NEUROLOGICAL DISORDERS AND THE DECLINE OF EXECUTIVE FUNCTIONS IN ADULTS AND THE ELDERLY

AFECÇÕES NEUROLÓGICAS E O DECLÍNIO DAS FUNÇÕES EXECUTIVAS NO ADULTO E NO IDOSO

TRASTORNOS NEUROLÓGICOS Y DETERIORO DE LAS FUNCIONES EJECUTIVAS EN ADULTOS Y ANCIANOS

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ABSTRACT

This study aimed to analyze the main neurological conditions associated with the decline of executive functions in adults and the elderly, with an emphasis on characteristic neuropsychological signs and symptoms. It is an integrative literature review, with a systematic search in the PubMed/MEDLINE, SciELO, LILACS, and PsycINFO databases, including articles published between 2015 and 2025. The results demonstrated that dementia syndromes (Alzheimer's disease and frontotemporal dementia), cerebrovascular diseases (stroke and small vessel disease), and neurodegenerative diseases (Parkinson's disease) represent the most prevalent conditions associated with executive impairment. Distinct neuropsychological patterns were identified: in Alzheimer's disease, deficits in complex tasks predominate; in frontotemporal dementia, disinhibition and judgment impairment stand out; in stroke, focal deficits are observed according to the lesion location; and in Parkinson's disease, bradyphrenia and difficulty switching between tasks predominate. In conclusion, early recognition of these patterns is fundamental for differential diagnosis, intervention planning, and preservation of functionality, contributing to improved quality of care in neuropsychology.

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Keywords: Executive Functions. Nervous System Diseases. Neuropsychology. Elderly.

RESUMO

O presente estudo teve como objetivo analisar as principais afecções neurológicas associadas ao declínio das funções executivas em adultos e idosos, com ênfase nos sinais e sintomas neuropsicológicos característicos. Trata-se de uma revisão integrativa da literatura, com busca sistemática nas bases PubMed/MEDLINE, SciELO, LILACS e PsycINFO, incluindo artigos publicados entre 2015 e 2025. Os resultados demonstraram que as síndromes demenciais (Doença de Alzheimer e Demência Frontotemporal), doenças cerebrovasculares (AVC e doença de pequenos vasos) e doenças neurodegenerativas (Doença de Parkinson) representam as condições mais prevalentes associadas ao comprometimento executivo. Foram identificados padrões neuropsicológicos distintos: na Doença de Alzheimer predominam déficits em tarefas complexas; na Demência Frontotemporal destacam-se desinibição e alterações de julgamento; no AVC observam-se déficits focais conforme a localização da lesão; e na Doença de Parkinson predominam bradifrenia e dificuldade de alternância de tarefas. Conclui-se que o reconhecimento precoce desses padrões é fundamental para o diagnóstico diferencial, planejamento de intervenções e preservação da funcionalidade, contribuindo para a melhoria da qualidade do cuidado em neuropsicologia.

Palavras-chave: Funções Executivas. Doencas do Sistema Nervoso. Neuropsicologia. Idoso.

RESUMEN

Este estudio tuvo como objetivo analizar las principales afecciones neurológicas asociadas con el deterioro de las funciones ejecutivas en adultos y ancianos, con énfasis en los signos y síntomas neuropsicológicos característicos. Se trata de una revisión bibliográfica integradora, con una búsqueda sistemática en las bases de datos PubMed/MEDLINE, SciELO, LILACS y PsycINFO, incluyendo artículos publicados entre 2015 y 2025. Los resultados demostraron que los síndromes de demencia (enfermedad de Alzheimer y demencia frontotemporal), las enfermedades cerebrovasculares (ictus y enfermedad de pequeños vasos) y las enfermedades neurodegenerativas (enfermedad de Parkinson) representan las afecciones más prevalentes asociadas con el deterioro de las funciones ejecutivas. Se identificaron patrones neuropsicológicos distintos: en la enfermedad de Alzheimer, predominan los déficits en tareas complejas; en la demencia frontotemporal, destacan la desinhibición y el deterioro del juicio; en el ictus, se observan déficits focales según la localización de la lesión; y en la enfermedad de Parkinson, predominan la bradifrenia y la dificultad para cambiar entre tareas. En conclusión, el reconocimiento precoz de estos patrones es fundamental para el diagnóstico diferencial, la planificación de la intervención y la preservación de la funcionalidad, lo que contribuye a mejorar la calidad de la atención en neuropsicología.

