

## Introduction

One percent of the population under 20 years of age will develop epilepsy; one of the most common neurological conditions in children (Epilepsy Foundation, n.d.). The adverse effects of epilepsy and its treatments have been assessed on many different aspects of children's functioning, however, their impact on adaptive functioning has not been widely studied. Adaptive functioning refers to people's ability to take care of themselves and interact with and assist others at an age appropriate level.

Research suggests that children with epilepsy are at risk of adaptive impairments, that these impairments may occur even in children whose seizures are well-controlled on a single AED, and that longer duration of epilepsy prior to surgical resection is predictive of lower post-surgical adaptive functioning (Basheer et al., 2007; Chapiesski et al., 2005; Culhane-Shelburne et al., 2002, Delalande et al., 2007). Past research has, however, been limited by small sample sizes and most studies have not assessed the impact of a broad range of seizure variables on adaptive functioning.

This study sought to provide greater detail about adaptive abilities in children with epilepsy, and to identify the seizure and treatment variables most predictive of adaptive functioning in order to aid clinicians in identifying children at greatest risk of suboptimal outcome so that interventions may be applied.

**Hypotheses:** We hypothesized that younger age at seizure onset, active seizures, higher number of current seizure medications, higher number of past seizure medications, and multiple seizure types would be negatively associated with independent living skills. We also hypothesized that undergoing a temporal lobectomy would be positively related to adaptive functioning.

## Methods

**Participants:** Participants were recruited from a larger group of children who were referred to Children's Healthcare of Atlanta for neuropsychological evaluation. Forty one families with a child diagnosed with epilepsy participated.

Table 1: Demographic and Seizure Variables

	Active Seizures (n=22)	Controlled Seizures (n=19)
Mean Age at Seizure Onset	5.43 (3.81)	6.21 (5.02)
Mean Time Since Seizure Onset	7.83 (4.67)	7.46 (4.31)
Mean Age at ABAS	13.28 (3.31)	13.71 (3.09)
Male: Female	17:5	11:8
Caucasian: African American	19:3	17:2
Number with IEP at School	16	4
Number of Current AEDs		
None	1	3
One	9	14
Two	10	2
Three	2	0
Number of Past AEDs		
None	3	3
One	5	8
Two	3	4
Three	2	2
Four or More	9	2
Mean Number of Seizure Types	2.23 (1.11)	1.83 (1.04)
Number who underwent a TLE	6	7

## Methods

**Participants:** Inclusion was contingent on a diagnosis of epilepsy and no additional neurological diagnosis with the exception of ADHD. Children with progressive epilepsy disorders were excluded. Sixty seven families were contacted regarding participation.

**Experimental Design:** Families completed the Adaptive Behavior Assessment System-II (ABAS; Harrison & Oakland, 2003) and a seizure information form. Age at seizure onset and time elapsed since first seizure were highly correlated ( $r = -.73$ ), so the latter was dropped from our model.

**Measures: Adaptive Functioning.** The ABAS is comprised of a General Adaptive Composite (GAC) and 3 domains: Conceptual, Social, and Practical.

**Seizure Variables.** Active seizures: 0 defined as no seizures in the past 12 months (controlled) and 1 defined as 1 or more seizures in the past 12 months (active; Fastenau et al., 2004).

## Results

**Data Analysis:** Linear regression was used with seizure and treatment variables as the predictor variables of the GAC and 3 domains of the ABAS. Analyses were one-tailed.

•Overall adaptive functioning as measured by the GAC was at the lower end of the average range regardless of current treatment status: prescribed one AED (Mean = 92.53, SD = 24.70), prescribed multiple AEDs (Mean = 90.58, SD = 16.17), and post-temporal lobectomy (Mean = 91.54, SD = 22.90).

