

Executive Functions And Asthma Self-Management: A Systematic Review

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ABSTRACT:

Bronchial asthma is a chronic inflammatory disease whose effective management largely depends on the patient's ability to regulate their behavior in accordance with therapeutic demands. Executive functions—including working memory, cognitive flexibility, and inhibitory control—are fundamental cognitive processes involved in goal-directed behavior, adaptive decision-making, and treatment adherence. However, the relationship between asthma and executive functioning has not been systematically examined.

The aim of this systematic review was to examine the empirical evidence regarding the association between executive functions and bronchial asthma. The review was conducted in accordance with the PRISMA 2020 guidelines, through a search of the PubMed, PsycINFO, Web of Science, and Scopus databases including studies published up to February 2026. Empirical studies assessing executive functions in patients with asthma using validated instruments were included.

Of the records identified, 14 studies met the inclusion criteria. The results indicate that individuals with asthma show impairments in working memory, cognitive flexibility, and inhibitory control in both pediatric and adult populations. Executive functioning was also associated with clinically relevant variables such as treatment adherence, appropriate inhaler use, and disease control. Neuroimaging studies further identified alterations in brain networks involved in cognitive control, suggesting possible underlying neurobiological mechanisms.

In conclusion, bronchial asthma appears to be associated with alterations in executive functioning that may affect disease self-management. Cognitive assessment may therefore contribute to

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improving clinical interventions and optimizing therapeutic outcomes.

Keywords: bronchial asthma; executive functions; working memory; treatment adherence; cognitive functioning.

1. Introduction

Bronchial asthma is a chronic inflammatory disease of the airways characterized by variable airflow obstruction, bronchial hyperresponsiveness, and recurrent episodes of dyspnea, wheezing, and coughing. It is one of the most prevalent chronic diseases worldwide and represents a major public health problem due to its impact on quality of life, its prolonged course, and the burden it places on healthcare systems (Fernández-Rodríguez & Miralles, 2015; Fernández-Rodríguez, 2012; 2017; Fernández-Rodríguez et al., 2018).

Effective asthma management requires the active involvement of patients in complex self-regulatory behaviors, including adherence to pharmacological treatment, correct inhaler use, symptom monitoring, and appropriate decision-making in response to changes in clinical status (Global Initiative for Asthma [GINA], 2023).

These behaviors largely depend on executive functions, a set of high-level cognitive processes involved in goal-directed behavioral control. Executive functions include working memory, inhibitory control, cognitive flexibility, and planning, and are primarily mediated by the activity of the prefrontal cortex and its connections with other brain regions (Diamond, 2013). These processes allow individuals to maintain relevant information in active memory, inhibit inappropriate responses, and adapt behavior according to environmental demands, which is essential for the effective management of chronic diseases.

Asthma management places significant demands on executive functioning. Patients must remember to take medication, interpret symptoms, and adjust therapeutic behaviors accordingly. In this context, impairments in executive functions may interfere with treatment

adherence and disease control. Sonney and Insel (2019) found that executive functioning—particularly cognitive flexibility—was significantly associated with treatment adherence in children with asthma, suggesting that executive processes play a fundamental role in effective disease management.

Several studies have identified executive function impairments in patients with asthma. Rajabi et al. (2018) observed that individuals with chronic asthma performed significantly worse on tasks assessing executive functions compared to healthy controls. Similarly, Taha (2017) reported deficits in cognitive flexibility and executive control in children with moderate to severe asthma, while Fryt et al. (2013) identified impairments in self-regulation and cognitive control in pediatric populations with asthma. These findings suggest that asthma may be associated with difficulties in cognitive processes involved in behavioral regulation.

Recent evidence further supports these findings. Christopher-Hayes et al. (2024) observed that children with asthma exhibited significant impairments in memory and cognitive processes related to executive control, suggesting that asthma may affect neurocognitive development. Likewise, Rhyou et al. (2021) found significant associations between asthma and cognitive impairment in adults, including deficits in working memory and executive functions, indicating that the cognitive impact of asthma may be observed across the lifespan.

In addition to behavioral evidence, neuroimaging studies have identified structural and functional brain alterations in individuals with asthma. Bian et al. (2018) observed alterations in white matter integrity associated with deficits in executive functions and working memory. More recent studies have identified alterations in functional

brain connectivity in patients with asthma, particularly in regions involved in cognitive control and executive functioning, suggesting a possible neurobiological mechanism underlying cognitive impairment in this population (Wang et al., 2024).