Palabras clave: Funciones Ejecutivas. Enfermedades del Sistema Nervioso. Neuropsicología. Personas Mayores.

1 INTRODUCTION

The present study focuses on the neurological alterations that affect the adult and elderly population, particularly with regard to the decline of executive functions (EFs). These higher-order cognitive functions - encompassing planning, working memory, inhibitory control and cognitive flexibility - are fundamental for autonomy, adaptation to new situations and maintenance of quality of life. Its deterioration is a significant and often early marker in a range of neurological conditions, thus representing a central axis for clinical evaluation and intervention (Diamond, 2013; Lezak et al., 2012).

A milestone in the conceptualization of these skills is offered by Diamond (2013), who defines them as a set of top-down cognitive processes essential for situations in which automatic behavior is insufficient or inappropriate. The author summarizes the existence of three central components of EFs, widely accepted in the literature: inhibitory control (which encompasses self-control to resist temptations and interference control to focus attention selectively), working memory (ability to maintain and manipulate information mentally) and cognitive flexibility (ability to change perspective or adapt to new demands). From these central components, higher-order executive functions are built, such as reasoning and problem solving, directly related to fluid intelligence (Diamond, 2013). This conceptual framework provides a solid basis for understanding how the impairment of these specific processes manifests itself in the various neurological conditions.

Population aging, a global phenomenon also observed in Brazil, has increased the prevalence of chronic and degenerative neurological diseases. Conditions such as Alzheimer's Disease, Cerebrovascular Accident (CVA), Parkinson's Disease, and other dementias represent important challenges for public health, not only because of their high incidence, but also because of the functional and psychosocial impact they have (Brasil, 2022; World Health Organization, 2021). In this context, early identification of signs and symptoms of impairment of executive functions becomes essential for differential diagnosis and intervention planning.

The relevance of this theme is justified by the lack of integrative reviews that synthesize, in a clear and up-to-date way, the evidence on the main neurological syndromes that affect executive functions in adults and the elderly. Understanding these relationships contributes both to the clinical practice of health professionals and to the direction of new research. Based on this assumption, the question that guides this investigation is formulated: What are the main neurological conditions that cause decline in executive functions in adults and the elderly, and what are the associated neuropsychological signs and symptoms?

As a hypothesis, it is considered that conditions such as dementia, stroke, and

demyelinating diseases are among those that most compromise executive functions, manifesting themselves through symptoms such as disorganization, difficulty in solving problems, impulsivity, and impaired attentional control.

In view of the above, the general objective of this article is to know the main neurological conditions that affect adults and the elderly, with emphasis on the signs and symptoms related to executive function disorders. The specific objectives are: to identify the most frequent neurological syndromes associated with executive decline; describe the main neuropsychological signs and symptoms present in these conditions and discuss the clinical and therapeutic implications based on the evidence collected.

The present integrative literature review aims, therefore, to offer an updated and critical synthesis of the knowledge produced on the subject, serving as a support tool for professionals, students and researchers interested in the interface between neurology and neuropsychology.

2 NEUROANATOMICAL CORRELATES OF EXECUTIVE FUNCTIONS AND THE IMPACT OF AGING

Beyond the classical conceptualization, EFs are underpinned by a complex and distributed neural architecture. The understanding of neural substrates has evolved from a view centered on the prefrontal cortex (PFC) to a model based on large-scale distributed networks (Pessoa, 2014; Seeley et al., 2007). Among these, the Executive Control Network (also called the Frontoparietal Network), involving the dorsolateral prefrontal cortex and the posterior parietal cortex, is fundamental for processes such as maintenance and manipulation of information in working memory, abstract reasoning, and problem solving (Miyake et al., 2000; Duncan, 2010). In parallel, the Salishence Network, which includes the anterior insula and the anterior cingulate cortex, is crucial for the detection of relevant stimuli and the initiation of cognitive control, acting as a "switch" that switches between the Default Mode Network and the Executive Control Network (Seeley et al., 2007; Menon; Uddin, 2010).

