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Review Paper

The Effect of Age of Onset on Cognitive Functions in Epilepsy: A Systematic Review

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ABSTRACT

Epilepsy is a chronic neurological disorder often associated with significant cognitive and psychological challenges. This systematic review examined the effect of age of onset on cognitive functions, focusing on domains such as memory, attention, executive function, and intelligence. Following PRISMA guidelines, 12 studies published between 2010 and 2025 were analyzed. The findings revealed that early-onset epilepsy often disrupts neurodevelopmental processes, leading to persistent deficits in attention, executive control, and intellectual function, whereas late-onset epilepsy is more influenced by psychological and treatment-related factors such as anxiety and polytherapy. Across age groups, cognitive impairments in epilepsy reflect both neurological and psychosocial mechanisms, underscoring the need for early assessment, targeted interventions and integrated management approaches.

Keywords: *Epilepsy, Cognition, Cognitive Outcomes, Age of Onset, Childhood Onset, Adult Onset*

Affecting around 50 million of the world population, the World Health Organization defines epilepsy as a neurological condition that causes unprovoked, recurrent seizures, which is a sudden rush of abnormal electrical activity in the brain. It is one of the oldest recognized conditions with records dating back to 4000 BCE. But the discrimination, stigma and misunderstanding around it has been present for centuries and even today (WHO, 2024). The most common onset of epilepsy is in young children and older adults. According to a study conducted by Hu et al. (2021), men tend to develop epilepsy more than women, because of the higher exposure to risk factors such as alcohol use and head trauma. Neuropsychology plays an important role in understanding how epilepsy affects a person's thinking and behaviour. By using carefully designed tests, neuropsychologists assess changes in memory, attention and other abilities, and also contribute to brain mapping procedures that guide treatment (Swanson et al., 2014).

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Cognitive impairments are among the most common and disabling consequences of epilepsy, often affecting memory, attention, language and executive functions. The impairment in memory isn't limited to just forgetting recent events, but can also be in difficulties forming new memories and recalling information from the past. Attention and concentration is another area that is affected, where they report of struggles to focus on tasks and draw out distractions, such that even simple daily tasks are draining. Impairment in language abilities can manifest as difficulty in finding the right words and expressing thoughts clearly. Executive functions of the individual can also be affected in a way that, these individuals would have difficulty in problem solving, multitask or adapt to new situations. According to a study conducted by Al-Shaz and Al-Khaligy (2013), impairment in intellectual function is also a common consequence in epilepsy of childhood. Patients with generalized tonic-clonic seizures tend to show more widespread deficits than those with focal or absence seizures (Abd El-Mawla et al., 2023). Moreover, the longer someone has lived with epilepsy, especially when seizures are frequent or poorly controlled, the more likely cumulative disruption across multiple cognitive domains including memory, attention and executive function (Zhou et al., 2022). Comorbid conditions such as depression, anxiety, and polypharmacy, which is the use of multiple antiseizure medications, further worsen cognitive impairment often beyond what epilepsy alone would predict (Flicker et al., 2016).

The age of onset of epilepsy can impact the development and quality of life of individuals. The different starting points such as childhood or in older adults can make a difference in the way it affects the persons overall functioning. Childhood onset occurs during periods when the brain is still developing and when synaptic connections are being formed, pruned, and reorganized, whereas adult onset happens after much of this development has already taken place. When epilepsy has an early onset, which is during the sensitive developmental windows abnormal neural activity may interfere with normal processes of brain maturation myelination, white matter development, formation of networks among different brain regions and this can lead to more widespread structural changes and cognitive deficits. Studies show that people with childhood onset temporal lobe epilepsy tend to have reduced white matter volume (including outside the primary seizure focus) and broader neuropsychological impairment compared with those whose seizures began in adulthood (Hermann et al., 2002; Hermann et al., 2003).

Some studies report that earlier onset, especially during childhood, is consistently linked to poorer performance on memory, attention, and executive. A study conducted by DeGeorge et al. (2021) found that younger age at onset predicted reduced auditory attention span and working memory scores. However, other work suggests that the relationship is less clear. In some cases, cognitive deficits appear already at or close to diagnosis, regardless of how early the seizures began indicating that underlying neurobiological factors may predate or coincide with epilepsy onset (Witt et al., 2015). Moreover, long-term studies show that once deficits are established, they may remain relatively stable over time rather than progressively worsen solely because of early onset (Eriksson et al., 2024).