Cognitive functioning also appears to be related to clinical asthma control. Ray et al. (2015) found significant associations between cognitive performance and asthma control in older adults, while O'Connor et al. (2015) observed that cognitive functioning was associated with proper inhaler use and treatment adherence. Similarly, Allen et al. (2003) demonstrated that executive functioning influences patients' ability to learn and maintain correct inhaler technique, highlighting the importance of executive functions in effective asthma treatment.

During childhood, executive functions play a crucial role in the development of the self-regulation required for independent disease management. Impairments in these functions may interfere with children's ability to progressively assume responsibility for their treatment, contributing to inadequate asthma control (Annett et al., 2005). Likewise, in older adults, cognitive decline may hinder effective disease management and compromise treatment adherence (Ray et al., 2015).

Despite the relevance of these findings, the existing literature shows considerable methodological heterogeneity and has not been systematically synthesized. Studies differ in terms of populations, assessment instruments, and methodological approaches, making it difficult to achieve a comprehensive understanding of the role of executive functions in bronchial asthma. Therefore, a systematic review is necessary to integrate the available evidence and clarify the relationship between executive functioning and asthma management.

Accordingly, the objective of the present systematic review is to examine the available empirical evidence regarding the relationship between executive functions and bronchial asthma. Specifically, this review aims to identify

executive function impairments in patients with asthma, analyze their relationship with disease management, and evaluate the neuropsychological and neurobiological mechanisms involved in this association.

2. Method

Study design

A systematic review of the scientific literature was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement (Page et al., 2021). The objective of the review was to identify, evaluate, and systematically synthesize the available empirical evidence on the relationship between executive functions and bronchial asthma.

Information sources

A comprehensive search was carried out in several databases in order to identify relevant studies. The databases consulted were PubMed, PsycINFO, Scopus, and Web of Science.

These databases were selected due to their broad coverage of biomedical, psychological, and neuropsychological research. The search included all records available up to February 2026.

Additionally, the reference lists of the included studies were manually reviewed in order to identify potentially relevant articles that had not been detected in the initial search.

Search strategy

The search strategy was designed to identify studies examining the relationship between asthma and executive functions. The following search equation was used, adapted according to the specific characteristics of each database:

(asthma OR "bronchial asthma") AND ("executive function" OR "working memory" OR "cognitive control" OR "cognitive flexibility" OR "inhibitory control" OR "neuropsychological function")**

No restrictions were applied regarding the year of publication. Only studies published in English or Spanish were included.

Eligibility criteria

Inclusion criteria

- Studies were included if they met the following criteria:
- Quantitative empirical studies
- Participants diagnosed with bronchial asthma
- Assessment of executive functions or related cognitive processes (e.g., working memory, inhibitory control, or cognitive flexibility)
- Use of validated neuropsychological or cognitive assessment instruments
- Publication in peer-reviewed scientific journals

Exclusion criteria

- Studies were excluded if they:
- Were systematic reviews, meta-analyses, editorials, or case studies
- Did not assess executive functions or relevant cognitive processes
- Did not include participants diagnosed with asthma
- Were conducted using animal models

Study selection process

The study selection process followed the PRISMA 2020 framework and included four stages:

- Identification
- Screening
- Eligibility assessment
- Final inclusion

The initial search identified a total of 69 records. Titles and abstracts were subsequently reviewed to assess their relevance. Studies that did not meet the inclusion criteria were excluded at this stage.

Next, the full texts of potentially eligible articles were evaluated. Finally, 14 studies met all inclusion criteria and were included in the systematic review.

Data extraction

Data from each study were extracted using a standardized procedure. The following information was collected:

- Author(s) and year of publication
- Study design
- Sample size and participant characteristics
- Age group
- Instruments used to assess executive functions
- Asthma-related measures
- Main findings

This procedure allowed for a systematic comparison of findings across the included studies.

Assessment of methodological quality

The methodological quality of the included studies was evaluated considering the following criteria:

- Sample characteristics
- Validity and reliability of the instruments used
- Clarity of the methodological design
- Adequacy of the statistical analyses

This process ensured that the results of the review were based on studies with an appropriate level of scientific rigor.