The interdependence between these core components is a crucial point. Diamond (2013) points out that working memory and inhibitory control rarely act in isolation, sustaining each other. On the one hand, working memory supports inhibitory control, as it is necessary to keep the objective or rule in mind to know what is relevant and, therefore, what should be inhibited. On the other hand, inhibitory control supports working memory by protecting the mental work space from internal and external distractions, suppressing irrelevant thoughts, and resisting proactive interference from previously learned information. This integrative view helps explain why lesions in seemingly distinct but connected brain regions can result in

complex and overlapping patterns of executive deficit.

The CPF acts as an integration hub within these networks, with sub-regions exhibiting functional specializations. Robust neuroimaging and lesion evidence indicates that the dorsolateral prefrontal cortex is predominantly involved in working memory and abstract reasoning, while the ventromedial prefrontal cortex and the orbitofrontal region are critical for inhibitory control, emotion regulation, and decision-making (Miller; Cohen, 2001; Ridderinkhof et al., 2004). This view is amplified by the understanding that EFs depend on fronto-striatal, frontothalamic and fronto-cerebellar circuits, where the basal ganglia modulate the selection of actions and the cerebellum, which was previously thought to be responsible only for motor coordination, contributes to timing and cognitive fluency (Buckner, 2013; Alexander et al., 1986).

The healthy brain aging process selectively impacts these circuits. Longitudinal MRI studies demonstrate that the prefrontal cortex and hippocampus are among the regions that exhibit the greatest age-related volumetric decline, with a rate of prefrontal gray matter atrophy of approximately 0.5% per year from the 5th decade of life, correlating significantly with poorer performance on planning tasks and mental flexibility (Fjell et al., 2013; Raz et al., 2005). This decline is accompanied by reductions in white matter integrity in the tracts that connect the frontal lobe to the other association areas of the cortex, hindering efficient neural communication (Bennett; Madden, 2014).

However, this decline is not inevitable or uniform. The concept of cognitive reserve proposes that the brain's ability to compensate for pathologies through pre-existing or alternative neural networks modulates the relationship between brain damage and clinical manifestation (Stern, 2002). Factors such as higher education, complex occupational engagement, and participation in intellectually stimulating leisure activities throughout life are associated with better preservation of executive performance in aging, even in the presence of brain changes (Stern, 2009; Valenzuela; Saczynski, 2008). This concept of "cognitive reserve" or individual resilience is supported by neuroplasticity throughout life, which allows functional reorganization and neural compensation, attenuating the impact of structural changes on cognitive performance (Park; Reuter-Lorenz, 2009).

By comparing the evidence presented, it is possible to perceive a conceptual evolution: from a localizationist view of EFs in the PFC to an understanding based on dynamic and distributed neural networks. This multidimensional understanding is essential to contextualize the patterns of executive impairment specific to each neurological condition, which will be discussed in subsequent topics, as the vulnerability of EFs in the elderly cannot be understood only by the location of lesions, but must consider the integrity of complex brain

networks and the biological and psychosocial factors that modulate cognitive resilience.

If, on the one hand, there are these protective factors mentioned above, there are also elements that promote or influence a higher risk of global cognitive dysfunction of these EFs, such as deafness, common and almost physiological, in the advanced age group (Lin et al., 2011).

2.1 NEUROLOGICAL DISORDERS AND THE IMPACT ON EXECUTIVE FUNCTIONS

Executive functions constitute a set of higher-order cognitive processes, responsible for inhibitory control, planning, mental flexibility, working memory, and decision-making. According to Diamond (2013, p. 136), "executive functions are a set of skills that enable goal-oriented behavior and are critical for success in school, work, and social life." The decline in these functions is closely linked to lesions or dysfunctions in the prefrontal and frontosubcortical circuits of the brain (Lezak et al., 2012).

Among the main neurological disorders associated with this decline in the adult and elderly population, dementia syndromes stand out. In Alzheimer's disease (AD), executive impairment is a central component and can be an early marker. Although episodic memory deficit is the most well-known feature, deficits in executive functions, such as difficulty with planning, problem-solving, and inhibitory control, are often present and contribute significantly to functional impairment (Baudic et al., 2006). Studies show that even in preclinical stages, subtle signs of executive impairment can be observed, such as difficulties in managing finances or following complex recipes, reflecting an initial dysfunction of the prefrontal circuits (Marsland et al., 2017).

In contrast to the initial pattern of Alzheimer's, Frontotemporal Dementia (FTD), particularly the behavioral variant, presents with a distinct and devastating profile of executive impairment. This syndrome is characterized by marked personality and behavior changes, including disinhibition, apathy, and loss of empathy, which directly reflect the early and severe degeneration of the frontal lobes and insula (Rascovsky et al., 2011). Patients exhibit an early loss of abstraction, social judgment, and novel problem-solving, with severe impairments in inhibitory control and decision-making (Bang et al., 2015).

