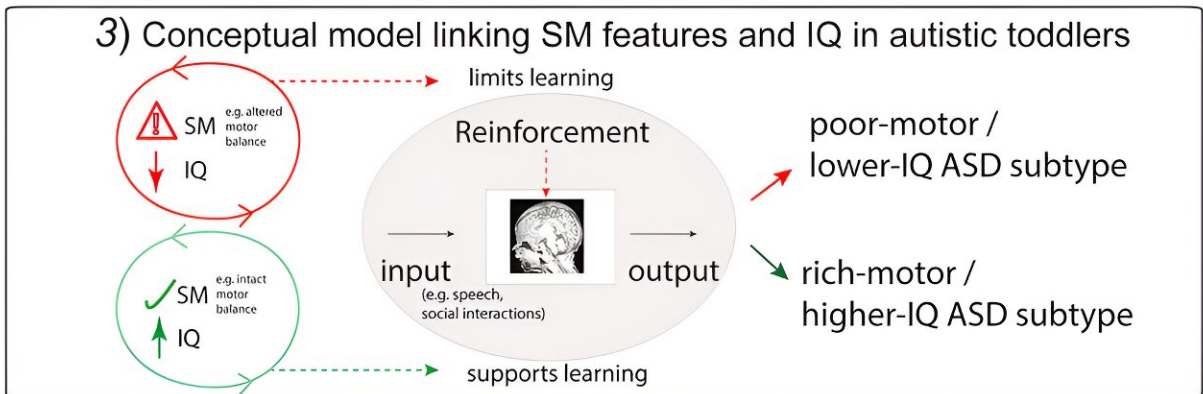
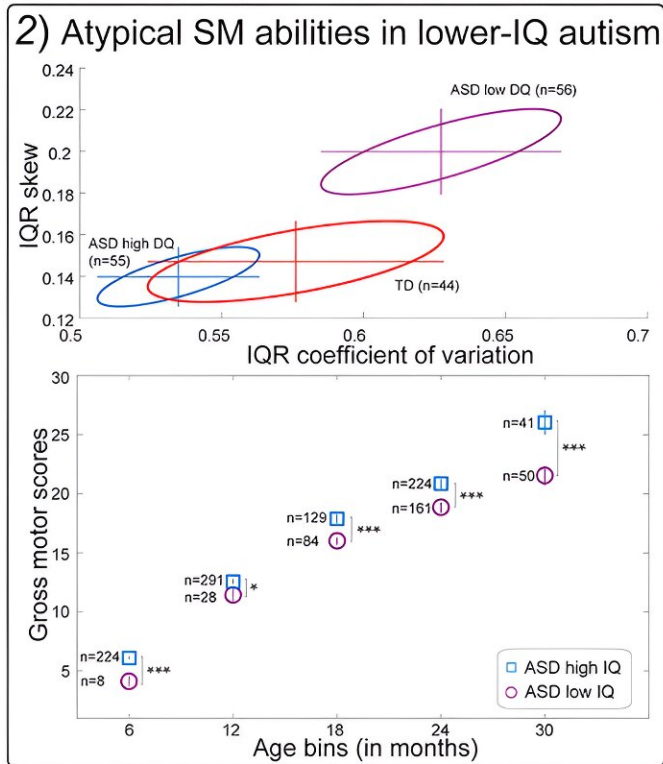
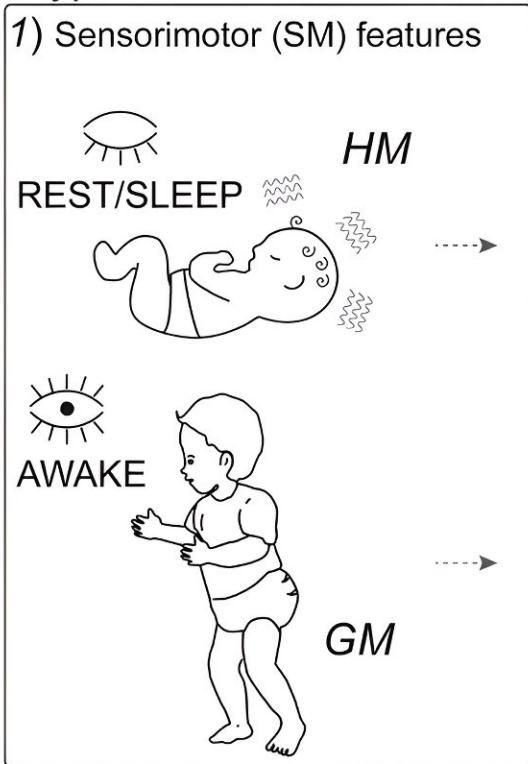


