

Stunting in infancy linked to differences in cognitive and brain function

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Children who are too short for their age can suffer reduced cognitive

ability arising from differences in brain function as early as six months of age, according to new research from the University of East Anglia.

Researchers compared the 'visual working [memory](#)'—the [memory capacity](#) that holds [visual cues](#) for processing—in [children](#) who had stunted growth with those having typical growth.

Published in the journal *Nature Human Behaviour*, the [study](#), "Stunting in infancy is associated with atypical activation of working memory and attention networks," found that the visual working memory of infants with poor physical growth was disrupted, making them more easily distracted and setting the stage for poorer cognitive ability one year later.

Stunted growth had previously been linked with poor cognitive outcomes later in life, but this is the first time that this association has been found in infancy. It is also the first time stunted growth has been linked to functional differences in how the brain works in [early development](#).

Led by Prof John Spencer of UEA's School of Psychology, the team of researchers studied more than 200 children in the first ever brain imaging study of its kind.

"We expected that poor growth might impact cognition in early development, but it was striking to see this at the level of brain function," said Prof Spencer.

"Typically-developing infants in our study showed engagement of a working memory brain network—and this [brain activity](#) predicted cognitive outcomes one year later. But the stunted infants showed a very different pattern suggesting that they were quite distractable."

"This distractibility was associated with a brain network typically involved in the allocation of attention to objects or tasks, suppressing

distraction, and maintaining items in working memory," said Dr. Sobana Wijeakumar, first author of the study. Dr. Wijeakumar is an Assistant Professor in the School of Psychology at the University of Nottingham.

The [brain](#) activity and cognitive abilities of the infants were assessed at six to nine months, and cognitive ability was followed up one year later. The results showed that infants with so-called "stunted growth," often caused by poor nutrition or ill-health, had significantly poorer cognitive abilities at both stages than their typically-developing counterparts.

Interestingly, the children who bucked the trend and did well in their second year of cognitive testing despite having restricted growth were those whose visual memory had been unexpectedly strong at the six to nine months stage.

The discovery suggests that efforts to improve working memory and tackle distractibility in children during their crucial early months may reduce or prevent cognitive disadvantages later in life. This research also highlights the importance of studying [brain function](#) in early development.

The research was led by the University of East Anglia in collaboration with the University of Nottingham, the Community Empowerment Lab, Durham University, University of Iowa, Rhode Island Hospital, Brown University, and the Bill & Melinda Gates Foundation.

More information: Sobana Wijeakumar et al, Stunting in infancy is associated with atypical activation of working memory and attention networks, *Nature Human Behaviour* (2023). [DOI: 10.1038/s41562-023-01725-3](#).
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