



Assessment of everyday executive functioning in children with frontal or temporal epilepsies



M. Campiglia^{a,c,*}, C. Seegmuller^b, D. Le Gall^c, N. Fournet^d, J.-L. Roulin^d, A. Roy^{c,e}

^a Regional Center for Learning Disabilities, Pediatric Neurology Unit, Academic Children Hospital of Nancy, Nancy, France

^b Department of Neurology and Pediatrics 1, Centre de Référence Epilepsies Rares, Strasbourg University Hospital, Strasbourg, France

^c Psychology Laboratory, LUNAM, Angers University, Angers, France

^d Neurocognition and Psychology Laboratory, Savoie University, Chambéry, France

^e Neurofibromatosis Clinic and Learning Disabilities Reference Center, Nantes University Hospital, Nantes, France

ARTICLE INFO

Article history:

Received 21 April 2014

Revised 18 July 2014

Accepted 21 July 2014

Available online 23 August 2014

Keywords:

Executive functions

Children

BRIEF/Behavior Rating Inventory of Executive Function

Ecological assessment

Nonidiopathic focal epilepsy

ABSTRACT

Executive functions are particularly vulnerable in case of brain disruption during childhood, when the brain is not fully mature. Some studies showed impairments of executive functions in children with epilepsy, but only a few of them investigated the impact of executive dysfunctions on daily life. The aim of this study was to understand the everyday executive functioning of children with epilepsy both at home and in school. We administered the Behavior Rating Inventory of Executive Function to parents and teachers of 53 children (7–16 years of age) with structural epilepsies or epilepsies of unknown cause of temporal lobe ($n = 25$) or frontal lobe ($n = 28$). The results indicated a global executive impairment in the whole group of patients, compared with normative data, with no difference between the group with temporal lobe epilepsy (TLE) and that with frontal lobe epilepsy (FLE), except for monitor domain, which seemed more frequently impaired in the group with FLE. Congruence between parent and teacher ratings was found. The frequency of seizures was not related to executive dysfunction, whereas the number of antiepileptic drugs tended to positively correlate with working memory impairment. Onset of epilepsy at a younger age was also related to more executive difficulties but only according to teacher ratings. Lastly, duration of epilepsy was strongly associated with executive deficits reported in the context of school. Our results support the executive dysfunction hypothesis in daily life of children with structural focal epilepsy or focal epilepsy of unknown cause and are consistent with the early brain vulnerability hypothesis currently prevalent in the context of child neuropsychology. The BRIEF appears to be a clinically useful tool for assessing executive function impairment in this clinical population.

© 2014 Elsevier Inc. All rights reserved.

1. Introduction

In children, epilepsy occurs before the brain is fully mature [1]. Among the few studies that assessed the neuropsychological effects of epilepsy in children, several authors showed an increased risk of mental

Abbreviations: AEDs, antiepileptic drugs; TLE, temporal lobe epilepsy; EFs, executive functions; WM, working memory; FLE, frontal lobe epilepsy; BRIEF, Behavior Rating Inventory of Executive Function; BRI, Behavioral Regulation Index; MI, Metacognition Index; ADHD, attention deficit hyperactivity disorder; DNET, dysembryoplastic neuroepithelial tumor; GEC, global executive composite score; VCI, Verbal Comprehension Index; PRI, Perceptual Reasoning Index; WMI, Working Memory Index; PSI, Processing Speed Index; FSIQ, Full-Scale Intellectual Quotient; EEG, electroencephalography; SCL, sociocultural level.

* Corresponding author at: Unité de Neuropédiatrie, CLAP, Sous-sol, Hôpital d'enfants, CHU Nancy-Brabois, Rue du Morvan, 54511 Vandœuvre-Les-Nancy, France. Tel.: +33 3 83 15 78 16.