New research identifies early sensorimotor markers for autism spectrum disorder

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Atypical motor abilities and lower IQ in 1,000+ autistic toddlers



Graphical abstract. Credit: *iScience* (2024). DOI: 10.1016/j.isci.2024.110685

A study published in the journal [iScience](#) has uncovered significant findings related to the early sensorimotor features and cognitive abilities of toddlers who are later diagnosed with Autism Spectrum Disorder (ASD). The research, led by Kristina Denisova, a professor of Psychology and Neuroscience at the CUNY Graduate Center and Queens College, takes an important step toward better understanding ASD so that more precise, individually tailored interventions can be developed.

Autism Spectrum Disorder, typically diagnosed around the ages of 4 to 5 years, is a [neurodevelopmental disorder](#) with complex and varied presentations, including atypical communication and restrictive and repetitive patterns of behavior. Moreover, cognitive abilities are often lower in individuals with ASD.

Despite the established link between lower intelligence quotient (IQ) in infancy and a future diagnosis of ASD, not all children with ASD exhibit lower cognitive abilities during infancy. The study addresses the critical gap in knowledge regarding the early features that differentiate children with varying cognitive abilities who later develop ASD.

The research team investigated the relationship between movement and cognitive abilities in toddlers before their ASD diagnosis, both during sleep and wakefulness. The study posed two key questions: Do ASD children with lower IQ exhibit altered movement during sleep compared to children with higher IQ? Additionally, are lower motor skills during wakefulness characteristic of lower-IQ children with ASD compared to those of higher-IQ ASD toddlers?

The research was conducted in two stages. In the first sample, the team examined [sensorimotor](#) features obtained from sleep [functional magnetic resonance](#) imaging (fMRI) in 111 toddlers with ASD. In the second, independent sample, they analyzed sensorimotor functioning during wakefulness in over 1,000 toddlers with ASD, categorized by lower vs. higher cognitive abilities.

The findings revealed that toddlers with ASD and lower IQs have significantly altered sensorimotor features compared to toddlers with ASD and higher IQs. Interestingly, the sensorimotor features of higher-IQ ASD toddlers were nearly indistinguishable from typically developing (TD) toddlers. This suggests that a higher IQ may confer resilience to atypical sensorimotor functioning, and conversely, that poor sensorimotor functioning may be a key marker for lower IQ in childhood autism.

Moreover, the study found that lower-IQ ASD toddlers consistently exhibited lower gross motor skills across various age milestones (6, 12, 18, 24, and 30 months). This disruption in early sensorimotor learning during critical developmental periods indicates a potential vulnerability in the brain's motor control circuitry, associated with lower cognitive abilities in toddlers who later receive an ASD diagnosis.

"The implications of these findings are far-reaching," said Denisova. "They underscore the need for more precise, tailored interventions for children with ASD, particularly those with lower [cognitive abilities](#). Interventions for lower-IQ autistic children may need to focus on enhancing both sensorimotor and cognitive skills, while interventions for higher-IQ [autistic children](#) might prioritize leveraging their strengths to mitigate potential mental health consequences."

Denisova emphasized the importance of future research in this area, particularly involving underserved families who face barriers in

accessing early intervention services.

This research was made possible with support from the National Institute of Mental Health of the National Institutes of Health. Research in the Denisova lab is also supported by the Simons Foundation Autism Research Initiative and faculty start-up funds.

More information: Kristina Denisova et al, Sensorimotor variability distinguishes early features of cognition in toddlers with autism, *iScience* (2024). [DOI: 10.1016/j.isci.2024.110685](https://doi.org/10.1016/j.isci.2024.110685)

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