Another neurological condition of great relevance is Parkinson's Disease (PD). Although motor symptoms are the hallmark, cognitive deficits are a central non-motor part of the disease. Bradyphrenia (slowness of thought) and difficulty in switching tasks (cognitive flexibility) are among the most common executive deficits and are related to dysfunction of the frontostriatal circuits, resulting from dopaminergic depletion (Kehagia et al., 2010). Although it occurs in the late stage of the disease, this executive impairment can precede

the development of full-blown dementia and is a strong predictor of functional disability, institutionalization, and poorer quality of life (Aydin et al., 2022).

Ischemic or hemorrhagic stroke, when it affects arterial territories that irrigate the frontal lobes or their subcortical circuits (such as the basal ganglia or thalamus), is a frequent cause of acute executive decline. Patients with stroke in the anterior cerebral artery or basal ganglia territories often develop frontal syndromes, characterized by apathy, loss of initiative (abulia), and significant impairments in planning and verbal fluency (Sun et al., 2014). Case-control studies consistently demonstrate that post-stroke individuals perform significantly lower on tests of executive functions, such as verbal fluency and cognitive flexibility, when compared to matched control groups (Pohjasvaara et al., 2002).

By comparing the evidence presented, it is possible to perceive a fundamental conceptual convergence: different neurological disorders, with different etiologies and primary manifestations, share the ability to compromise the neural circuits responsible for executive functions. While AD and FTD highlight progressive patterns of cortical involvement, PD illustrates a neurodegenerative disease with prominent subcortical cognitive impact, and stroke represents an acute and focal vascular cause. The interpretation of this comparison suggests that, regardless of the progressive or acute nature of the neurological condition, the frontal and fronto-subcortical axis is a common neural substrate whose dysfunction manifests itself through the decline of executive functions, reinforcing the centrality of this cognitive domain for the individual's functionality.

3 METHODOLOGY

This study consists of an Integrative Literature Review, a method that allows the synthesis of available evidence on a given topic, integrating studies with different methodological designs for a comprehensive understanding of the phenomenon investigated (Whittemore; Knafl, 2005). This format was selected because it enables the analysis and consolidation of the knowledge produced on the main neurological disorders that impact executive functions in adults and the elderly, providing a solid basis for clinical practice and future research.

The execution of this review strictly followed the five-step methodological framework proposed by Whittemore and Knafl (2005), detailed below:

3.1 IDENTIFICATION OF THE PROBLEM

The initial stage consisted of the clear formulation of the research problem and the guiding question, which was defined as: "What are the main neurological conditions that lead

to a decline in executive functions in adults and the elderly, and what are the associated neuropsychological signs and symptoms?". The definition of the problem guided all subsequent phases of the review.

3.2 SEARCH IN THE LITERATURE

A systematic and comprehensive literature search was conducted between October and November 2025 in the following electronic databases: PubMed/MEDLINE, SciELO, LILACS, and PsycINFO. The search strategy used the Health Sciences Descriptors (DeCS) and their equivalents in Medical Subject Headings (MeSH), combined through the Boolean operators AND and OR. The main terms used were: "Executive Function", "Neurocognitive Disorders", "Aged", "Alzheimer's Disease", "Stroke", "Parkinson's Disease". The following inclusion criteria were established: free full texts, published between 2015 and 2025, in Portuguese and English, which addressed the relationship between neurological disorders and executive functions in the target population. A total of 976 studies focusing on primary psychiatric disorders, paediatric population, or those without full text availability were excluded.

3.3 CRITICAL EVALUATION OF THE DATA

The 74 retrieved studies were exported to the Mendeley reference manager, where duplicates were removed. The selection was carried out in two stages: initial screening by title and abstract, followed by the full reading of potentially relevant articles. Of these, 50 studies were excluded because they did not answer the initial question. After that, 24 studies that met the inclusion criteria were submitted to a critical evaluation of their methodological quality. For this, the instrument that validates different study designs was used, with the CASP (Critical Appraisal Skills Programme) tool for observational studies and clinical trials. This step allowed us to classify the level of evidence for each included study.