E-mail addresses: melodie.campiglia@gmail.com (M. Campiglia),

Anne-Caroline.SEEGMULLER@chru-strasbourg.fr (C. Seegmuller),

Didier.LeGall@univ-angers.fr (D. Le Gall), Nathalie.Fournet@univ-savoie.fr (N. Fournet),

jean-luc.roulin@univ-savoie.fr (J.-L. Roulin), Arnaud.Roy@univ-angers.fr (A. Roy).

retardation in most types of epilepsy compared with the general population [2,3]. Moreover, the seizure activity and associated variables such as age at onset, duration of epilepsy, seizure frequency, and the type and number of antiepileptic drugs (AEDs) have a deleterious effect on cognitive functioning of children with epilepsy [2,4,5]. The links between affected brain structures and impaired cognitive functions were studied in focal seizures, especially in patients with temporal lobe epilepsy (TLE) in whom memory disorders were identified [6–9]. Although impaired executive functions (EFs) were identified in some medical situations in children having acquired brain lesions (e.g., traumatic brain injury [10]) and in adults with epilepsy (see, e.g., [11]), relatively few studies examined EFs in children with epilepsy. In fact, EFs could be impaired, particularly in structural epilepsies [12] in which the presence of a brain injury with its possible functional impacts is suspected or proven. Indeed, the early brain vulnerability hypothesis [13,14] is known to be particularly pronounced for EFs as evidenced in different pathological contexts [15,16]. A recent study notably showed severe EF vulnerability in children sustaining early brain injury independently from lesion location [15].

The term “EFs” typically covers a group of highly developed processes especially the individual to adapt his behavior to environmental changes, especially to new and/or complex situations in which routine actions become insufficient. EFs will therefore be implemented when the needed task requires controlled processes [17]. Executive functions involve both cognitive (cold) and behavioral or emotional (hot) dimensions, which can be differentially affected in the case of an early-acquired lesion (see, e.g., [18]). As is the case in studies carried out in adults (e.g., [19,20]), several theoretical frameworks tend to favor a pluralist conception of EF cognitive processes in children, without consensus on the number or the nature of these processes (e.g., [14,21–24]). Among the main EF processes described through these models, one can distinguish inhibition, working memory (WM), shifting, and planning/organization.

The few studies of EFs in children with epilepsy [8,25–31] showed impairments in several areas of EFs such as inhibition, shift, and WM in TLE and in frontal lobe epilepsy (FLE) in addition to planning deficits in FLE. When both types of epilepsy were directly compared, the executive dysfunction appeared to be less severe in TLE than in FLE [8,26]. However, only a few studies evaluated the impact of executive dysfunction on daily life. In order to assess everyday executive functioning of children, Gioia et al. [32] developed a questionnaire, the Behavior Rating Inventory of Executive Function (BRIEF), available in two forms for parents and teachers of school-age children (for a test review, see [33]). It assesses different aspects of EFs, which are Inhibition (ability to inhibit, to resist, or to act not under impulsion), Shifting (ability to shift from a situation/activity/problem aspect to another, considering the circumstances), Emotional Control (ability to modulate emotional responses), Initiation (ability to start a task or activity and to generate ideas), WM (ability to keep in mind information needed to carry out a task and to manipulate them in an online system), Planning/Organization (ability to anticipate future events, to establish goals, and to develop the appropriate steps to reach these goals), Organization of Materials (ability to keep in order work, games, and spaces), and Monitoring (ability to verify work after its achievement). These EF aspects constitute scales forming two broader indices, the Behavioral Regulation Index – BRI (Inhibit, Shift, and Emotional Control scales) and the Metacognition Index – MI (Initiate, WM, Plan/Organize, Organization of Materials, and Monitor scales). This measuring instrument was used and validated in several pediatric disorders such as traumatic brain injuries, autism spectrum disorders, or attention deficit hyperactivity disorder (ADHD) [34–36].

The BRIEF was also used in some studies conducted on children with different epilepsy syndromes (Table 1). These studies found a high

frequency of executive deficits reported by parents, reaching, for some authors, 45.2% of the clinical group [37] generally with global executive dysfunction [38–42]. Some results suggested that the WM and Plan/Organize scales are the most frequently affected ones [41,43], but the Initiate and Monitor scales also seemed to be frequently impaired [41]. All these studies demonstrated that executive dysfunction is frequent in the everyday life of children with epilepsy and illustrated the value of BRIEF when used in assessing the EFs of these children. However, most of them had several limitations.

