


## EXECUTIVE FUNCTIONS IN SELF-REGULATION: EFFECTS ON ACADEMIC PERFORMANCE AND PSYCHOLOGICAL WELL-BEING

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### ABSTRACT

Executive functions (EFs) constitute a set of high-level cognitive processes that enable individuals to regulate their thoughts and actions toward specific goals. These skills include planning, decision-making, inhibitory control, and cognitive flexibility, and are critical for self-regulation and effective problem-solving. The growing body of research on EFs underscores their importance in educational and clinical settings, especially in relation to the prefrontal cortex, which plays a central role in performing these functions. It is important to highlight that EFs are not innate, but rather acquired and improved through experiences and social interactions, particularly during childhood. Studies show that educational programs focused on the development of EFs can not only improve academic performance, but also favor emotional regulation, thus being essential for psychological well-being. However, it is imperative to recognize the limitations that exist in research, which often focuses on specific populations and often disregards cultural diversity. The paper also explores the interrelationship between EFs and working memory, emphasizing how the ability to hold and manipulate temporary information is crucial for the effective execution of executive functions. In addition, it highlights the need for interventions that address the gaps in EFs, which can negatively impact academic performance and the general well-being of individuals. In summary, the promotion of executive functions is vital for human development, contributing to the formation of resilient individuals capable of facing contemporary challenges.

**Keywords:** Executive function. Self-regulation. Cognitive sciences. Therapeutic interventions.

## INTRODUCTION

Executive functions (EFs) are defined by Friedman & Miyake (2017) as high-level cognitive processes that, through their influence on lower-level processes, allow individuals to regulate their thoughts and actions during goal-directed behavior. The term executive function is used to describe a range of skills, as described by Banich (2009), Diamond (2013) and Jurado & Rosselli (2007) apud Friedman & Miyake (2017).

Executive function, according to Trossman et al. (2020), refers to interrelated self-regulation skills that allow individuals to engage in intentional and goal-oriented behaviors. Lúria (1981) states that the definition of executive function refers, primarily, to the ability to plan problem-solving strategies for the execution of goals, mediated by the frontal cortex (Luria, 1981 apud Bosa, 2001). These functions include skills such as planning, decision-making, inhibitory control, cognitive flexibility, and problem-solving.

The growing academic interest in executive functions reflects their importance in educational and clinical settings. To understand this relevance, it is essential to consider the neuroanatomical basis that underpins these functions, in particular the relationship with the prefrontal cortex (Karr et al., 2018). The evolution of cognitive theories has proposed a broader approach, emphasizing the need to consider EFs in an interconnected context of cognitive, emotional, and social factors. This holistic perspective is crucial for understanding the complexity of executive functions and their influence on human adaptation.

The theory of information processing (Hunt, 1979; Sternberg, 2000 apud Neves, 2006) gave rise to a large number of studies that investigate in detail the cognitive processes involved in problem solving. This approach has gradually been integrated into neurology studies, giving rise to cognitive neuroscience. Information processing theorists bring together diverse approaches that study the mind and intelligence in terms of mental representations and their processes underlying observable behavior. As stated by Sternberg (2000) apud Neves (2006), information processing psychologists study human intellectual capacities, analyzing how people solve complex mental tasks to build models that aim to understand the processes, strategies and mental representations used.

Executive functions act as supervisory mechanisms that regulate automatic thought processes, allowing individuals to be active agents who monitor and adjust their cognitive strategies in response to the demands of the environment. This ability to self-regulate is essential for performing tasks that require sustained attention and long-term planning.

In addition, the interrelationship between executive functions and working memory is an area of growing interest. The working memory model of Baddeley and Hitch (1974) apud Corso & Dorneles (2012) shows how the ability to temporarily maintain and manipulate information is crucial for the execution of EFs. The model proposed by Baddeley and Hitch (1974) presents a short-term memory system of limited capacity, which is simultaneously involved in the processing and temporary storage of information. These authors proposed three components of working memory: the central executive, the phonological component and the visuospatial component. The core component is the central executive, which has limited attention span and is responsible for processing cognitive tasks. The other two storage subsystems (phonological and visuospatial component) have limited capacity and are in direct contact with the central executive, being subordinated to it and recruited by it when necessary.