3.4 DATA ANALYSIS

The data from the 24 selected studies were extracted and organized in a Microsoft Excel matrix, containing information such as author, year, objectives, study design, population, neuropsychological assessment instruments used, main results, and conclusions about executive functions. The synthesis of the data was conducted in a narrative and thematic way, grouping the evidence according to the neurological conditions identified (e.g., Alzheimer's Disease, Frontotemporal Dementia, Stroke, Parkinson's Disease) and the respective patterns of executive impairment reported.

3.5 PRESENTATION OF RESULTS

The final presentation of the results, which will be detailed in the subsequent topic, organizes the findings in a clear and systematic manner, highlighting the consolidated evidence, the contradictions found in the literature, and the knowledge gaps identified. The discussion integrates this evidence to answer the initial research question, as well as addressing the implications for clinical practice and future investigations.

4 RESULTS AND DISCUSSIONS

The systematic search in the databases resulted in the initial identification of 1,050 studies. After removing duplicates and applying the eligibility criteria, 24 studies were included for data extraction and synthesis. Analysis of these studies revealed consistent patterns regarding the most prevalent neurological conditions associated with declining executive functions in adults and the elderly.

The results of this integrative review show that the impairment of executive functions is a transversal characteristic of several neurological conditions that affect adults and the elderly, corroborating the initial premise that the frontal and fronto-subcortical axis acts as a neural substrate vulnerable to different pathophysiological processes. The consistency and convergence of the findings in the literature analyzed reinforce the clinical relevance of these deficits, which manifest themselves in a distinct but overlapping way between the conditions studied.

By analyzing the patterns of executive impairment in the neurological disorders reviewed, the practical application of the theoretical model proposed by Diamond (2013) becomes evident. The deficits observed can be understood as a selective or combined disruption of the three central components of EFs. For example, the marked disinhibition in FTD reflects a primary breakdown of inhibitory control; difficulty in complex tasks in AD shows an impairment of working memory and reasoning, a higher-order function that depends on it; and bradyphrenia and difficulty in switching tasks in PD are classic manifestations of a deficit in cognitive flexibility. Recognizing these profiles in light of the basic components of EFs not only aids in differential diagnosis, but also directs cognitive rehabilitation strategies to the specific processes most affected.

4.1 DEMENTIA SYNDROMES AND EXECUTIVE IMPAIRMENT

Alzheimer's disease (AD) has been consistently associated with executive impairments, even in preclinical phases. Fundamental studies, such as the Harvard Aging Brain Study, demonstrate that deficits in components of executive functions, including

working memory and inhibitory control, are among the first measurable cognitive signs of neurodegenerative disease, and may precede the diagnosis of dementia by a decade or more (Colliot et al., 2020; Papp et al., 2023). In addition, functional neuroimaging consistently reveals that hypometabolism and atrophy in the dorsolateral prefrontal cortex and posterior cingulate cortex are strongly correlated with performance in complex executive tasks, such as the Track Test - Part B, in preclinical and early-stage AD (Scholl et al., 2016; Buckley et al., 2017; Papp et al., 2023).

The clinical presentation of Alzheimer's disease (AD) can sometimes challenge the typical amnestic paradigm. Case studies and patient series document the existence of an atypical variant of AD, often called dysexecutive variant, in which executive impairment is prominent from the beginning, with relative preservation of episodic memory (Ossenkoppele et al., 2015). MRI and positron emission tomography (PET) scans in these cases often reveal prominent atrophy and hypometabolism not only in the typical temporoparietal regions, but also markedly in the dorsolateral prefrontal cortex (Ossenkoppele et al., 2015). This pattern corroborates the existence of a dysexecutive variant of AD, in which the recognition of the cognitive impairment profile and its neural substrate are fundamental for the differential diagnosis with other conditions, such as Frontotemporal Dementia (FTD) itself.

In the context of dementia syndromes, the data confirm that Alzheimer's Disease (AD), although classically associated with mnesic impairments, presents significant executive impairment. This finding is in line with Diamond (2013), who emphasizes the interdependence between working memory and executive functions. The strong correlation between changes in the dorsolateral prefrontal cortex and performance in complex executive tasks suggests that the assessment of executive functions may be a sensitive marker of progression in AD, as previously indicated by revised diagnostic criteria (Dubois et al., 2014).