Although many studies have examined the relationship between age of onset and cognitive outcomes in epilepsy, their findings remain scattered. Some report a strong link between early onset and poorer neuropsychological functioning, others, however, find that once you take into account things like seizure type, frequency, or medication use, the effect of age of onset is far less obvious. Differences in study design, sample size, cognitive domains assessed, and demographic factors further complicate comparisons across research. Because of this heterogeneity, it is difficult to draw firm conclusions from individual studies alone, highlighting the need and importance for a systematic synthesis of evidence that can clarify patterns and guide future clinical practice.

A systematic review is therefore both timely and necessary, as it can bring these scattered results together into a more coherent understanding. Beyond its academic value, such a review can also has practical relevance. Knowing how the time of epilepsy onset influences cognition can help improve prognosis, help teachers and parents make informed decisions about educational support, guide the design of cognitive rehabilitation programs and highlight the importance of early interventions when seizures begin in childhood. In this way, a systematic review can bridge the gap between research evidence and the day-to-day realities faced by people living with epilepsy.

This systematic review aims to examine the effect of age of onset of epilepsy on cognitive functions by bringing together findings from existing research. By looking across studies, it will consider how different methodological approaches have been used to investigate these areas. The review will also identify where the evidence is strong, where it remains limited or inconsistent and what gaps should be addressed in future research. In doing so it aims not only to clarify the current state of knowledge but also to point the way toward more targeted studies and interventions.

METHODOLOGY

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were followed for this systematic review. The authors searched from three major databases which were PubMed, Google Scholar and Science Direct. The search terms used for searching for the articles were ‘Epilepsy’, ‘Cognition’, ‘Cognitive outcomes’, ‘Age of onset’, ‘Childhood onset’, ‘Adult onset’, ‘Attention and Concentration’, ‘Memory’, ‘Intelligence’, ‘Executive Functions.’ This helped in enabling more relevant articles for Age of onset and its effect on cognitive functions in individuals with epilepsy.

Selection of the articles was done based on clearly defined inclusion and exclusion criteria to ensure relevance. The study was included it involved participants with a confirmed diagnosis of epilepsy and explicitly reported the age of participants. Studies encompassing any type of epilepsy were considered, provided they presented measurable data on cognitive domains such as memory, attention, executive function, or intelligence. Only peer-reviewed articles published in English between 2010 and the present were included. Excluded were studies that did not specify the age, relied solely on subjective or non-validated cognitive assessments, or examined epilepsy as a secondary condition to another neurodegenerative disorder. Additionally, systematic reviews, book chapters, and non-English publications were omitted.

Study Selection and Categorization

The study selection was done after reading through the abstracts and clearly going over the inclusion and exclusion criteria. Duplicate studies were excluded and only those which were relevant to epilepsy and cognitive outcomes were included, as per the inclusion criteria.