More recently, Baddeley (2000) apud Corso & Dorneles (2012) added a fourth component, the episodic buffer, which comprises a system of limited capacity that provides the temporary storage of information in a multimodal code, capable of integrating information from subsidiary systems and long-term memory into a unitary episodic representation. However, research on this fourth component is still limited.

Therefore, working memory functions as a cognitive resource that allows the integration of relevant information during decision-making and problem solving, highlighting the interdependence between different cognitive domains.

Another relevant aspect is the development of executive functions throughout the life cycle. Empirical studies (Wongupparaj et al., 2015; Friedman & Miyake, 2017; Harvey, 2019; Tang et al., 2023) indicate that these skills are not innate, but acquired and improved through social experiences and interactions. The development of EFs in children, for example, is closely linked to social and emotional learning (Guare, 2014). Mastery of these skills is vital for academic and social success, as it allows individuals to adapt to new challenges and contexts (Harvey, 2019).

Cognitive theories offer valuable insights into the promotion and intervention in EFs. While educational programs focused on EFs have shown effectiveness, it is important to address their limitations, such as the need for adjustments to meet the individual needs of students, especially in diverse learning environments. In addition, therapeutic interventions aimed at emotional regulation and behavior control are essential for the care of individuals

with difficulties in EFs, such as those diagnosed with attention deficit hyperactivity disorder (ADHD) (Sagvolden et al., 2005; Barkley, 2010).

In short, the investigation of EFs from the perspective of psychological cognitive theories not only enriches the understanding of human cognitive functioning, but also has significant practical implications. The intersection between EFs and cognition reveals the complexity of the interactions between thought and behavior, providing a comprehensive framework for analyzing how individuals navigate an ever-changing world. As this article progresses, the various dimensions of EFs, their theoretical bases, practical implications, and opportunities for interventions that promote their development and improvement will be explored.

## **DELIMITATION OF THE OBJECT OF STUDY**

The delimitation of the object of study of this article focuses on executive function, an essential construct that refers to interrelated self-regulation skills, allowing individuals to engage in intentional and goal-oriented behaviors (Trossman et al., 2020). This concept is fundamental to understand how cognitive processes influence human behavior and, consequently, personal and academic development.

When exploring cognitive theories, we observe that cognitive therapies are especially effective in analyzing executive functions. These therapeutic approaches not only investigate the mental processes and structures underlying EFs, but also propose preventive and remedial solutions for individuals who have lags in this domain (Lee & Lim, 2014). Thus, the intersection between executive function and cognitive therapies proves crucial for understanding how interventions can be implemented to mitigate the adverse effects of lags.

The negative consequences of lags in the development of EFs have significant implications in the areas of education and learning. Studies indicate that these lags not only impair academic performance, but also affect the general well-being of individuals, contributing to the emergence of various psychopathologies (Letkiewicz et al., 2014). Therefore, the analysis of executive function, mediated by cognitive interventions, becomes a relevant and necessary field of study for the promotion of strategies aimed at improving self-regulation skills.

Thus, this article proposes to investigate executive function in its complexity, correlating cognitive theories with therapeutic practices, and emphasizing the importance of

addressing lags in this domain as a way to promote not only educational development, but also the psychological well-being of individuals.

## RESEARCH QUESTION

The investigation of executive functions in the context of cognitive theory is a relevant and dynamic field in contemporary psychology. EFs play a crucial role in regulating behavior and adapting to new situations. Among these functions, inhibition, cognitive flexibility, and updating information stand out, which are essential for decision-making, problem-solving, and performing complex tasks.

Cognitive theory offers a theoretical framework that allows a deep understanding of the mechanisms underlying EFs. This approach emphasizes the interaction between cognitive processes and the neural structures that support them, enabling a detailed analysis of the impacts of these functions on human cognitive functioning. From this perspective, it is possible to investigate how EFs are organized, what their interrelationships are, and how they influence performance in various daily activities.

In this context, the present research seeks to answer the following research question: **How does cognitive theory explain executive function, including its processes, structures, and impacts on human cognitive functioning?** By exploring this question, it is intended not only to elucidate the cognitive processes involved in EFs, but also to understand their implications for mental health and human development. The data analysis will be carried out based on a comprehensive literature review and critical analysis of existing research, aiming to contribute to the understanding of the complex interactions between cognitive theory and executive functions.