Frontotemporal dementia (FTD) emerged as the condition with the most severe profile of executive impairment. Studies comparing groups of patients consistently demonstrate that individuals with FTD exhibit profound deficits in domains such as cognitive flexibility and inhibitory control, with effect sizes that are often large compared to healthy controls and even other groups of patients with other types of dementia (Knopman et al., 2021; Bang et al., 2015). This result was expected, given the primary location of the pathology in the frontal lobes and in the neural networks connected to them. The rapid and devastating progression of cognitive decline in this population is well documented, with longitudinal studies showing sharp declines in global and specific cognitive scores over short time intervals (Knopman et al., 2021; Miocinovic et al., 2023), justifying the need for early and specific interventions.

FTD is distinguished not only clinically, but also by its specific neuropathological and genetic substrates. According to Mackenzie & Neumann (2016), in their comprehensive review on the neuropathology of FTD, degeneration occurs predominantly in the anterior temporal, frontal, insula, and anterior cingulate regions, with selective loss of von Economo neurons (VENs) in cortical layer 5, crucial for initiative, judgment, and emotional response.

In addition, the clinical findings of behavioral variant FTD (bvFTD) are markedly distinct from those seen in Alzheimer's disease. While AD typically presents with early amnesia, bvFTD manifests through social disinhibition, apathy, loss of empathy, hyperorality (often with a preference for sweet foods), and stereotyped or perseverative behaviors (Bang et al., 2015; Gainotti et al., 2023). This constellation of behavioral symptoms directly reflects dysfunction in the frontotemporal circuits and in the salience network, being a central axis for the differential diagnosis. Such characteristics are consistent with severe deficits in inhibitory control measures and mental flexibility in this population.

4.2 CEREBROVASCULAR DISEASES AND EXECUTIVE FUNCTIONS

Ischemic stroke in anterior cerebral artery territory or fronto-subcortical circuits shows a significant association with acute executive deficits. The focal and location-dependent nature of these deficits is well established. A symptom-injury study that mapped cognitive deficits in 410 patients with acute ischemic stroke demonstrated that lesions in the anterior cingulate gyrus were specifically associated with impairments in inhibitory control and cognitive flexibility (Shi et al., 2021). In a complementary way, other structural neuroimaging studies confirm that lesions in the supplementary motor area and dorsolateral prefrontal regions correlate significantly with deficits in phonemic verbal fluency and in other tasks that require generation and self-initiation (Pantoni et al., 2022; Shi et al., 2021). The high prevalence of executive impairment in stroke is corroborated by studies using the Frontal Assessment Battery (FAB), often finding impairment rates greater than 50% in the acute and subacute phases, depending on the location of the injury (Sandeberg et al., 2023).

In addition to focal frontal lobe injury due to stroke, Small Cerebral Vessel Disease, assessed by white matter hyperintensity loading on T2 and magnetic resonance imaging flair, shows a dose-dependent correlation with executive performance. Longitudinal studies demonstrate that a higher burden of white matter hyperintensities, quantified by scores such as Fazekas's, independently predicts decline in executive functions over time, even after adjusting for confounding factors such as age, education, and hypertension (Smith et al., 2019; De Leeuw et al., 2022). This association reinforces the concept that subclinical but cumulative cerebral vascular changes have a measurable and progressive impact on

executive function, acting as a substrate for vascular cognitive decline even in the absence of an acute vascular event.

4.3 NEURODEGENERATIVE DISEASES WITH A MOTOR COMPONENT

In Parkinson's Disease (PD), executive impairment is established as an independent predictor of functional disability and progression to dementia. The international consensus on cognitive impairment in PD establishes that deficits in mental flexibility tasks, such as the Wisconsin Card Sorting Test (WCST), are robust predictors of cognitive decline (Aarsland et al., 2021). Longitudinal studies have shown that patients in the early stage of PD with poor executive performance have a significantly increased risk of progression to dementia, with hazard ratios that often vary between 2.0 and 4.0, depending on the population and the assessment instrument (Aarsland et al., 2021). From a pathophysiological point of view, reduced functional connectivity between the striatum and the prefrontal cortex — a central signature of PD — explains a substantial portion of the variance in the performance of executive functions in this population, corroborating the fronto-striatal basis of these deficits (Tahmasian et al., 2017).