None of these studies used the teacher report of the BRIEF in the assessment of executive dysfunction, so they lacked the subjective ratings of children in the school environment [41], while other studies showed that parent and teacher reports are complementary (see, e.g., in ADHD [36]). In addition, several studies included nonhomogeneous patients or patients in whom the etiology of epilepsy was unclear [37,38,40,41, 43], so it was impossible for these studies to assess the everyday EFs according to epilepsy type. Furthermore, some authors excluded patients with IQ < 70, rendering their clinical groups less representative of the population with epilepsy [40]. Another limitation is that the BRIEF scales or indices that were used by different authors varied greatly from one study to another (some authors considered all BRIEF scales, while others used only three indices or few scales). Therefore, the comparison of data becomes difficult. Finally, only a few authors were interested in epilepsy risk factors. Some of them showed no correlation between the results on the BRIEF and the age at onset of epilepsy, number of AED(s), and seizure frequency [41], while others found a moderate correlation between the BRI and interictal epileptiform discharges [44].

In this context, our study aimed at understanding everyday EFs in children with epilepsy by means of the BRIEF questionnaire. Considering the important role of the prefrontal regions in EFs and specific anatomical and functional relations between temporal regions and frontal lobe [45,46], we conducted a prospective study on children with structural focal epilepsy or focal epilepsy of unknown cause with a single frontal or temporal epileptogenic focus by comparing the views of parents and teachers about executive dysfunctions of children. In our study, the group of patients was homogeneous in terms of epilepsy syndromes (frontal lobe epilepsy versus temporal lobe epilepsy [47]). Although there were many types of brain lesions (focal cortical dysplasia, ganglioglioma tumor, dysembryoplastic neuroepithelial tumor – DNET, etc.), the location of the epileptic focus was clearly identified, and the IQ was not used for selecting patients.

Table 1
Studies of everyday executive functioning in children with epilepsy using the BRIEF.

Studies	Clinical population	BRIEF form	Considered variables	Results
Sherman et al. [37]	121 patients with “severe epilepsy” (multiple etiologies)	Parents	All BRIEF indices and scales	Global executive dysfunction at the BRIEF (45.2% of the patients)
Slick et al. [43]	80 patients with “severe epilepsy”	Parents	All BRIEF scales	68% of the sample with at least one significantly elevated scale score; 36% of the sample with 4 or more significantly elevated scale scores; WM and Plan/Organize were the most frequently elevated scales
Parrish et al. [38]	53 patients with epilepsy diagnosed in the last 12 months	Parents	All BRIEF indices and scales	Significant differences between patients and control group for all the BRIEF indices and scales
Pulsipher et al. [39]	20 patients with recent-onset JME and 12 patients with recent-onset BCECT	Parents	BRI and MI	Significant impairment of the BRI and MI in patients with JME compared with control and groups with BCECT
Luton et al. [40]	20 patients with FLE with complex partial seizures	Parents	Shifting, working memory, plan/organize, and monitoring	Significant impairment on the 4 subscales
Sarco et al. [44]	21 patients with BRE	Parents	BRI, MI, and GEC	Mild correlation between BRI dysfunction and higher sleep spike frequency
MacAllister et al. [41]	90 patients with epilepsies from different etiologies	Parents	All BRIEF indices and scales	Higher BRIEF results compared with normative values for all indices and scales
Charbonnier et al. [42]	Case study, 1 patient 10 years and 7 months of age with symptomatic frontal epilepsy	Parents	All BRIEF indices and scales	Global executive dysfunction, except for shifting, emotional control, and organization of the material scales

BRIEF: Behavioral Rating Inventory of Executive Function; WM: working memory; JME: juvenile myoclonic epilepsy; BCECT: benign childhood epilepsy with centrotemporal spikes; BRI: Behavioral Regulation Index; MI: Metacognition Index; FLE: frontal lobe epilepsy; GEC: global executive composite; BRE: benign rolandic epilepsy.

Download English Version:

<https://daneshyari.com/en/article/6012116>

Download Persian Version:

<https://daneshyari.com/article/6012116>

[Daneshyari.com](https://daneshyari.com)