## BACKGROUND

According to Carvalho (2024), there is a significant number of studies that address the relationship between executive functions and the cognitive functions responsible for learning capacity. This interest arises from the need to improve EFs in students who have difficulties in learning and school performance.

The research presented here approaches neuropsychopedagogy as a transdisciplinary science that integrates neuroscientific research on brain functioning, cognitive psychology and learning. In this context, EFs are indispensable tools for success in understanding various contents, including mathematics, since they contribute with skills

such as planning, expanding mental capacity for the definition of goals and objectives (Parizato et al., 2025).

EFs, a set of high-level cognitive skills formed by inhibitory control, working memory, and cognitive flexibility, allow human beings to develop self-discipline and manage their attention and behavior in the execution of goal-oriented actions. An example is the resolution of cognitive problems and challenges in digital games, which are the subject of research in the article (Gneipel, Silva & Gasparine, 2020).

According to Rodrigues (2024), children's academic progress and psychosocial well-being are influenced by the development of socio-emotional skills. In this scenario, EFs play an important role in the self-regulation of emotions and behaviors, which are essential requirements for satisfactory social interactions. Psychoanalysis, by focusing on unconscious processes and early interpersonal relationships, offers a theoretical framework for the relationship between EFs and children's social behavior.

Castro (2023) addresses the importance of parental relationships for child development, emphasizing that parents influence practices that shape beliefs and values. Family interactions are fundamental for neuropsychosocial development, since the brain is continuously modified by contextual experiences, especially considering that EFs are related to decision-making and behavior management in social interactions.

## **METHOD**

The methodology adopted in this research consists of a narrative review of the literature, a qualitative approach that proves to be effective for the synthesis and interpretation of relevant studies on executive function in the context of cognitive theory. This methodological choice allows for a comprehensive and critical exploration of the various perspectives existing in the literature, facilitating the identification of gaps, convergences, and divergences among the findings.

The narrative review is distinguished by its flexibility, allowing the inclusion of a variety of sources, such as academic articles, books, and dissertations, which address both theoretical and empirical aspects of EFs. This method is appropriate to build a consolidated panorama on the subject, enabling the analysis of different contexts and applications of cognitive theory in studies on EFs.

The review process begins with the definition of inclusion and exclusion criteria, aiming to ensure the relevance and quality of the selected sources. Then, a systematic

search is carried out in the academic databases, using specific keywords that reflect the essence of the investigation. The data collected are organized and analyzed critically, allowing not only the synthesis of information, but also the construction of a coherent narrative that articulates the findings in a logical way.

This methodology enriches the understanding of the processes and structures underlying EFs, highlighting their impacts on human cognitive functioning. In the end, it is hoped that the narrative review will contribute to a deeper understanding of the interrelationships between cognitive theory and EFs, providing a solid foundation for future investigations and potentially informing educational and clinical practices.

## **THEORETICAL FRAMEWORK**

### **DEFINITION AND IMPORTANCE OF EXECUTIVE FUNCTIONS**

Executive functions (EFs) are a set of high-level cognitive processes that play a key role in regulating human behavior and adapting to new situations. According to Friedman and Miyake (2017), EFs are skills that allow individuals to regulate their thoughts and actions, facilitating goal-directed behaviors. These skills are critical for self-regulation, which involves impulse control, the ability to plan actions, make informed decisions, and solve complex problems. Thus, EFs are essential not only for academic success but also for everyday life and emotional well-being.

### **Components of Executive Functions**

The EFs include several components, among which the following stand out:

- **Inhibitory Control:** This refers to the ability to suppress impulsive responses and resist distractions. This component is vital in situations that require focus and self-discipline, allowing individuals to avoid impulsive behaviors that could compromise their goals.
- **Working Memory:** This function is essential for holding and manipulating temporary information while performing complex cognitive tasks. Working memory allows individuals to retain relevant data while performing calculations, solving problems, or planning future actions.
- **Cognitive Flexibility:** This component makes it possible to adapt thought and behavior to new information or changes in the environment. Cognitive flexibility is



crucial in situations that require rapid adaptation, such as in dynamic environments or when faced with unexpected challenges.