For PD, the results confirm that executive impairment is not an epiphenomenon, but a central component of the disease, with significant prognostic implications. Systematic reviews and international consensus attest that deficits in mental flexibility tests, such as the WCST, and in verbal fluency, double or even triple the risk of progression to dementia (Aarsland et al., 2021), which highlights the predictive value of neuropsychological assessment in the management of this population. The strong association between frontostriatal functional connectivity and executive performance provides mechanistic support for clinical observations, unequivocally linking cognitive symptomatology to disease pathophysiology (Aarsland et al., 2021).

The central role of neuropsychological assessment is recognized by the International Society of Movement Disorders (MDS), which officially recommends the use of established instruments, such as the Wisconsin Card Sorting Test (WCST), the Verbal Fluency Tests, the Stroop Test, and the Similarities subtest of the WAIS-IV, to assess executive functions in PD. This recommendation is based on robust psychometric properties, normative data, and sensitivity to cognitive impairment in the disease, as corroborated by recent methodological reviews (Moustafa et al., 2023). These tests predominantly evaluate functions mediated by fronto-striatal circuits, which are the most vulnerable in the pathophysiology of PD, explaining the predominance of deficits in mental flexibility, inhibitory control, and verbal generation.

Scientific evidence reinforces the need for a detailed neuropsychological assessment that transcends global cognitive screening. Instruments such as the MoCA (Montreal Cognitive Assessment), whose superiority in sensitivity for executive and visuospatial deficits compared to the MMSE (Mini-Mental State Examination) has been validated in specific cohorts of patients, are valuable tools for initial screening (Santos-García et al., 2022). In the therapeutic sphere, the approach should be multimodal and etiologically oriented, ranging from the use of cholinesterase inhibitors (preferably rivastigmine) for the treatment of cognitive deficits in PD to non-pharmacological interventions, such as occupational therapy—focused on compensatory strategies and environmental adaptation—and personalized cognitive rehabilitation programs, an integrative approach supported by recent research (Gill et al., 2021).

4.4 PATTERNS OF NEUROPSYCHOLOGICAL SIGNS AND SYMPTOMS

The synthesis of the data allowed the identification of distinct neuropsychological patterns associated with the decline of executive functions in the main neurological disorders investigated. These patterns reflect the specific neural circuits affected in each condition and are critical for differential diagnosis and intervention planning.

The results demonstrated that while executive commitment is a common denominator, its clinical profile varies significantly:

- In typical Alzheimer's disease (AD), there is a progressive decline in the ability to perform complex tasks that require planning and mental manipulation, with relative preservation of simple inhibitory control until more advanced stages. Episodic memory is severely compromised from the start.
- In the behavioral/dysexecutive variant of AD (bvAD), executive impairment is prominent and may mimic Frontotemporal Dementia, with the presence of disinhibition, apathy, and personality changes, often associated with a memory profile similar to that of typical AD.
- In behavioral variant Frontotemporal Dementia (CVD), there is an early and severe impairment in inhibitory control, mental flexibility, and social judgment, with marked disinhibition, perseverance, and loss of empathy.
- In cerebrovascular accident (CVA), the deficits are acute and focal, depending on the location of the lesion, and can selectively affect components such as inhibitory control, verbal fluency or initiative.

- In Parkinson's Disease (PD), bradyphrenia (slowness of thought), difficulty in alternating tasks, and deficits in motor planning predominate, reflecting the dysfunction of the fronto-striatal circuits.

The following table summarizes the main findings:

Table 1

Synthesis of the main findings on executive impairment due to neurological disorder

Neurological Disorder	Recommended Assessment Instrument	Executive Mastery Achieved & Clinical Standard	References
Alzheimer's Disease (AD) – Typical Variant	Trail Making Test – Part B, FCSRT	Deficit in complex tasks and planning. Severely impaired episodic memory. Executive functions affected, but are not the primary deficit.	Papp et al. (2023); Dubois et al. (2014)
Alzheimer's Disease (AD) – Behavioral/Dysexecutive Variant (bvAD)	Hayling Test, Semantic Verbal Fluency, FAB, INECO	Severe executive impairment, with disinhibition, apathy, and personality changes. It can mimic DFTvc, but with a memory profile similar to that of typical AD.	Ossenkoppele et al. (2015)
Frontotemporal Dementia – Behavioral Variant (DFTvc)	Hayling Test, Phonemic Verbal Fluency, FRONTIER Screen, Digit Span Backwards	Marked disinhibition, compromised social judgment, lack of empathy. Early and severe executive impairment, with severely impaired inhibitory control and mental flexibility.	Bang et al. (2015)
Stroke (anterior territory)	Stroop Test, FAB	Focal deficits dependent on the location of the lesion (e.g., inhibitory control with lesion in the anterior cingulate gyrus).	Shi et al. (2021); Sandeberg et al. (2023)
Parkinson's disease (PD)	Wisconsin Card Sorting Test (WCST), Verbal Fluency (FAS/Semantics), Stroop, WAIS-IV – Similarities	Bradyphrenia, difficulty in alternating tasks, deficits in motor planning.	Aarsland et al. (2021)

Source: Conde (2026).

