060231
- Shadick, N. A., Phillips, C. B., Logigian, E. L., Steere, A. C., Kaplan, R. F., Berardi, V. P., ... & Liang, M. H. (1994). The long-term clinical outcomes of Lyme disease: A population-based retrospective cohort study. *Annals of Internal Medicine, 121,* 560-567. https://doi.org/10.7326/0003-4819-121-8-199410150-00002
- Vázquez, M., Sparrow, S. S., & Shapiro, E. D. (2003). Long-term neuropsychologic and health outcomes of children with facial nerve palsy attributable to Lyme disease. *Pediatrics, 112,* e93-e97. https://doi.org/10.1542/peds.112.2.e93
- Zotter, S., Koch, J., Schlachter, K., Katzensteiner, S., Dorninger, L., Brunner, J., Baumann, M., Wolf-Magele, A., Schmid, H., Ulmer, H., Hagspiel, S., & Rostasy, K. (2013). Neuropsychological profile of children after an episode of neuroborreliosis. *Neuropediatrics, 44,* 346–353. https://doi.org/10.1055/s-0033-1349724

Menopause

The relationships between menopause and cognitive function are generally poorly understood. Reviews tend to find that menopause itself has subtle or temporary effects on cognition, and no consistent relationship with the risk for dementia (Pertesi et al., 2019). Similarly, hormone replacement therapy (HRT) tends to improve performance in some areas of cognition, but results may be inconsistent.

- Duff, S. J., & Hampson, E. (2000). A beneficial effect of estrogen on working memory in postmenopausal women taking hormone replacement therapy. *Hormones and Behavior, 38*, 262-276. https://doi.org/10.1006/hbeh.2000.1625
- Georgakis, M. K., Beskou-Kontou, T., Theodoridis, I., Skalkidou, A., & Petridou, E. T. (2019). Surgical menopause in association with cognitive function and risk of dementia: A systematic review and meta-analysis. *Psychoneuroendocrinology, 106,* 9-19. https://doi.org/10.1016/j.psyneuen.2019.03.013

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- Rice, K., & Morse, C. (2003). Measuring cognition in menopause research: A review of test use. *Climacteric, 6,* 2-22. https://doi.org/10.1080/cmt.6.1.2.22

Mild Cognitive Impairment (MCI) & Age-Related Decline

Performance on almost all cognitive tasks consistently declines after middle age, and may assist in identifying early or mild impairment in multiple domains. Creyos Health contains additional features for identifying MCI according to established diagnostic guidelines. See the entries for Alzheimer's disease and non-Alzheimer's dementia for related references. The Instrumental Activities of Daily Living (IADL) questionnaire, also available in Creyos Health, can be used to gather self-report or informant data that complement cognitive assessments when examining patients concerned with age-related cognitive decline.

- Ala, T. A., Hughes, L. F., Kyrouac, G. A., Ghobrial, M. W., & Elble, R. J. (2001). Pentagon copying is more impaired in dementia with Lewy bodies than in Alzheimer's disease. *Journal of Neurology, Neurosurgery & Psychiatry, 70,* 483-488. https://doi.org/10.1136/jnnp.70.4.483
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- Bélanger, S., Belleville, S., & Gauthier, S. (2010). Inhibition impairments in Alzheimer's disease, mild cognitive impairment and healthy aging: Effect of congruency proportion in a Stroop task. *Neuropsychologia, 48,* 581-590. https://doi.org/10.1016/j.neuropsychologia.2009.10.021

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Multiple Sclerosis

Multiple Sclerosis (MS) patients may show consistent impairment on some domains of cognition such as response inhibition, memory, and processing speed. However, it may be the case that this impaired performance reflects slower task performance and therefore a reduced amount of item completion within a set amount of time. The subtype of MS may also affect the presence or severity of impairment.

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Parkinson's Disease

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Post-Traumatic Stress Disorder (PTSD)

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Schizophrenia

Cognitive impairment is closely linked with schizophrenia, and may even act as an early warning sign of a diagnosis. Specific areas have been shown to be impaired in patients with schizophrenia, but some researchers propose that impairments are global, affecting many or most domains of cognition.

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Sleep

Research suggests a relationship between sleep and cognition, outlined primarily in a large-scale study that found cognitive performance measured by the Creyos battery was lower in individuals deviating from 7-8 hours of sleep per night (Wild et al., 2018).

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Stress

It is important to distinguish multiple aspects of stress, including (1) acute stress (short-term or induced in a lab setting), (2) perceived stress (everyday life stressors), and (3) chronic stress (long-term), as the effect of stress on cognition depends on the type of stress endured. For example, acute high stress may impair response inhibition or working memory; however, milder forms of stress may actually improve task performance and some aspects of memory in certain situations. Long-term perceived stress may also impair aspects of memory such as episodic and spatial working memory, although effects are context- and patient-dependent. For PTSD, see the separate entry in this guide. The Perceived Stress Scale (PSS) questionnaire, also available in Creyos Health, can be used to gather self-report data that complement cognitive assessments.

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Stroke

Stroke often leads to cognitive symptoms. The nature of impairments may depend on the type of stroke, the parts of the brain affected, severity, and other symptoms experienced (such as spatial neglect). See sections on brain injury and concussion for additional information about impairments directly attributable to brain damage.

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Youth Battery

The tasks included in the youth battery are most appropriate for younger children. In a study with children aged 4 to 11 with and without neurodevelopmental disorders, these tasks were well received by most children. Younger children (4-6) may require additional explanation of the rules and a demonstration of how to input their answers. Children may also be susceptible to losing focus over time, so shorter batches of 4 to 6 tasks at a time are recommended.

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