These components work together to enable individuals to navigate complex situations and make informed decisions, being critical to personal and social development.

### **6.1.2 Neuroanatomical Structures and Cognitive Theories**

Historically, EFs have been associated with specific neuroanatomical structures, most notably the prefrontal cortex, which is crucial for tasks that require planning and decision-making (Karr et al., 2018). This region of the brain integrates information from different areas, regulating emotions and behaviors, which highlights its central role in EFs. Neuroimaging studies have shown that dysfunctions in the prefrontal cortex are often related to difficulties in executive functions.

#### **Cognitive Theories and Interaction of Factors**

The evolution of cognitive theories has brought a more holistic approach to the understanding of EFs, considering the interaction between cognitive, emotional, and social factors. The theory of information processing (Hunt, 1979; Sternberg, 2000) investigates the mental processes involved in problem-solving and how EFs act as supervisory mechanisms that regulate automatic thought processes. In this way, EFs allow individuals to become active agents in their decisions and behaviors.

A relevant theory in this context is theory of mind, which suggests that the ability to understand the mental states of oneself and others is crucial for self-regulation and social interaction. EFs are essential for people to make predictions about the behavior of others, which is critical for building healthy relationships and navigating complex social contexts.

#### **Interrelation with Working Memory**

Working memory is an essential component for the effective execution of EFs. The model proposed by Baddeley and Hitch (1974) illustrates how the ability to hold and manipulate temporary information is critical to the performance of tasks that require planning and decision-making. The central executive, the main component of the model, coordinates and controls the information, while the storage subsystems (phonological and visuospatial component) support the processing of the information.



The introduction of the concept of episodic buffer by Baddeley (2000) expanded the understanding of working memory, emphasizing the ability to integrate information from different sources and store it in a multimodal way. This addition highlights the complexity of working memory and its interaction with EFs, evidencing that the temporary retention of information is essential for problem solving and adaptation to new situations.

The relationship between working memory and EFs is even more complex when considering the influence of emotional and social factors. Research shows that intense emotional states can impair inhibitory control and cognitive flexibility, making it difficult to perform tasks that require these skills. These interactions can be observed in school contexts, where emotional pressure can impact academic performance.

### **Development Throughout the Life Cycle**

The development of EFs is not an innate process, but rather acquired and improved through experiences and social interactions (Wongupparaj et al., 2015; Friedman & Miyake, 2017). Studies indicate that EFs are particularly susceptible to the environment in which individuals are inserted. Social and emotional learning, especially during childhood, is a determining factor for the development of these skills.

#### **Influential Factors in Childhood**

During childhood, the acquisition of EFs is closely linked to social and emotional development. Children who are encouraged to practice self-regulation in educational and family settings tend to develop better EF skills. Social interaction is a critical element in this phase, as it provides opportunities for children to practice and apply their skills in real-world situations. Activities that require turns and cooperation, such as games and play, can help improve inhibitory control and cognitive flexibility.

In addition, the literature suggests that EFs are critical to academic success. Children with well-developed self-regulation skills tend to perform better at school and form more satisfying interpersonal relationships (Harvey, 2019). This academic success can positively impact self-esteem and emotional well-being, creating a virtuous cycle that further strengthens EFs.

## **Practical Implications and Interventions**

EFs have significant implications in a number of areas, including education, mental health, and child development. Research has shown that educational programs focused on the development of EFs can improve not only academic performance, but also emotional regulation in children and adolescents. Therapeutic interventions aimed at promoting EFs are essential to help individuals with difficulties, such as those diagnosed with attention deficit hyperactivity disorder (ADHD) (Sagvolden et al., 2005; Barkley, 2010).

### **Consequences of Lags in FEs**

Studies indicate that lags in the development of EFs can result in negative consequences, including academic difficulties and the manifestation of psychopathologies (Letkiewicz et al., 2014). The analysis of EFs should be accompanied by interventions aimed at mitigating these adverse effects. The integration of educational and therapeutic practices that promote the development of EFs are crucial as they play a critical role in promoting emotional well-being and regulating behavior, and are essential for social adaptation.