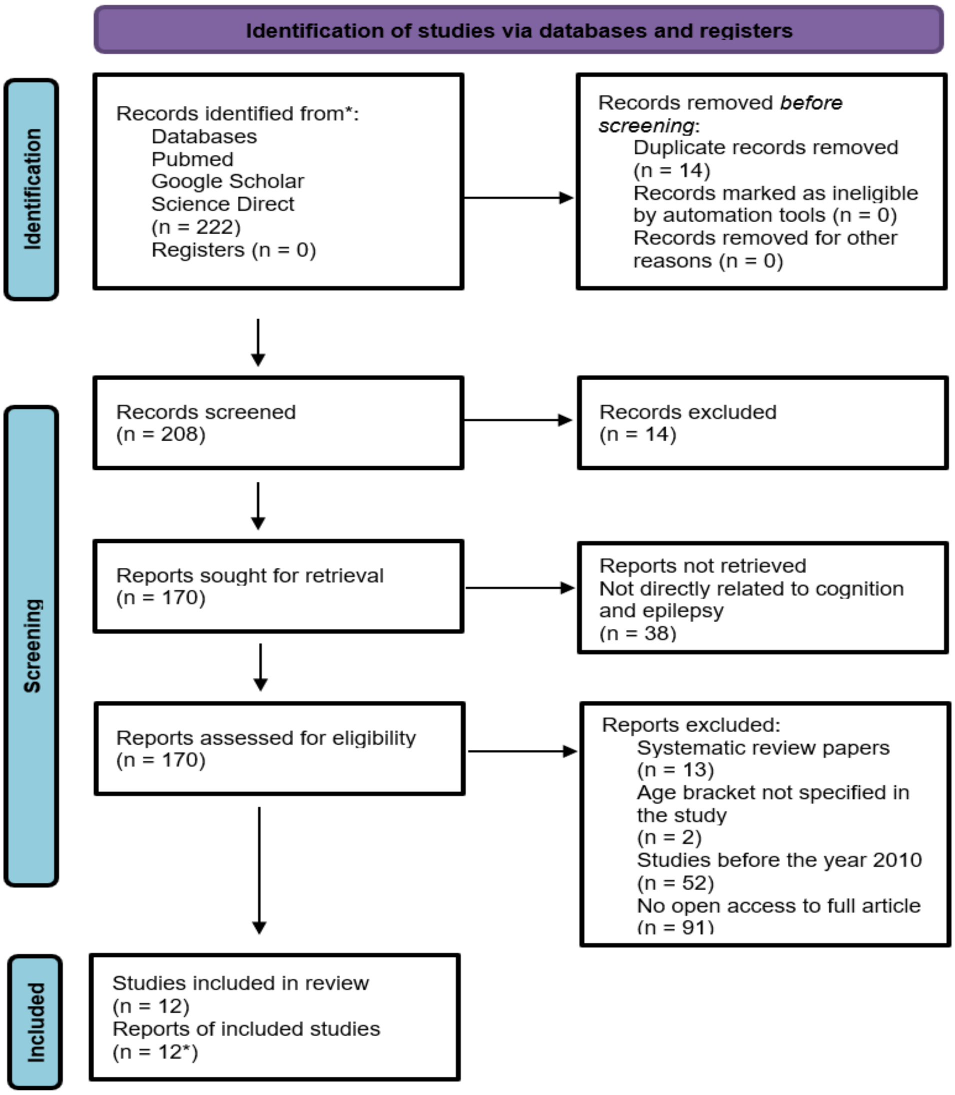
Data Collection

The data extraction was independently done by the author where the information was extracted from each of the selected article, including the author, year, theoretical or conceptual framework, research Questions, hypothesis, methodology, analysis and major findings, conclusion, limitations.

RESULTS

Based on the PRISMA flow diagram, a total of 222 records were initially identified through database searches, including PubMed, Google Scholar, and ScienceDirect. After the removal of 14 duplicate records, 208 unique records remained for screening. Following title and abstract screening, 14 records were excluded, leaving 170 reports for full-text assessment. During the eligibility stage, 38 reports were excluded for not being directly related to cognition and epilepsy. Of the remaining 158 were excluded for various reasons, including being systematic review papers (n = 13), lacking specification of the age bracket studied (n = 2), being published before 2010 (n = 52), or not providing open-access full-text versions (n = 91). Finally, 12 studies met all inclusion criteria and were incorporated into the final systematic review. The screening process is shown in a PRISMA flow diagram in Figure 1.
The studies contained in this review were carried out in 8 countries. Most of the studies were located in United States (n=3), India (n=2), China (n=2), Egypt (n=1), United Kingdom (n=1), Germany (n=1), Australia (n=1) and Italy (n=1). The articles were published mostly in the time frame between 2010 and 2025. Table 1 (see Appendix) is a summary of detailed study characteristics and critical evaluation.

Figure 1 PRISMA flowchart showing final results



Note. Source: (Page et al., 2020)

DISCUSSION

Epilepsy, a chronic neurological condition marked by recurrent seizures, is increasingly recognized as a disorder that extends beyond the domain of seizure control to encompass significant cognitive and psychological consequences. These challenges can arise early in development or emerge later in life, shaped by a range of factors such as age of onset, seizure frequency, brain network integrity and treatment with antiepileptic medications. Emotional and psychological aspects, including anxiety and depression may further intensify these difficulties. The studies reviewed under the following themes explore how it impacts neurodevelopmental and neurocognitive trajectories from childhood through older adulthood, through mechanisms including early neural disruption, altered brain network efficiency, emotional distress and treatment burden. Together, the review aims to provide a nuanced understanding of how cognitive impairments in epilepsy emerge, persist, and interact with both biological and psychosocial factors over. The major themes were identified through the systematic review of the literature.