Data synthesis

Due to the heterogeneity of study designs, sample characteristics, and assessment instruments, a qualitative synthesis of the results was conducted.

The analysis focused on:

- Identifying executive function impairments in patients with asthma
- Examining the relationship between executive functions and asthma management
- Analyzing the neuropsychological and neurobiological mechanisms involved

A meta-analysis was not performed due to the methodological variability among the included studies.

3. Results

The study selection process was conducted following the PRISMA 2020 guidelines. The initial bibliographic search identified 69 potentially relevant records.

After removing duplicate records and reviewing titles and abstracts, 55 studies were excluded for not meeting the inclusion criteria, primarily due

to the absence of executive function assessments or the lack of participants diagnosed with asthma.

Subsequently, the full texts of 14 articles were evaluated for eligibility. Ultimately, 14 studies met all inclusion criteria and were included in the systematic review.

These studies examined the relationship between bronchial asthma and various executive functions, including working memory, cognitive flexibility, inhibitory control, planning, and self-regulation.

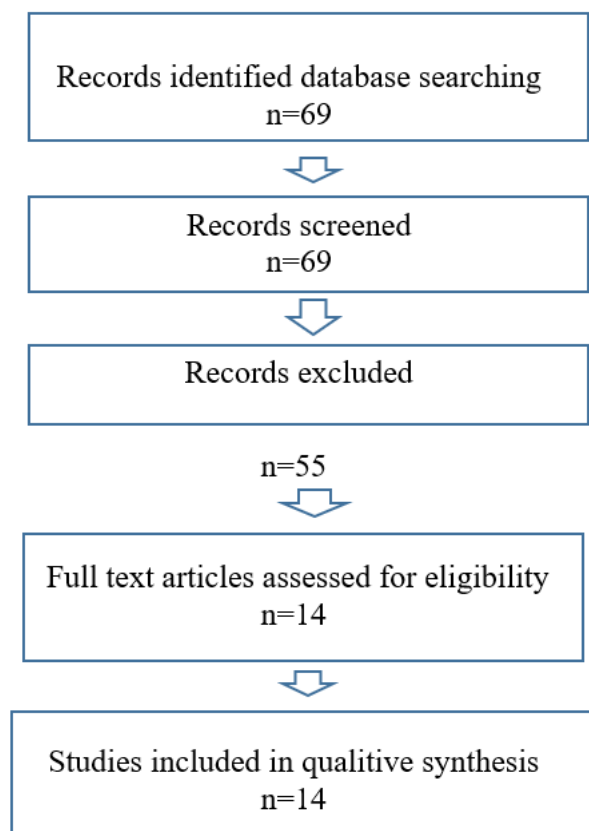


Figure 1. PRISMA 2020 flow diagram of the study selection process.

Characteristics of the included studies

The 14 studies included in this review were published between 2003 and 2024, reflecting a growing interest in the relationship between asthma and executive functioning over the past two decades.

Sample sizes varied considerably across studies, ranging from small samples of approximately 30

participants to studies involving several hundred individuals.

The studies included diverse populations, such as children, adolescents, adults, and older adults, allowing examination of the impact of asthma on executive functioning across the lifespan.

Author	Year	Country	(N)	Age Group	Study Design	Executive Function Measures	Main Findings
Allen et al.	2003	UK	30	Older adults	Cross-sectional	Executive function tests	Executive functioning associated with inhaler technique learning
Annett et al.	2005	USA	63	Children	Cross-sectional	Neuropsychological tests	Asthma associated with neuropsychological impairments
Fryt et al.	2013	Poland	80	Children	Cross-sectional	Executive function tasks	Self-regulation impairments
Ray et al.	2015	USA	452	Older adults	Cross-sectional	Trail Making Test, working memory	Cognitive impairment related to asthma control
O'Connor et al.	2015	USA	425	Older adults	Cross-sectional	Working memory, processing speed	Cognitive functioning associated with treatment adherence
Taha	2017	Egypt	52	Children	Case-control	Wisconsin Card Sorting Test	Executive deficits in children with asthma
Rajabi et al.	2018	Iran	60	Adults	Case-control	Executive tests	Lower executive performance in asthma patients
Bian et al.	2018	China	40	Adults	Neuroimaging	Working memory tasks	White matter alterations
Sonney & Insel	2019	USA	31	Children	Cross-sectional	BRIEF	Executive functions related to adherence
Rhyou & Nam	2021	Korea	1119	Adults	Cross-sectional	Cognitive tests	Asthma associated with cognitive decline
Gidaris et al.	2021	Greece	93	Children	Cross-sectional	BRIEF	Executive impairments
Wang et al.	2024	China	45	Adults	Neuroimaging	Functional connectivity	Brain network alterations
Christopher-Hayes et al.	2024	USA	3798	Children	Cohort	Memory executive tests	Cognitive deficits in asthma
Durak & Kaya	2026	Turkey	74	Adults	Cross-sectional	CFS, MMAS-8	Cognitive flexibility related to adherence