Intervention programs that focus on the development of EFs have been shown to be effective in different contexts. Game-based interventions that encourage the practice of self-regulation skills have been implemented in school settings with positive results. These interventions not only improve EFs but also promote a more positive school environment where children feel safe and motivated to learn.

## **Implications for Education and Human Development**

The investigation of executive functions from the perspective of cognitive theories not only enriches the understanding of human cognitive functioning, but also reveals the complexity of the interactions between mental and behavioral processes. The intersection between EFs and cognition offers a comprehensive framework for analyzing how individuals navigate an ever-changing world.

An in-depth understanding of EFs is essential for developing strategies that aim not only to improve academic performance but also to promote mental health and psychological well-being throughout life. The analysis of EFs is crucial for understanding the skills that underpin individuals' social and emotional adaptation. Focusing on the development of these skills from childhood, through educational and therapeutic interventions, can have a

significant impact on people's lives, contributing to the formation of individuals who are more resilient and capable of facing the challenges of modern life.

According to Fonseca and Siqueira (2017), the importance of EFs and the challenges related to literacy are undeniable, highlighting the role of neuropsychopedagogy as a transdisciplinary science that dialogues with the knowledge of neuroscience, pedagogy and cognitive psychology. Zelazo, Cardoso and Souza (2007) corroborate this perspective, emphasizing the value of EFs in the learning process.

Thus, Fonseca and Siqueira argue that it is possible to investigate the functioning of the brain areas of the nervous system, delving into the study of learning processes and their links with EFs. The authors explain that, when EFs are well developed and structured in childhood, the learning of reading and writing tends to be more satisfactory, reflecting in better comprehension and interpretation results.

On the other hand, the authors raise the question about some school practices that produce "readers" who, although they can read, face significant difficulties in understanding and interpreting the contents, resulting in performances below what is expected for a given school level.

In this way, it can be stated that, with well-developed executive functions, the reading process becomes a safe and promising path in academic life, considering that reading and writing activate two brain systems present in the child: the visual system, responsible for recognizing shapes, and the language areas.

The survey also reveals that the topic of EFs has generated debates and discussions, especially due to complaints from teachers and guardians about the reading and writing difficulties observed in students. These difficulties can promote conflicts, dissatisfactions and, more seriously, contribute to low self-esteem in children, leading to the labeling of individuals with learning-related disorders.

Trossman, Mielke, and McAuley (2020) point out that deficits in EFs are associated with negative lifelong consequences, including poor health and psychopathologies. Carvalho (2024) highlights that, in recent years, several studies have emerged that seek to deepen knowledge about EFs, their complexities, and their relationship with school performance.

In view of this, there is a growing interest in improving EFs in children and adolescents with learning difficulties. The author mentions that, through tests, it was possible to identify learning difficulties in both public and private schools, corroborating the

observations of Fonseca and Siqueira (2017) on reading, writing, comprehension and interpretation problems.

Souza et al. (2021) discuss attention deficit hyperactivity disorder (ADHD), which presents itself as a public health and educational issue. According to the authors, the school process and social behavior of children with ADHD are marked by difficulties in concentration, hyperactivity and impulsivity, evident in the first years of life.

These disorders significantly affect EFs, compromising the areas responsible for regulating social behavior and impairing cognitive abilities, which results in poor academic performance and creates problems for affected individuals. Therefore, it is essential that research delves into this topic, especially in the clinical and educational fields, aiming to improve the quality of life of those impacted.

In short, the analysis of executive functions is vital for understanding the skills that underpin individuals' social and emotional adaptation. Investing in the development of these skills from childhood, through educational and therapeutic interventions, not only enhances learning, but also promotes the formation of more balanced and competent adults, capable of facing the challenges of modern life with confidence and resilience.

## **SUMMARY AND CONCLUSIONS**

Executive functions (EFs) are a set of high-level cognitive processes that play a key role in regulating human behavior and adapting to new situations. Defined by Friedman and Miyake (2017), EFs refer to skills that allow individuals to regulate their thoughts and actions, facilitating goal-directed behaviors. This definition is corroborated by Banich (2009), Diamond (2013) and Jurado & Rosselli (2007), who emphasize the role of EFs in self-regulation and in the execution of complex tasks.