Theme 1 – Neurodevelopmental and Neurodegenerative Cognitive Impact of Age of Onset

Al-Shaz and Al-Khaligy (2013) conducted a study to evaluate the intelligence in epileptic children and to determine the factors associated with intellectual impairment. The study consisted of two groups of subjects. Group 1 included sixty epileptic children and the control group2 consisted of sixty healthy, age and sex matched children who did not have any medical pr psychiatric problem. The epilepsy syndromes were first classified as generalized or partial after which the generalized epilepsies were subclassified into Generalized Idiopathic Epilepsy (GIE), the partial epilepsies were classified into Frontal Lobe Epilepsy (FLE), Temporal Lobe Epilepsy (TLE), Central Epilepsy (CE) or Occipital Epilepsy (OE). For the assessment of intelligence, the Wechsler Intelligence Scale for children (4^{th} edition) was used. It was found that the Intelligence Quotient (IQ) score ranged from 55 to 97 overall. After comparing the study and control groups, it was found that, though there was no significant difference between the groups with regards to age or sex, there was a significant decrease of IQ in the study group. In the current study, antiepileptic drug usage was not a significant risk factor for low intelligence in the multivariate analysis. It was found that the age of the child or age of epilepsy onset were not found be risk factors for intellectual dysfunction. However, in previous literature, it was reported to be confounding risk factors especially the age of onset. The study concluded that epilepsy has a negative effect on intellectual function.

By contrasting patients with mild cognitive impairment (LOEU-MCI) and normal cognition (LOEU-CN) with non-epileptic MCI and cognitively normal controls, Cesarini et al. (2023) examined cognitive, neurobiological, and neurophysiological characteristics in patients with late-onset epilepsy of unknown etiology (LOEU). In comparison to patients with non-epileptic MCI, they discovered that 59% of LOEU patients had MCI at the commencement of their seizures and performed worse in executive function, global cognition, and visuospatial skills. While resting-state EEG showed decreased parietal and occipital alpha rhythms and higher frontal and temporal delta sources in LOEU-MCI, CSF analysis showed lower $A\beta 42$ levels in LOEU-MCI compared to LOEU-CN, indicating amyloid-related activities. These results demonstrate that amyloid pathology and disturbances of cortical rhythm may be linked to multiple-domain cognitive impairment in LOEU.

These studies indicate that both childhood and late-onset forms of epilepsy show evidence of cognitive impairment with differences in domains and the underlying mechanisms reported across the age groups.

Theme 2 – Memory System Vulnerability Across Lifespan

A study was conducted by Zhu et al. (2021) to explore the quantitative measurement of visual attention and neuro-electrophysiological relevance of memory deficits in temporal lobe epilepsy (TLE) using eye tracking technology and electroencephalography (EEG). The participants of the study included thirty-four adult TLE patients and twenty-eight healthy controls. The Wechsler Memory Scales-Chinese Revision (WMS-RC) was administered on the participants. To increase the reproducibility of the memory assessment, an automated computer-based assessment platform that provided a game like interaction was made. EEG and eye tracking data was also recorded. Findings showed that TLE patients performed significantly worse on the Digit Span backward task of the Wechsler Memory Scale, while differences on the visual recognition task were marginal. Although there was no difference in visual attention during the encoding phase, TLE patients made more visits during recall and took longer to locate target items during the eye-tracking memory game. This implies that rather than attention, their deficit is related to memory retrieval efficiency. Additionally, the study discovered a negative relationship between short-term memory function and nocturnal interictal epileptiform discharges (IEDs) during sleep, suggesting that nocturnal spikes may interfere with memory maintenance. Overall, the findings confirm that while attention processes are essentially intact, TLE patients show particular retrieval-related memory problems.