Table 1. Characteristics of the studies included in the systematic review

Most studies employed observational cross-sectional designs, although some used longitudinal or experimental approaches.

Executive functions were assessed using validated neuropsychological instruments, including:

- Wisconsin Card Sorting Test
- Trail Making Test
- Working memory tasks
- Behavioral questionnaires assessing executive function

Executive function impairments in patients with asthma

The results of the included studies consistently indicate that patients with asthma exhibit impairments in several executive functions.

Several studies identified deficits in cognitive flexibility and executive control in individuals

with asthma compared with healthy control groups. For example, Rajabi et al. (2018) found that patients with chronic asthma performed significantly worse on tasks assessing executive functions. Similarly, Taha (2017) observed significant deficits in cognitive flexibility and executive control among children with moderate to severe asthma.

Fryt et al. (2013) also reported impairments in self-regulation and executive control processes in children with asthma, suggesting that this condition may affect cognitive processes involved in behavioral regulation.

Working memory was another domain frequently affected. Christopher-Hayes et al. (2024) observed impairments in memory and related cognitive functions among children with asthma, whereas Rhyou et al. (2021) identified deficits in working memory and other cognitive functions in adults with asthma.

Executive Domain	Function Evidence	Key Studies
Working memory	Frequently impaired	Christopher-Hayes et al., Rhyou et al.
Cognitive flexibility	Strong association with adherence	Sonney & Insel; Durak & Kaya
Inhibitory control	Moderate evidence	Taha; Rajabi
Self-regulation	Observed mainly in pediatric populations	Fryt; Annett

Table 2. Executive function domains affected in asthma

Relationship between executive functions and asthma management

Several studies demonstrated that executive functions play a crucial role in the effective management of asthma.

Sonney and Insel (2019) found that executive functioning was significantly associated with treatment adherence in children with asthma. Patients with better executive functioning exhibited higher levels of adherence to pharmacological treatment.

Similarly, Durak and Kaya (2026) reported a significant relationship between treatment adherence and cognitive flexibility in adult patients with asthma.

O'Connor et al. (2015) also found that cognitive functioning was associated with correct inhaler use and higher levels of treatment adherence in older adults with asthma.

Consistently, Allen et al. (2003) demonstrated that executive functioning influences patients' ability to learn and maintain correct inhaler

technique, highlighting the importance of these cognitive processes in disease management.

Ray et al. (2015) also identified significant associations between cognitive functioning and asthma control in older adults, suggesting that cognitive impairment may negatively affect disease management.

Neurobiological evidence of cognitive alterations in asthma

The included studies also provided evidence of structural and functional brain alterations in patients with asthma.

Bian et al. (2018) identified disruptions in white matter integrity associated with deficits in executive functions and working memory. These findings suggest that asthma may affect brain structures involved in cognitive control.

Similarly, Wang et al. (2024) identified alterations in functional brain connectivity in patients with asthma, particularly in networks involved in cognitive control, suggesting a possible neurobiological mechanism underlying the cognitive impairment observed in this population.

Impact of asthma on executive functioning across the lifespan

The included studies indicate that the impact of asthma on executive functions may be observed throughout the lifespan.

In pediatric populations, Annett et al. (2005) observed associations between asthma and neuropsychological performance, suggesting that asthma may affect cognitive development.

In adults and older adults, several studies identified associations between asthma and cognitive impairment, including deficits in executive functions, working memory, and attention (Ray et al., 2015; Rhyou et al., 2021).