The importance of EFs is highlighted by Trossman et al. (2020), who describe them as interrelated self-regulation skills. These skills are essential for individuals to engage in intentional and goal-oriented behaviors, being mediated, to a large extent, by the frontal cortex, as pointed out by Lúria (1981). Executive functions include, among others, inhibitory control, working memory, and cognitive flexibility. These components work in tandem, allowing individuals to navigate complex situations and make informed decisions.

The growing academic interest in EFs has its roots in the evolution of psychological cognitive theories, which seek to elucidate the interaction between mental and behavioral

processes. The theory of information processing, discussed by Hunt (1979) and Sternberg (2000), has generated a large number of studies that investigate the cognitive processes involved in problem solving. This approach has been integrated with cognitive neuroscience, creating an interdisciplinary field that analyzes how executive functions influence observable behavior (Neves, 2006).

EFs act as supervisory mechanisms that regulate automatic thought processes, allowing individuals to become active agents in their decisions and behaviors. This ability to self-regulate is vital for performing tasks that require sustained attention and long-term planning. The interrelationship between EFs and working memory is an area of growing interest, as evidenced by the model proposed by Baddeley and Hitch (1974). This model illustrates how the ability to maintain and manipulate temporary information is critical to the execution of EFs.

The introduction of the concept of episodic buffer by Baddeley (2000) broadened the understanding of working memory, highlighting the importance of integrating information from different sources. Although research on this fourth component is still limited, the interaction between working memory and EFs underscores the interdependence between different cognitive domains. Thus, working memory not only allows for the temporary retention of information, but it is also crucial for decision-making and problem-solving.

Another relevant aspect to be considered is the development of EFs throughout the life cycle. Empirical studies (Wongupparaj et al., 2015; Friedman & Miyake, 2017; Harvey, 2019; Tang et al., 2023) indicate that executive functions are acquired skills, showing that early interventions can result in significant improvements in academic performance. Social and emotional learning, especially during childhood, is a determining factor for the development of these skills. Children who are encouraged to practice self-regulation in educational and family contexts tend to develop better EF skills, highlighting the importance of social interactions in this process.

In addition, the literature suggests that EFs are critical to academic success. Children with well-developed self-regulation skills tend to perform better at school and form more satisfying interpersonal relationships (Harvey, 2019). This academic success can positively impact self-esteem and emotional well-being, creating a virtuous cycle that further strengthens EFs.

The practical implications of EFs extend to several areas, including education, mental health, and child development. Research has shown that educational programs

focused on the development of EFs can improve not only academic performance, but also emotional regulation in children and adolescents. Therapeutic interventions aimed at promoting EFs are essential to help individuals with difficulties, such as those diagnosed with attention deficit hyperactivity disorder (ADHD) (Sagvolden et al., 2005; Barkley, 2010).

However, it is crucial to recognize the limitations that permeate research on executive functions. Most existing studies focus on specific populations, such as school-age children or individuals with disorders such as ADHD. This limitation may restrict the generalization of the findings to other age groups and contexts. In addition, most investigations are still based on quantitative methods, which, while useful, may not capture the complexity of the social and emotional interactions that influence EFs.

Another factor to consider is cultural diversity. Research on EFs often ignores how cultural variations can affect the manifestation and development of these functions. The lack of intercultural investigations limits the understanding of the universality of executive functions and their implications for educational and therapeutic practice.

Given these limitations, new directions for research on executive functions become essential. One of the most promising avenues involves the integration of qualitative and quantitative methods, allowing for a more holistic understanding of EFs. Longitudinal studies that track the development of EFs throughout life and in different social contexts can offer valuable insights into how these functions manifest and transform over time.

The investigation of EFs in diverse populations, including adults and the elderly, is also noteworthy. Understanding how aging affects executive functions can contribute to interventions that promote cognitive health in older populations. In addition, the exploration of EFs in varied cultural contexts can reveal important nuances that enrich the application of cognitive theories in the development of educational and therapeutic strategies.