Rayner et al. (2016) examined the mechanisms underlying autobiographical memory impairment in focal epilepsy, contrasting predictors of memory dysfunction in patients with early-onset and late-onset epilepsy. The study included 92 individuals with focal epilepsy and 74 healthy controls. Compared to controls, patients performed significantly worse on both semantic and episodic autobiographical memory tasks, as assessed by the Autobiographical Memory Interview (AMI), as well as on standard verbal and visual memory measures. Within the early-onset group, poorer semantic recall was associated with higher seizure frequency, while episodic recall was linked to younger age of seizure onset and reduced working memory scores. In contrast, among those with late-onset epilepsy, poorer autobiographical recall was correlated with higher depression scores, lesion presence on MRI and polytherapy suggesting that distinct mechanisms underpin memory impairment depending on when epilepsy begins. The findings indicated that neurobiological and disease-related factors were key antecedents of autobiographical memory dysfunction in early-onset epilepsy, whereas psychological and structural factors contributed more strongly to memory impairment in late-onset cases. The study highlighted that memory deficits in epilepsy are not uniform but vary in origin and expression according to the developmental stage of onset, with early-onset cases reflecting altered network maturation and chronicity and late-onset cases reflecting mood-related cognitive disturbance and lesion burden.

These studies show that the manifestation of memory issues in epilepsy varies across life span. Rayner et al. (2016) discovered that the mechanisms underlying autobiographical memory dysfunction varied with the timing of epilepsy onset, whereas Zhu et al. (2021) found retrieval-specific short-term memory deficits linked to interictal epileptiform discharges in adults with temporal lobe epilepsy. Instead of an uniform deficit, memory disruption seemed to be associated with different neurological and clinical factors in both studies, highlighting the variability of memory system vulnerability in epilepsy.

Theme 3 – Attention, Executive Control and Processing Efficiency

In order to track the cognitive development of children with newly diagnosed or recently onset epilepsy over a period of five to six years, Rathouz et al. (2014) carried out a prospective longitudinal research. Sixty-nine children with epilepsy, identified as having either idiopathic global epilepsy (IGE) or localization-related epilepsy (LRE), and sixty-two usually developing first-degree cousin controls, all between the ages of eight and eighteen, were included in the sample. During three testing waves at baseline, two years later, and again five to six years after diagnosis participants completed thorough neuropsychological evaluations. Multiple domains, including IQ, academic success, language, executive function, attention, fine motor dexterity, and psychomotor speed, were assessed using standardized assessments. The findings showed that children with epilepsy showed notable deficits in mathematical computation, fine motor abilities, and a number of areas related to attention, reaction inhibition, and processing efficiency. There was no indication of gradual decrease or compensatory improvement, and these impairments were evident at or close to the time of diagnosis and remained constant throughout the follow-up waves. Although children with IGE tended to have slightly larger impairment, especially in tasks involving psychomotor speed and executive control, the cognitive trajectories of both LRE and IGE groups were constant in comparison to one another. Basic literacy skills like reading and spelling, as well as core language abilities, seemed to be mostly unaffected. Overall, the results show that cognitive deficits in processing speed, executive inhibition, and attention regulation appear early in epilepsy and remain mostly constant, indicating that these issues are long-lasting neurodevelopmental disturbances rather than progressive deterioration.

A two-year longitudinal study was conducted by Lin et al. (2014) to compare the cognitive and brain development of children recently diagnosed with Juvenile Myoclonic Epilepsy (JME) to their contemporaries who are usually developing. The study evaluated 57 healthy controls, ages 8 to 18, and 19 children with new-onset JME at the time of diagnosis and again two years later. General intelligence, problem-solving, reaction inhibition, and processing speed, skills that significantly depend on executive control and attention, were assessed using a wide range of cognitive tests such as WASI Full-Scale IQ; D-KEFS Card Sort for problem-solving, Color-Word Interference for response inhibition, WISC/WAIS Digit-Symbol Coding for psychomotor speed. To monitor changes in cortical development, MRI brain imaging was also performed at both time points. Every child was enrolled in a regular school, and the socioeconomic backgrounds of the two groups were matched. According to the results, children with JME had decreased cognitive progress over the next two years, especially in attention, response inhibition, and processing speed, even though their initial performance was comparable to or marginally below that of their peers. Despite general progress, these kids were unable to "catch up" with their peers, indicating that their issues started early and persisted. In the early stages of the illness, problem-solving abilities seemed to be largely unaffected, but they may eventually become more susceptible. Children with JME displayed slower cortical thinning, particularly in the frontal, parietal, and temporal regions areas involved in attention, planning, and motor control while typically developing children displayed normal age-related reductions in cortical thickness and volume which is a sign of healthy brain maturation. These results suggest that JME has an early impact on cognitive development as well as the brain's regular maturation process, resulting in long-term difficulties with executive control and processing efficiency.

