

# ATTENTION DEFICIT DISORDER SYMPTOMS, RATES AND IMPACT IN ADULTS WITH SELF-REPORTED EPILEPSY: RESULTS FROM A NATIONAL EPIDEMIOLOGICAL SURVEY OF EPILEPSY

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## BACKGROUND & OBJECTIVES

Symptoms of Attention Deficit Disorder without hyperactivity (ADD) and with hyperactivity (ADHD) are well described in pediatric epilepsy<sup>1,2</sup> but little is known about this condition in adults with epilepsy. Our prior work<sup>3</sup> reported on the prevalence of epilepsy in the US adult population as well as rates of self-reported physician (MD) diagnosis of ADHD in propensity matched samples of persons with and without epilepsy. Self-reported MD diagnosis of ADHD was significantly more common (p< 0.01) in persons with epilepsy vs. those without (13.2% vs. 5.5%, Prevalence Ratio: 2.39, 95% CI: 2.03-2.81). MD diagnosis alone may underestimate co-morbidity because of under-diagnosis and failure to recognize subsyndromic but significant symptoms. This study was conducted to assess symptom-based rates of ADHD and its impact in epilepsy using validated scales.

## METHODS

In 2008, an 11-item screening survey mailed to 340,000 households yielded data for 172,959 adults 18+ and was used to identify a cohort of persons with a self-reported doctor diagnosis of epilepsy or seizure. In 2009, a follow-up survey targeted 5,000 persons with epilepsy and 2,500 persons with probable epilepsy; 5,117 (68%) returned surveys and 2,395 persons with epilepsy were confirmed. Among these individuals 1415 reported antiepileptic drug (AED) use and 1,361 had complete data on the Adult ADHD Self-report scale (ASRS) data.

## METHODS (Cont.)

The 2009 survey obtained sociodemographic, employment and medication use data and included the following validated instruments:

- Adult ADHD Self-Report Scale<sup>4</sup> (ASRS, ADHD screening measure)
- Physicians Health Questionnaire<sup>5</sup> (PHQ-9, depression screen)
- Generalized Anxiety Disorder Assessment<sup>6</sup> (GAD-7, anxiety screen)
- Quality of Life in Epilepsy<sup>7</sup> (QOLIE-10)
- Quality of Life Enjoyment and Satisfaction Questionnaire<sup>8</sup> (Q-LES-Q)
- Sheehan Disability Scale<sup>9</sup> (SDS, social functioning assessment)

Self-reports of epilepsy or seizure disorder confirmed epilepsy status and cases were also screened for AED use. Those above the ASRS symptom score cut-point were considered a positive ADHD case. Chi-square tested sociodemographic differences between ASRS positive and ASRS negative cases. Logistic regression was used to assess differences in rates of work-related disability, clinical depression and anxiety. Linear regression was used to assess impact of ASRS status on outcomes. All models controlled for sociodemographic characteristics as well as co-morbid depression and anxiety. Unstandardized regression coefficients (B), Odds Ratios (OR) and 95% confidence intervals (CI) were calculated. No alpha level adjustment was made to account for multiple statistical tests.

## CONCLUSIONS

- ADHD symptoms in adults with epilepsy were more common in this follow-up study (18.4%) using self-reported ADHD symptoms vs. prior work (13.2%<sup>3</sup>) where the case definition was based on self-reported history of MD diagnosis.
- Those with epilepsy and ADHD are also more likely to be at risk for other psychiatric and neurologic conditions, including depression and anxiety.
- Unlike children and adolescents where symptoms are seen more often in males, ADHD symptoms in adults with epilepsy are equally common among both genders.
- ADHD symptoms in persons with epilepsy are associated with increased risk of work-related disability or unemployment.
- ADHD symptoms in persons with epilepsy are associated with decreased quality of life and greater disability in family-, social- and work-related domains. Future analyses will explore differential impact for attention vs. hyperactive symptoms.
- Given the frequency and associated impact of ADHD symptoms in adults with epilepsy, screening for and appropriately treating this condition may improve outcomes for people with epilepsy.