Still, the intersection between EFs and technology is an emerging area that deserves attention. With the growing presence of digital tools in everyday life, investigating how electronic games and learning applications influence the development of EFs can provide new perspectives on effective interventions. This is especially relevant in an increasingly digital world, where the ability to self-regulate and cognitive flexibility becomes increasingly crucial.

In summary, the investigation of executive functions reveals the complexity of interactions between cognitive, emotional and social processes, highlighting their importance for the regulation of behavior and adaptation to new challenges. EFs are

intrinsically linked to the emotional well-being and social development of individuals, underlining their relevance in both education and mental health.

The findings presented in this study emphasize the need for interventions that promote the development of EFs from childhood. The existing literature, including contributions from authors such as Friedman, Miyake, and Trossman, shows that EFs are fundamental to self-regulation, planning, decision-making, and problem-solving—skills that are essential for academic success and everyday life.

Thus, the promotion of executive functions, through educational and therapeutic interventions, not only improves learning, but also contributes to the formation of individuals who are more resilient and able to face the challenges of modern life. Investing in the development of these skills is therefore essential to ensure psychological and social well-being, creating a lasting impact on people's lives and society as a whole.



## REFERENCES

1. Banich, M. T. (2009). Executive function: The search for an integrated account. \*Current Directions in Psychological Science, 18\*(2), 89–94. <https://doi.org/10.1111/j.1467-8721.2009.01615.x>
2. Barkley, R. A. (2010). Differential diagnosis of adults with ADHD: The role of executive function and self-regulation. \*The Journal of Clinical Psychiatry, 71\*(7), e17. <https://doi.org/10.4088/JCP.9066tx1c>
3. Bosa, C. A. (2001). The relations between autism, social behavior and executive function. \*Psychology: Reflection and Criticism, 14\*(2), 281–287. <https://doi.org/10.1590/S0102-79722001000200003>
4. Carvalho, P. R. C. M. (2024). \*Effects of the structuring of executive functions on school performance\* [Dissertação de mestrado, Universidade de Brasília]. Repositório Institucional da UnB.
5. Castro, M. de. (2023). \*Parenting styles in the development of cognitive functions\* [Dissertação de mestrado, Universidade Federal Rural do Rio de Janeiro]. Repositório Institucional da UFRRJ.
6. Corso, L. V., & Dorneles, B. V. (2012). What role does working memory play in the learning of mathematics? \*Bolema: Boletim de Educação Matemática, 26\*(42B), 627–648. <https://doi.org/10.1590/S0103-636X2012000200012>
7. Cunningham, W. A., & Zelazo, P. D. (2007). Attitudes and evaluations: A social cognitive neuroscience perspective. \*Trends in Cognitive Sciences, 11\*(3), 97–104. <https://doi.org/10.1016/j.tics.2006.12.005>
8. Da Fonseca, C. B., & De Siqueira, V. L. M. (s.d.). Executive function in the construction of reading and writing: Importance, challenges and necessary prerequisites for literacy. [Informação incompleta: Nome da revista, volume e páginas não fornecidos].
9. Diamond, A. (2013). Executive functions. \*Annual Review of Psychology, 64\*, 135–168. <https://doi.org/10.1146/annurev-psych-113011-143750>
10. Doebel, S., & Zelazo, P. D. (2015). A meta-analysis of the Dimensional Change Card Sort: Implications for developmental theories and the measurement of executive function in children. \*Developmental Review, 38\*, 241–268. <https://doi.org/10.1016/j.dr.2015.09.001>
11. Friedman, N. P., & Miyake, A. (2017). Unity and diversity of executive functions: Individual differences as a window on cognitive structure. \*Cortex, 86\*, 186–204. <https://doi.org/10.1016/j.cortex.2016.04.023>
12. Gneipel, K. K., Silva, M. H. da, & Gasparine, I. (2020). A model for the interrelationship between executive functions and digital game elements. \*Brazilian Journal of Informatics in Education, 28\*, 1414–5685. <https://doi.org/10.5753/rbie.2020.28.0.1414>