In a cross-sectional study conducted at a tertiary care facility in New Delhi, 50 patients with juvenile myoclonic epilepsy (JME) and 50 healthy, age- and sex-matched controls were examined for cognitive impairment. The Mini-Mental State Examination (MMSE) for general cognition, the PGI Memory Scale (PGIMS) for verbal and visual memory, the Frontal Assessment Battery (FAB) and Executive Interview (EXIT) for frontal lobe and executive functions, and tests of visuospatial abilities like the Clock Drawing Test (CDT), Cube Copying Test (CCT), and Nahor Benson Test (NBT) were all part of the comprehensive neuropsychological battery that participants over the age of 12 completed. The study also looked at correlations between clinical factors such seizure control, age of onset, duration of epilepsy, EEG abnormalities, and kind of antiepileptic medicine and cognitive performance. According to the findings, JME patients did noticeably worse on tests of verbal and visual memory, planning, attention, mental flexibility, response inhibition, and visuospatial abilities. Executive dysfunction was evident on frontal lobe tests, although memory and visuospatial impairments indicated broader cortical involvement. EEG abnormalities, lower levels of education, and longer duration of epilepsy were the strongest predictors of cognitive impairment; seizure frequency and treatment type were not. The results indicate that JME is linked to parieto-occipital and frontal dysfunction, underscoring the necessity of early cognitive evaluation and treatment for those who are affected (Chawla et al., 2020)

Moorthi et al. (2020) used the NIMHANS Neuropsychological Battery to evaluate 74 epileptic children where 27 participants had Generalized Tonic-Clonic Seizures (GTCS) and 47 Complex Partial Seizure (CPS) between the ages 9–15. The battery covered learning-memory (Rey Auditory Verbal Learning Test, Logical Memory, Memory for Designs), executive control/processing speed (Digit Symbol Substitution, phonemic/category fluency), motor speed (Finger Tapping), and screened mood with the CES-DC. EEG and MRI results were also recorded. The CPS group performed significantly worse on verbal passage memory (Logical Memory, immediate and delayed) and visual learning/long-delay recall (Memory for Designs), and they reported higher levels of depressive symptoms (CES-DC). Group comparisons revealed widespread impairment in attention, executive efficiency, and learning-memory across both types of epilepsy. Many other measures did not differ reliably between GTCS and CPS, indicating shared deficits in attention/processing speed and motor efficiency across groups. Overall, nearly half of the sample screened positive for depressive symptoms, and CPS children showed the heaviest burden in episodic memory alongside mood difficulties.

A study titled “Frontal lobe epilepsy: an eye tracking study of memory and attention” was conducted where 44 adults with frontal lobe epilepsy (FLE) vs 50 matched controls using WMS-RC subtests (Digit Span, Visual Recognition, Logical Memory) plus a computerized short-term memory game paired with EyeLink 1000 eye-tracking to separate encoding and decoding (recall) phases were studied. In the game, FLE patients required more time across all difficulty levels and performed worse on all three memory scores. For both fractal and face stimuli, eye metrics during decoding consistently demonstrated inefficiency i.e higher average fixation duration, more fixations per target, longer first fixation to targets and a lower fraction of time fixating the target area. These eye-tracking metrics were associated with lower WMS-RC scores, suggesting that less effective visual search/selection during recall was linked to weaker clinical memory performance (Zhang et al., 2023).

Across these studies, its reported that early and persistent weaknesses in attention, response inhibition and processing speed in childhood-onset epilepsies, with JME and FLE showing executive dysfunction on neuropsychological testing. Longitudinal work notes largely stable group differences over years and MRI in new-onset JME describes altered cortical maturation paralleling these cognitive findings. Eye-tracking in FLE specifically links retrieval-phase attentional maintenance inefficiency to poorer memory scores and CPS samples show heavier episodic-memory and mood burdens.