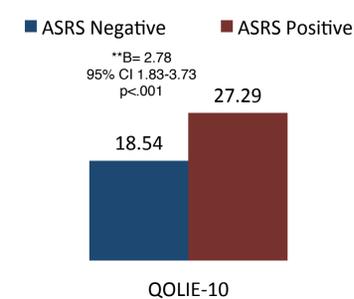
## RESULTS

**Table 1: Comparison of Those With Epilepsy Who Are ASRS+ or ASRS-**

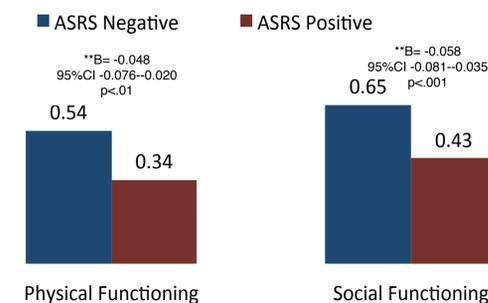
		ASRS Negative 1,110/81.6%	ASRS Positive 251/18.4%	P-Value
<b>Gender</b>	Male	47.40%	51.00%	0.301
<b>Age Category</b>	Less Than 30	9.5%	12.4%	0.045
	30-39	13.0%	16.7%	
	40-49	22.6%	20.3%	
	50-59	27.7%	31.1%	
	60+	27.2%	19.5%	
<b>Income</b>	Under \$30K	41.8%	53.0%	0.001
	30-49.9K	17.9%	21.1%	
	50-74.9K	17.1%	11.2%	
	75K+	23.2%	14.7%	
<b>Race</b>	White	88.2%	87.6%	0.933
	Black	6.8%	7.2%	
	Other/No Answer	5.0%	5.2%	
<b>Spanish Origin</b>	Spanish/Hispanic	3.2%	3.2%	0.238
	Not Spanish/Hispanic	94.4%	92.4%	
	No Answer	2.4%	4.4%	
<b>Population Density (Urban vs. Rural)</b>	Under 100,000	16.1%	23.5%	0.004
	100,000-499,999	18.0%	19.9%	
	500,000-1,999,999	21.6%	23.5%	
	2,000,000 or More	44.2%	33.1%	
<b>Disabled</b>	OR† 2.50, 95%CI: 1.9-3.3	27.1%	48.2%	0.001
<b>Employed Full Time</b>	OR 0.27, 95%CI: .17-.43	24.3%	8.0%	0.001
<b>+ Depression (PHQ-9)</b>	OR 8.91, 95%CI: 6.5-12.2	17.6%*	64.9%*	0.001
<b>+ Anxiety (GAD-7)</b>	OR 7.83, 95%CI: 5.7-10.7	14.0%*	55.4%*	0.001

†Odds Ratio. \*Percent of individuals above the screening cut-point for each scale.

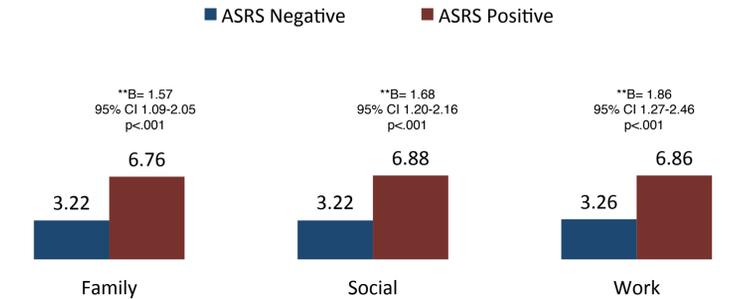
**Figure 1: Mean QOLIE Results**  
Higher Mean Score = Lower Quality of Life



**Figure 2: Mean Q-LES-Q Results**  
Higher Mean Score = Greater Life Enjoyment



**Figure 3: Mean SDS Results**  
Higher Mean Score = Greater Disability



There were 1,361 persons with confirmed epilepsy or seizure disorder and 18.4% (n=251) also met the ASRS symptom criteria for ADHD. Compared with ASRS negative cases (81.6%, n=1,110), the ASRS positive cases were significantly more likely (Table 1)...

- to be younger
- to have lower incomes
- to live rurally
- to be unable to work due to disability
- to be unemployed

...and to score above the clinical cut-point for depression and anxiety. No Gender or Race/Ethnicity differences were found.

\*\*B is the average change in the DV associated with one unit change in the IV, controlling for other covariates.

Given the higher rates of psychiatric conditions reported among those with epilepsy, anxiety and depression covariates were included in modeling. Compared with ASRS negative cases, ASRS positive cases had significantly (Figures 1,2,3)...

- lower quality of life overall (QOLIE)
- worse physical and social functioning (Q-LES-Q)
- more family-, social- and work-related disability (SDS)

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