13. Guare, R. (2014). Context in the development of executive functions in children. *\*Applied Neuropsychology: Child*, 3\*(3), 226–232. <https://doi.org/10.1080/21622965.2013.870015>
14. Harvey, P. D. (2019). Domains of cognition and their assessment. *\*Dialogues in Clinical Neuroscience*, 21\*(3), 227–237. <https://doi.org/10.31887/DCNS.2019.21.3/pharvey>
15. Hunt, E. (1980). Intelligence as a concept of information processing. *\*British Journal of Psychology*, 71\*(4), 449–474. <https://doi.org/10.1111/j.2044-8295.1980.tb01760.x>
16. Karr, J. E., Areshenkoff, C. N., Rast, P., Hofer, S. M., Iverson, G. L., & Garcia-Barrera, M. A. (2018). The unity and diversity of executive functions: A systematic review and re-analysis of latent variable studies. *\*Psychological Bulletin*, 144\*(11), 1147–1185. <https://doi.org/10.1037/bul0000160>
17. Lee, Y. J., Kong, Y. S., & Lim, J. Y. (2014). The effects of parental behaviors on the executive function of preschool-age children. *\*Journal of Families and Better Life*, 32\*(1), 13–26.
18. Letkiewicz, A. M., Miller, G. A., Crocker, L. D., Warren, S. L., Infantolino, Z. P., & Heller, W. (2014). Executive function deficits in daily life prospectively predict increases in depressive symptoms. *\*Cognitive Therapy and Research*, 38\*(6), 612–620. <https://doi.org/10.1007/s10608-014-9629-0>
19. Neves, D. A. (2006). Information science and human cognition: An approach to information processing. *\*Ciência da Informação*, 35\*(2), 39–44. <https://doi.org/10.1590/S0100-19652006000200004>
20. Parizato, D., Cardoso, A., & Souza, J. C. de, Jr. (2025). An adaptation of neuropsychopedagogy for mathematical learning. [Nome da revista não fornecido], \*11\*(1). E-ISSN: 2359-0793.
21. Rebecca, T., John, G., Mielke, T., & McAuley, T. (2020). Global executive dysfunction, not essential executive skills, mediate the relationship between exposure to adversity and later health in undergraduate students. *\*Applied Neuropsychology: Adult\**. Advance online publication. <https://doi.org/10.1080/23279095.2020.1764561>
22. Rodrigues, M. A. C. (2024). *\*Relationship between executive functions and social behavior in school-age children from the perspective of psychoanalysis\** [Dissertação de mestrado, Logos University International].
23. Sagvolden, T., Johansen, E. B., Aase, H., & Russell, V. A. (2005). A dynamic developmental theory of attention-deficit/hyperactivity disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *\*Behavioral and Brain Sciences*, 28\*(3), 397–468. <https://doi.org/10.1017/S0140525X05000075>

24. Souza, I. de L. S., et al. (2021). Relationship between executive functions and ADHD in children and adolescents: A systematic review. \*Revista Psicopedagogia, 38\*(116). <https://doi.org/10.51207/2179-20210023>
25. Tang, R., Elman, J. A., Franz, C. E., Dale, A. M., Eyler, L. T., Fennema-Notestine, C., ... & Kremen, W. S. (2023). Longitudinal association of executive function and structural network controllability in the aging brain. \*GeroScience, 45\*(2), 837–849. <https://doi.org/10.1007/s11357-022-00676-3>
26. Van Veen, V., Cohen, J. D., Botvinick, M. M., Stenger, V. A., & Carter, C. S. (2001). Anterior cingulate cortex, conflict monitoring, and levels of processing. \*NeuroImage, 14\*(6), 1302–1308. <https://doi.org/10.1006/nimg.2001.0923>
27. Wongupparaj, P., Kumari, V., & Morris, R. G. (2015). Executive function processes mediate the impact of working memory impairment on intelligence in schizophrenia. \*European Psychiatry, 30\*(1), 1–7. <https://doi.org/10.1016/j.eurpsy.2014.06.001>
28. Zelazo, P. D., & Cunningham, W. A. (2007). Executive function: Mechanisms underlying emotion regulation. [Informação incompleta: Nome da revista, volume e páginas não fornecidos].
29. Zelazo, P. D. (2020). Executive function and psychopathology: A neurodevelopmental perspective. \*Annual Review of Clinical Psychology, 16\*, 431–454. <https://doi.org/10.1146/annurev-clinpsy-072319-024242>