These findings suggest that asthma may have persistent effects on cognitive functioning across the lifespan.

Overall synthesis of findings

Overall, the results of this systematic review indicate that bronchial asthma is associated with impairments in several executive functions, including working memory, cognitive flexibility, and inhibitory control.

These impairments may affect patients' ability to effectively manage their disease and adhere to treatment.

Furthermore, neurobiological evidence suggests that these cognitive alterations may be related to structural and functional changes in the brain.

Taken together, these findings highlight the importance of considering executive functioning as a relevant factor in the clinical management of asthma.

4. Discussion

The present systematic review examined the relationship between executive functions and bronchial asthma by integrating the empirical evidence from studies published between 2003 and 2024. The findings consistently indicate that asthma is associated with impairments in executive functioning, including deficits in working memory, cognitive flexibility, inhibitory control, and behavioral self-regulation. Furthermore, the evidence suggests that executive functioning plays a crucial role in disease management, treatment adherence, and clinical asthma control.

Executive function impairments in patients with asthma

The findings of this review indicate that impairments in executive functions are relatively common among individuals with asthma and can be observed at different stages of the lifespan. Several studies reported that patients with asthma exhibit poorer performance on tasks assessing executive functioning compared with healthy control participants (Rajabi et al., 2018; Taha, 2017). These impairments have been identified in both pediatric and adult populations, suggesting that executive dysfunction associated with

asthma may represent a relatively stable phenomenon.

Among the executive domains affected, working memory and cognitive flexibility appear to be particularly vulnerable. These cognitive processes are essential for goal-directed behavior and adaptation to environmental demands (Diamond, 2013). Impairments in these functions may reduce patients' ability to respond effectively to changes in their clinical condition, potentially compromising appropriate disease management.

Recent evidence further supports these findings. Christopher-Hayes et al. (2024) reported that children with asthma showed significant

impairments in memory and cognitive processes related to executive control, suggesting that asthma may influence neurocognitive development. Similarly, Fryt et al. (2013) identified impairments in self-regulatory processes in children with asthma, while Annett et al. (2005) observed associations between asthma and neuropsychological performance.

In adult populations, Rhyou et al. (2021) reported significant associations between asthma and cognitive impairment, including deficits in executive functioning and working memory. These findings suggest that the cognitive impact of asthma may persist across the lifespan.

Executive Function Domain	Description	Evidence from Included Studies	Key Studies
Working Memory	Ability to maintain and manipulate information temporarily in order to guide and adapt goal-directed behavior.	Frequently reported impairments in both pediatric and adult populations with asthma.	Christopher-Hayes et al. (2024); Rhyou & Nam (2021); Ray et al. (2015)
Cognitive Flexibility	Capacity to shift between cognitive strategies and adapt behavior to changing environmental demands.	Associated with treatment adherence and adaptive disease management.	Sonney & Insel (2019); Durak & Kaya (2026); Taha (2017)
Inhibitory Control	Ability to suppress automatic or inappropriate responses in favor of goal-directed actions.	Moderate evidence suggesting deficits in individuals with asthma compared with healthy controls.	Rajabi et al. (2018); Taha (2017)
Self-Regulation	Ability to monitor and regulate behavior, emotions, and cognitive processes to achieve long-term goals.	Particularly affected in pediatric populations with asthma.	Fryt et al. (2013); Annett et al. (2005)

Table 3. Executive Function Domains Affected in Asthma

Executive functions and asthma management

One of the most clinically relevant findings of this review concerns the relationship between executive functioning and effective asthma management. Executive functions play a central role in the regulation of health-related behaviors,

including treatment adherence, symptom monitoring, and therapeutic decision-making.

Sonney and Insel (2019) found that executive functioning was significantly associated with medication adherence among children with asthma. Similarly, O'Connor et al. (2015) and Durak and Kaya (2026) reported that cognitive

functioning was related to correct inhaler use and treatment adherence among older adults.

Furthermore, Allen et al. (2003) demonstrated that executive functioning influences patients' ability to learn and maintain proper inhaler technique. This finding is particularly important, as incorrect inhaler use represents one of the primary causes of poor asthma control.

Ray et al. (2015) also identified significant associations between cognitive functioning and asthma control, suggesting that cognitive impairment may negatively influence disease outcomes.

