

Long and complex shadow childhood epilepsy casts over educational achievement

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Register studies (Wimberly *et al*) reveal the long-lasting educational disadvantage of childhood epilepsy but unexpected sex differences indicate that the mechanisms require cautious interpretation.

COMMENTARY

The Danish national cohort study of educational achievement in childhood-onset epilepsy, published in this edition, is an impressive and important contribution to the literature. Its scale is striking: more than 1.19 million individuals were included, of whom 11 760 developed epilepsy before the age of 15 years, with follow-up extending into adulthood. The linkage of multiple registers allows the authors to describe, at the population level, a pattern that clinicians, families and teachers have long recognised: children with epilepsy are at substantially increased risk of educational disadvantage. In this study, childhood-onset epilepsy was associated with higher odds of not completing primary school, lower grades in final mathematics and language examinations and markedly reduced attainment of higher educational qualifications by the age of 35 years. Only 9.3% of individuals with epilepsy reached the highest educational level compared with 19.5% of matched reference individuals.

Although it may be tempting to assume that this study 'proves' that childhood epilepsy impairs cognitive development, it does not. Rather, it demonstrates that children with epilepsy follow different educational trajectories. This distinction matters. Educational achievement is not a direct measure of brain function. It is a proxy measure, an outcome dependent to some extent on cognitive ability but also shaped by school attendance, teacher and family expectations, psychiatric comorbidity, stigma and social exclusion,

treatment burden and the practical disruptions associated with managing a chronic neurological condition.

Register-based markers of epilepsy severity may also function as proxy measures for broader factors that disrupt education. Complicated epilepsy may index greater seizure burden but it may also be associated with repeated appointments, hospitalisations, increased fatigue and anti-seizure medication load, restrictions on school activities, parental anxiety and greater school absence. School attendance is one of the strongest predictors of academic attainment.¹ A child who misses lessons because of seizures, clinic appointments, postictal recovery, medication effects or exclusion from activities may underperform academically even when their underlying cognitive capacity is relatively preserved.

The social meaning of epilepsy also deserves emphasis. Epilepsy remains a stigmatising condition. Children may be overprotected, underestimated, bullied, excluded from ordinary activities or treated as fragile by adults around them. These experiences may affect confidence, participation and educational aspiration. Psychiatric comorbidity, especially anxiety and depression, may further mediate the relationship between epilepsy and school outcomes.

In light of these factors, the sex difference reported in the study is intriguing. Males appear to have a more adverse epilepsy profile, with higher proportions of early-onset and complicated epilepsy, yet the association between epilepsy and primary school non-completion is stronger in females. This pattern is difficult to reconcile with a simple epilepsy-burden/organic explanation. If educational disadvantage were primarily a direct consequence of epilepsy severity, one would expect the strongest educational effects in the group with the most severe epilepsy profile. The discordance suggests that the pathway between epilepsy and educational attainment is not simply dose-responsive

to clinical severity as captured in register data.

The study therefore provides compelling evidence that childhood-onset epilepsy is associated with poorer educational achievement. It does not establish that epilepsy itself directly impairs brain function in a way that inevitably leads to educational failure. The mechanisms are likely to be multifactorial and cumulative. The most useful implication of this study is not determinism but intervention: better recognition of educational risk, proactive school liaison, monitoring of attendance, psychological support, anti-stigma work and timely neuropsychological assessment. The findings should prompt us to ask not only what epilepsy may do to the developing brain but also what living with epilepsy does to a child's opportunities to learn.

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