Theme 4 – Intellectual Function and Neurocognitive Maturation Constraints

Of the sixty-two children with non-lesional epilepsy in a research by Woodfield et al. (2023), thirty-four had intact cognition and twenty-eight had verified cognitive impairment. To investigate whole-brain network organization, the researchers built intricate structural connectomes using diffusion tensor imaging and structural magnetic resonance imaging. They discovered that children with cognitive impairment had longer average path lengths and worse global network efficiency, which suggests that information transit across the brain is less integrated and efficient. These results held true for fractional anisotropy-weighted and streamline-weighted networks, among other modeling techniques. Multivariable analyses showed that while age of seizure onset, duration of epilepsy, and number of anti-seizure drugs were not significant predictors, cognitive impairment was independently linked to daily seizure frequency and longer normalized average path length. In a subset where intelligence quotient evaluations were available, the quotient had a negative correlation with normalized average path length and a positive correlation with network global efficiency. Overall, the study showed that children with epilepsy had worse intellectual performance when their structural connectome efficiency was lower and their path length was longer. This suggests that cognitive issues in this population may be caused by disruptions in global network integration.

Potthoff et al. (2025) studied 98 surgical focal cortical dysplasia (FCD) cases with comprehensive presurgical neuropsychological testing across seven domains (IQ, attention, motor, verbal/figural memory, language, visuo-construction), converting test scores to standardized 0–4 performance categories. Group comparisons considered histopathology (IIa vs IIb), age at onset of epilepsy (AOE; <6 vs ≥6 years), lesion lateralization/localization, seizure frequency and ASM load. Early AOE was the key factor in determining cognitive status; children with onset before 6 years had lower IQs (frequently below average or significantly below average) and poorer motor function than children with later onset, and a larger percentage of them met impairment thresholds. On the other hand, variations in domain scores at the group level were not explained by FCD type (IIa vs. IIb), side, lobe or ASM load. The results acknowledge the limitations of the retrospective, single-center design, varied test batteries, and lack of molecular/MRI quantification, but they also support a neurodevelopmental constraint associated with early epileptic burden, which is particularly evident in the global intellect and motor systems.

These findings show that decreased intellectual performance in epilepsy is closely related to early epileptic onset and impaired brain network efficiency. Early neurodevelopmental disruption seems to place long-lasting limitations on cognitive maturation and integration, according to both structural and clinical viewpoints.

Theme 5 – Clinical and Psychological Risk Factors for Cognitive Impairment

A study by Miller et al. (2016) sought to define cognitive function and highlight risk factors for impairment in older adults with epilepsy. The study used a thorough neuropsychological battery that assessed several cognitive domains, as well as measures of anxiety and depression, to compare thirty-eight older persons with epilepsy to twenty-nine age-matched healthy controls. The neuropsychological battery included the Mini-Mental State Examination, Mattis Dementia Rating Scale–2, Hopkins Verbal Learning Test–Revised, Verbal Paired Associates, Brief Visuospatial Memory Test–Revised, Trail Making Tests A and B, Digit Symbol Coding, Controlled Oral Word Association, Rey–Osterrieth Complex Figure Test, Boston Naming Test, Animal Fluency and Judgment of Line Orientation. Results showed that older adults with epilepsy performed significantly worse across nearly all domains particularly in attention, executive function, memory and language even when magnetic resonance imaging (MRI) scans were normal. Visual memory and attention were most impaired, with nearly forty per cent of the epilepsy group showing clinically significant cognitive impairment. According to regression studies, higher anxiety levels predicted worse visual memory outcomes, whereas taking more antiepileptic medications was linked to worse language and visuospatial performance. Remarkably, age of onset and seizure frequency did not show up as important predictors. The study emphasizes the need for comprehensive management strategies that address both neurological and psychological contributors to cognitive decline by showing that treatment-related and emotional factors, such as medication burden and anxiety, also have an impact on cognitive difficulties in older adults with epilepsy. These factors are not limited to structural brain abnormalities.

Limitations

The limitations of the review should also be taken into consideration. The included studies varied considerably in their design, sample size, assessment tools, and participant characteristics, which may limit direct comparability. Some studies relied on cross-sectional designs, making it difficult to determine causality or long-term changes in cognition. Additionally, factors such as medication type, seizure frequency and comorbid psychiatric conditions were not consistently controlled across studies, which could have influenced results. Future research would benefit from larger, longitudinal, and methodologically consistent designs to clarify developmental trajectories and mechanisms underlying cognitive outcomes in epilepsy.

CONCLUSION

Overall, the review shows that cognitive impairments are common in epilepsy and differ depending on the age of onset, with early-onset cases often showing developmental constraints and later-onset cases reflecting combined neurological and psychological influences. These findings highlight the importance of early assessment, tailored interventions, and attention to both medical and emotional factors in improving quality of life for individuals with epilepsy.

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Conflict of Interest

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