Taken together, these findings indicate that executive functions play a critical role in asthma self-management and that impairments in these processes may contribute to poorer disease control.

Neurobiological mechanisms

The evidence included in this review also suggests potential neurobiological mechanisms underlying executive dysfunction in patients with asthma. Neuroimaging studies have identified structural and functional alterations in the brains of individuals with asthma.

Bian et al. (2018) reported disruptions in white matter integrity associated with deficits in executive functions, suggesting alterations in neural connectivity. Similarly, Wang et al. (2024) identified alterations in functional brain connectivity in patients with asthma, particularly in networks involved in cognitive control.

These findings suggest that asthma may directly affect neural systems responsible for executive functioning. Possible mechanisms include chronic systemic inflammation, which may influence neural functioning through neuroimmune pathways, and intermittent hypoxia, which may contribute to cognitive impairment.

Clinical Implications

The findings of this review have important clinical implications. Executive function

impairments may represent an important but frequently overlooked factor in asthma management.

Assessing executive functioning could help identify patients at increased risk of difficulties in managing their disease. Cognitive assessment may therefore contribute to more personalized clinical interventions.

Moreover, interventions aimed at improving executive functioning could potentially enhance treatment adherence and asthma control.

In pediatric populations, early identification of executive function impairments may facilitate the development of interventions designed to improve self-regulation skills and disease self-management.

In older adults, cognitive assessment may help identify individuals who require additional support in managing their condition.

5. Limitations

This review has several limitations that should be considered when interpreting the findings.

First, most of the included studies employed cross-sectional designs, which limits the ability to establish causal relationships between asthma and executive dysfunction.

Second, there was substantial heterogeneity in the instruments used to assess executive functions, which may complicate comparisons across studies.

Additionally, factors such as asthma severity, pharmacological treatment, and the presence of comorbid conditions were not consistently controlled across studies.

These methodological limitations highlight the need for further research using more standardized and rigorous approaches.

6. Future directions

Future research should employ longitudinal designs in order to examine potential causal relationships between asthma and executive dysfunction.

Neuroimaging studies may also help clarify the neurobiological mechanisms underlying cognitive alterations in asthma.

Furthermore, intervention studies are needed to determine whether improvements in executive functioning can enhance asthma self-management and clinical outcomes.

Such research could contribute to the development of integrated clinical approaches that incorporate cognitive assessment into the management of asthma.

7. Conclusion

In conclusion, the available evidence indicates that bronchial asthma is associated with impairments in executive functioning, particularly in working memory, cognitive flexibility, and inhibitory control.

These cognitive alterations may negatively affect disease management, treatment adherence, and asthma control.

The findings of this review highlight the importance of considering executive functioning as a relevant factor in the clinical management of asthma and underscore the potential value of integrating cognitive assessment into clinical care for patients with this condition.

