Opinion

Dyscalculia: what's in a name?

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Dyscalculia or the 'specific Learning Disorder with impairments in Mathematics' refers to the neurodevelopment disorder with mathematic skills substantially below (<10th percentile) those expected for the individual's chronological age and persisting math problems despite the provision of interventions that target those difficulties.[1,2] Dyscalculia has a biological origin, causing abnormalities at the cognitive level, resulting in mathematical underachievement and persistent difficulties that become fully manifest in elementary school when the demands for the numerical skills exceed the individual's limited capacities (e.g., as in timed tests or long calculation tasks). The prevalence of dyscalculia is around 5-7.[1–4] The prevalence in siblings ranges from 40 to 64%.[1–6] Although specific learning disorders are more common in males than in females,[1–3] studies often reveal no more boys with dyscalculia compared to the number of girls with dyscalculia. In addition there is an increased prevalence of dyscalculia in children with ADHD[7] and DCD[1–8] and there are often comorbidities with impairment in spelling accuracy and severe difficulties with grammar and punctuation accuracy.[1–8]

One robust clinical indicator of dyscalculia is unexplained low mathematics achievement during elementary school resistant to high levels of task specific support. However, dyscalculia is frequently but not invariably already preceded in kindergarten by delays in language skills.[1] A three-year longitudinal study[9,10] on children followed up from kindergarten to grade 2, revealed that children (at age 7 to 8years) were especially correctly diagnosed in kindergarten by a combination of the prerequisite knowledge of counting and number representation. Moreover seriation and classification abilities had some value added in the screening of atypical development. Another longitudinal study revealed that the variance in mathematical proficiency in kindergarten was also predicted by language on top of the prerequisite counting knowledge as kindergarten indicators.[11] In addition, children with dyscalculia had severe problems with magnitude comparison and estimation abilities in kindergarten.[12] Moreover not only school environment, but also home environment mattered. The predictive value of the environment was demonstrated by a prospective relationship with numerical outcome in kindergarten. Early numeracy could be stimulated by an adaptive computerized instruction.[13] Finally they also differed from peers without learning disorders on working memory proficiency.[14]

A comprehensive assessment will involve a multidisciplinary diagnosis and professionals with expertise in specific learning disorders Difficulties in other academic skills such as history and science attributable to difficulties learning the underlying mathematic skills[1] should not be overlooked. The potential negative functional consequences of dyscalculia due to barriers and effortful learning across the lifespan, including higher rates of dropout and psychological distress and poorer overall mental health, should be part of psycho-education, explaining to parents, children and teachers what dyscalculia is and how to deal with the specific learning disorder. In addition, a more explicit exposure to opportunities to focus on numbers, such as playing adaptive educational games during pre-kindergarten seem important as a look ahead approach to reduce the gap with peers without neurodevelopment disorders who are spontaneously interested in numbers and enjoying and implicitly learning from counting games before they enter formal schooling.[15]

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Conflict of interest

Author declares that there is no conflict of interest.

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