The results demonstrate robust evidence that different neurological disorders share the impairment of executive functions as a common denominator, but with distinct neuropsychological profiles that reflect the specific neural circuits affected in each condition.

The analysis of the symptom patterns revealed distinct but overlapping neuropsychological profiles among the conditions. This finding has direct practical implications for the differential diagnosis. For example, while marked disinhibition is a warning sign for FTD, bradyphrenia is more suggestive of PD. However, the presence of difficulties in complex tasks is a common denominator, emphasizing the need for a comprehensive assessment that goes beyond global cognitive screening.

The synthesized evidence has relevant implications for clinical practice. They support the routine incorporation of specific instruments for the assessment of executive functions (such as FAB, Trail Making Test and WCST) in the neuropsychological assessment of neurological patients. In addition, the different impairment profiles suggest that cognitive rehabilitation interventions should be tailored to the underlying etiology, targeting specific neural circuits.

In short, the results consolidate the notion that executive functions represent a central cognitive axis, whose integrity is compromised by a variety of neurological disorders. The identification of the specific patterns of impairment associated with each condition, notably the crucial distinction between AD variants and CVTD, not only facilitates differential diagnosis, but also paves the way for earlier and more targeted interventions, aimed at preserving the functionality and quality of life of patients.

5 CONCLUSION

The present integrative review, by synthesizing evidence published between 2015 and 2025, allowed us to consolidate current scientific knowledge on the main neurological conditions associated with the decline of executive functions in adults and the elderly.

In response to the initial research problem, it was identified that the neurological conditions that most cause decline in executive functions are dementia syndromes (especially AD and FTD), cerebrovascular diseases (stroke and small vessel disease) and neurodegenerative diseases with a motor component (PD), as evidenced by the recent studies included in this synthesis. Regarding neuropsychological signs and symptoms, it was observed that they vary according to etiology: in LD, difficulties in complex tasks and planning predominate; in FTD, disinhibition and compromised social judgment stand out; in stroke, focal deficits are observed depending on the location of the lesion; and in PD, bradyphrenia and difficulty in switching tasks predominate.

The confirmation of the initial hypothesis based on recent literature reinforces that the frontal and fronto-subcortical axis constitute a common neural substrate, whose dysfunction manifests itself through executive decline, regardless of the progressive or acute nature of the neurological condition.

From the point of view of practical implications, the findings highlight the importance of detailed neuropsychological assessment of executive functions as an essential component in the management of neurological patients, allowing not only differential diagnosis, but also the planning of personalized rehabilitative interventions and prediction of functional prognosis. The incorporation of specific instruments such as FAB, Trail Making Test, and WCST, as recommended by recent international consensuses, is essential for the early detection of these deficits.

The limitations of this study are the methodological heterogeneity of the included studies and the scarcity of studies that longitudinally investigate the trajectory of executive decline in different neurological disorders. For future research, it is suggested to carry out studies that integrate neuroimaging and neuropsychological assessment to better understand the neural mechanisms underlying executive impairment, as well as the development of specific interventions for the rehabilitation of executive functions in each clinical population.

It is concluded that the early recognition of the patterns of executive impairment specific to each neurological disease, based on the most current evidence, is essential for improving patient care, contributing to the preservation of functional autonomy and quality of life in the adult and elderly population.

Finally, it is crucial to consider that EFs and the prefrontal cortex that supports them are uniquely vulnerable. This means that they are the first to suffer and the most affected by a range of factors, including stress, sleep deprivation, loneliness and lack of physical exercise. This characteristic reinforces the need for a holistic approach in the evaluation and management of patients complaining of executive decline, in which contextual and lifestyle factors should be investigated, as they may mimic or exacerbate the symptoms of an underlying neurological condition.

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