8. References

- Allen, S. C., Jain, M., Ragab, S., & Malik, N. (2003). Acquisition and short-term retention of inhaler techniques require intact executive function in elderly subjects. *Age and Ageing*, 32(3), 299–302. <https://doi.org/10.1093/ageing/32.3.299>
- Annett, R. D., Stansbury, K., Kelly, H. W., & Strunk, R. C. (2005). Association of hypothalamic–pituitary–adrenal axis function with neuropsychological performance in children with asthma. *Child Neuropsychology*, 11(4), 333–348. [10.1080/09297040490916929](https://doi.org/10.1080/09297040490916929)
- Bian, R., Zhang, Y., Yang, Y., Yin, Y., Zhao, X., Chen, H., & Yuan, Y. (2018). White matter integrity disruptions correlate with cognitive impairments in asthma. *Journal of Magnetic Resonance Imaging*, 48, 748–756. [10.1002/jmri.25946](https://doi.org/10.1002/jmri.25946)
- Christopher-Hayes, N. J., Haynes, S. C., Kenyon, N. J., Merchant, V. D., Schweitzer, J. B., & Ghatti, S. (2024). Asthma and Memory Function in Children, 7(11), e2442803. [10.1001/jamanetworkopen.2024.42803](https://doi.org/10.1001/jamanetworkopen.2024.42803)
- Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, 64, 135–168. <https://doi.org/10.1146/annurev-psych-113011-143750>
- Durak, B & Kaya, A. E. (2026). Cognitive flexibility and associated factors in stable asthma patients: the mediating role of treatment adherence. *Journal of Health Sciences and Medicine*, 9(1), 39-44. [10.32322/jhsm.1796816](https://doi.org/10.32322/jhsm.1796816)
- Fernández-Rodríguez, J. C. (2012). The experience and expression of anger and anxiety in bronchial asthma patients. *Anuario de Psicología*, 2(42), 213-225. <https://revistes.ub.edu/index.php/Anuario-psicologia/article/view/8211>
- Fernández-Rodríguez, J. C. (2017). State of the Relationship between Bronchial Asthma and Psychological Factors. *Annals of Clinical and Laboratory Research*, 3(4), 1- 2. [10.21767/2386-5180.1000204](https://doi.org/10.21767/2386-5180.1000204)
- Fernández-Rodríguez, J. C. & Miralles, F. (2015). Presence of depression in patients with asthma and its influence on their families. *Anuario de Psicología*, 45(3), 361-374. <https://revistes.ub.edu/index.php/Anuario-psicologia/article/view/14645>
- Fernández-Rodríguez, J. C., Miralles, F. & Cima, A. (2018). Presence of negative emotions in bronchial asthma. *Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, 9(17), 256-276. [http://dx.doi.org/10.23913/ride.v9i17.380](https://dx.doi.org/10.23913/ride.v9i17.380)
- Fryt, J., Pilecka, W. & Smolen, T. (2013). Does asthma disturb executive functions and self-regulation in children. *Polish Journal of Applied Psychology*, 12(2), 169-185. <http://pjpap.psychologia.uni.wroc.pl/sites/default/files/fryt.pdf>

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- Gidaris, D., Stabouli, S., Eleftheriou, K., Cassimos, D., Urquhart, D., Kotsis, V. y Zafeiriou, D. (2021). Trastornos respiratorios subjetivos relacionados con el sueño y función ejecutiva en niños con asma intermitente o persistente leve. *The Clinical Respiratory Journal*, 15(7), 794-799. <https://doi.org/10.1111/crj.13364>
- Global Initiative for Asthma. (2023). Global strategy for asthma management and prevention. <https://ginasthma.org/wp-content/uploads/2023/05/GINA-2023-Full-Report-2023-WMS.pdf>
- O'Connor, R., Wolf, M. S., Smith, S. G., Martynenko, M., Vicencio, D. P., Sano, M., Wisnivesky, J. P., & Federman, A. D. (2015). Health literacy, cognitive function, and inhaler technique among older adults with asthma. *Chest*, 147(5), 1307–1315. 10.1378/pecho.14-0914.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *British Medical Journal*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Rajabi, S., Keshavarz, E., Dehghani, Y., & Keshavarz, M. (2018). Comparing executive functions between patients with chronic asthma and healthy subjects. *Journal of Asthma*, 55(4), 452–459. 10.1080/02770903.2017.1337786.
- Ray, M., Sano, M., Wisnivesky, J. P., Wolf, M. S., & Federman, A. D. (2015). Asthma control and cognitive function in a cohort of elderly adults. *Journal of the American Geriatrics Society*, 63(4), 684–691. 10.1111/jgs.13350.
- Rhyou H. I., Bae W. Y. & Nam Y. H. (2021). Association Between Olfactory Function and Asthma in Adults. *Journal of Asthma & Allergy*. 31(14), 309-316. 10.2147/JAA.S299796.
- Sonney, J., & Insel, K. C. (2019). Exploring the intersection of executive function and medication adherence in school-age children with asthma. *Journal of Asthma*, 56(2), 179–189. 10.1080/02770903.2018.1441870.
- Taha, H. (2017). Poor executive functions among children with moderate-to-severe asthma. *Frontiers in Psychology*, 8, 793. 10.3389/fpsyg.2017.00793
- Wang W., Gulliver J., Beevers S., Freni Sterrantino A., Davies B., Atkinson R. W. & Fecht D. (2024). Short-Term Nitrogen Dioxide Exposure and Emergency Hospital Admissions for Asthma in Children: A Case-Crossover Analysis in England. *Journal of Asthma & Allergy*, 9(17), 349-359. 10.2147/JAA.S448600.
-