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[1 Commentary; D.Wolke@warwick.ac.uk]

Timing and content of interventions to enhance cognitive performance of very-low-birthweight children

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This commentary is on the original article by Grunewaldt et al. To view this paper visit <http://dx.doi.org/10.1111/dmcn>.

Children born at very low birthweight (VLBW) are at an increased risk for altered brain development or injury. This risk is associated with increased cognitive, attention, and behavioural impairments, and poorer academic achievement. These impairments have been found to persist into adulthood¹ and adversely affect life chances. For many years, the focus of interventions to improve cognitive abilities and behaviour of VLBW children has been to improve early mother-child interaction and to provide increased cognitive stimulation during infancy or toddlerhood. However, these early interventions have had limited long-term success for VLBW children.²

An alternative is to consider interventions at a time of emerging higher cognitive functions (such as at preschool or school age) and to focus on underlying mechanisms [such](#) as the ability to select, retain, process, and plan actions, and to anticipate the consequences of these actions. The ability to hold, analyse, and

manipulate information long enough [for processing](#) requires memory, often referred to as working memory. Problems with working memory have been reported to be more frequent in VLBW children and related to academic achievement.

Grunewaldt et al.³ conducted a controlled study to evaluate whether a computerized visual spatial memory training [program](#) applied over a 5-week period showed positive effects on working memory and generalized to other functions (e.g. attention, language, learning) or daily living skills and problem behaviour in VLBW pre-schoolers approximately 6 months after the end of the intervention. The working memory intervention did exactly what it said 'on the label': it improved visuospatial and verbal working memory. The Grunewaldt et al. study is a small trial, using a matched rather than randomized comparison group for a 7-month follow-up and can be considered as a proof of principle that adaptive working memory training can work in VLBW preschool children. However, the adaptive training did not generalize to problem behaviour such as attention problems or other areas of daily living. Nevertheless, the authors speculate that these sustained effects over 6 months on working memory may be beneficial when the children start school and be positive for their scholastic and academic achievement.

The Grunewaldt et al. and other recent studies raise two important issues that need exploration in future research before recommending adaptive working memory training for widespread implementation. Firstly, does memory training generalize to academic achievement and thus real life improvements beyond standard memory assessments? The 'proof of the pudding is in the eating' – it requires much larger trials with follow-up over years and academic performance assessed with achievement tests and particularly, teacher ratings. Such trials are currently under way⁴ and the findings eagerly awaited. Secondly, when should interventions take

place for VLBW children? Previous research has indicated that interventions in infancy may have short-term but not positive long-term effects on cognitive or academic performance.² It is not surprising that interventions in the first few months of life may not be enough to solve the complex issue of cognitive deficits in preterm children at school age. This highlights the need for intervention at around school age, either before school entry or early on in school. Recent evidence from an observational study suggests that cognitive stimulation and increased parenting sensitivity around school entry is associated with improved academic achievement in VLBW adolescents.⁵ This observation requires study with a randomized controlled trial to be certain of causality. However, it suggests that it may not just be the content but the timing of interventions that is important to improve academic achievement. Possibly, interventions around school entry for VLBW children and their families that combine adaptive working memory training and efforts that increase parental sensitivity may improve cognitive and social skills, and reduce schooling problems.

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