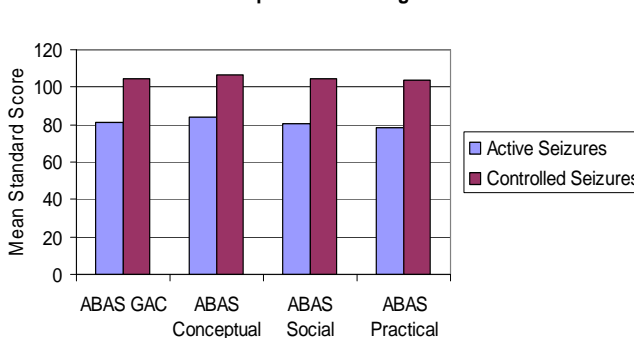
Table 2. Unstandardized b coefficients (standard error) showing the ability of seizure variables to predict the GAC and domains of the ABAS.

	GAC	Conceptual	Practical	Social
Age at Seizure Onset	.07 (.07)	.05 (.06)	.08 (.07)	.05 (.08)
Active Seizures	-21.99 (6.63)**	-21.24 (6.04)**	-24.64 (6.98)**	-22.48 (7.80)*
Number of Current AEDs	1.26 (5.46)	.70 (4.97)	1.72 (5.75)	4.80 (6.42)
Number of Past AEDs	-.72 (1.58)	.03 (1.44)	.02 (1.66)	-2.50 (1.86)
Number of Seizure Types	-2.02 (2.80)	-2.56 (2.55)	-1.20 (2.95)	-.26 (3.30)
TLE	-6.28 (7.58)	-1.84 (6.90)	-3.12 (7.98)	-3.61 (8.91)

\*p < .01, \*\*p < .001

•Overall, our model accounted for 34% of the variance on the GAC, and 36%, 34%, and 28% on the Conceptual, Practical, and Social domains respectively.

Figure 1. Active seizures are associated with reduced adaptive functioning.



## Discussion

•The findings of this study suggest **children who have had one or more seizures in the past year are at greater risk of suboptimal adaptive functioning** according to parent-report.

•Inconsistent with our hypotheses, no other seizure and treatment variables were significantly associated with adaptive functioning. Although additional studies are needed, the **lack of predictive utility for our remaining seizure and treatment variables suggests that they may contribute little additional variance to understanding adaptive functioning.**

•The strength of the relationship between the active seizures variable and adaptive functioning was strong and present across adaptive domains. Results indicated that **children with active seizures are functioning at a significantly lower adaptive level than their healthy peers as well as their peers with controlled seizures.**

•In the controlled seizure group, mean adaptive functioning was consistently in the average range. In the **active seizure group, mean adaptive functioning ranged from the low end of the low average range to the borderline range.**

•Parents may place greater restrictions on their child's independence while they continue to have seizures to ensure their child's safety and well-being. Furthermore, the brain's continued abnormal functioning, as evidenced by seizures, may be interfering with the development of children's adaptive skills and/or their ability to evidence adaptive behavior in age-appropriate circumstances.

•**Children with active seizures were more likely to have an IEP in place at school than children with controlled seizures (74% versus 17%),** suggestive of **more pervasive neurological dysfunction** in this group.

•The predictive utility of this active seizures variable warrants attention, particularly as researchers are challenging the accuracy of patient report of seizure frequency (e.g., Hoppe et al., 2007).

•The findings of this study suggest that categorizing seizures as active or controlled may be a **meaningful estimate of current epilepsy burden** that is easier for parents to report than frequency, and which may be subject to less measurement error and increased reliability.

### Future Research

•More studies on the influence of active seizures on adaptive functioning that include longitudinal assessment of adaptive functioning are needed to better clarify how adaptive functioning abilities change as seizure and treatment variables are modified. Additionally, possible differential AED effects on adaptive functioning should be examined.

•Future research is needed to determine the clinical utility of categorizing seizures as active and controlled, and to examine whether the findings of this study extend to other domains of neuropsychological functioning (e.g., executive functioning).

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