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
10.1038/s41562-023-01725-3.
www.nature.com/articles/s41562-023-01725-3