

MEDIA RELEASE

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MATERNAL MENTAL WELLBEING SHAPES CHILDREN'S EARLY COGNITIVE DEVELOPMENT, GUSTO STUDY FINDS

Singapore study finds that absence of anxiety or depressive symptoms in mothers does not necessarily indicate wellbeing, and positive maternal wellbeing is linked to stronger cognitive development in preschool children

SINGAPORE — A Singapore study tracking 328 mother-child pairs has found two distinct pathways linking maternal mental health to child outcomes at age four. The research from A*STAR Institute for Human Development and Potential (A*STAR IHDP), in collaboration with the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), and KK Women's and Children's Hospital (KKH), draws on data from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) birth cohort.

While poor maternal mental health, including anxiety and depression symptoms, was linked to harsher or more lenient parenting and behavioural difficulties in children, positive maternal wellbeing was linked to warm parenting characterised by clear boundaries and stronger cognitive abilities. Crucially, the researchers found that positive and negative mental health operate largely independently – meaning that treating depression does not automatically boost positive mental health.

These findings suggest that supporting mothers to thrive emotionally, not just reducing psychological distress, may be an important lever for enhancing children's early cognitive development.

"Not depressed" is not the same as thriving

Standard mental health screening typically places mothers on a single scale: from "depressed" to "not depressed." But this study supports a dual-factor model where mental health consists of two separate dimensions:

- **Negative mental health:** The presence of distress, such as depression and anxiety.
- **Positive mental health:** The presence of wellness, such as feeling calm, confident, and optimistic.

Under this model, a mother can score low on negative mental health – appearing healthy on standard screenings – and yet score low on positive wellbeing. She is "functional but not flourishing." The study found that while such mothers may avoid the negative impacts of negative mental health, their children may still miss out on the developmental benefits associated with high positive wellbeing.

Two pathways to child development

The researchers assessed children at ages 4 to 4.5 — a critical window before formal schooling — using standardised tests for IQ, vocabulary, numeracy, and executive function. They found that the two dimensions of maternal mental health influence children through different parenting styles, leading to different outcomes:

- **The "risk" pathway:** Mothers with higher depression or anxiety symptoms tended toward strict, punitive parenting or overly lenient parenting with few boundaries. These styles were linked to more behavioural difficulties in children.
- **The "benefit" pathway:** Mothers with higher positive wellbeing were more likely to parent with warmth while setting clear boundaries and explaining rules. This style was linked to cognitive benefits: stronger IQ, vocabulary, numeracy, and executive function in children.

In short, addressing negative mental health and promoting wellbeing in mothers are two separate goals — with two separate benefits for children.

Why parenting style matters

The study highlights "authoritative" parenting as the key link between maternal wellbeing and child cognitive development. Researchers distinguish between three primary styles:

- **Authoritative:** High warmth paired with clear standards. These parents set boundaries but explain the reasoning behind rules, fostering understanding.
- **Authoritarian:** Low warmth, high control. These parents demand obedience and use punishment without explanation.
- **Permissive:** High warmth, low standards. These parents are lenient and often avoid enforcing boundaries.

Of these three styles, authoritative parenting has long been linked to better cognitive outcomes in children — a finding supported by multiple studies over several decades. What this study adds is evidence that a mother's positive emotional state may be what enables her to maintain this engaged, patience-demanding style.

"Our findings suggest that public health policies could go beyond treating mental disorders to actively support mothers' positive wellbeing. Helping mothers feel calm and confident may benefit both parenting and children's cognitive development during the preschool years," said Dr Michelle Kee, the study's first author and Principal Scientist at A*STAR IHDP.

"In clinical practice, some Asian mothers may have grown up in families where an authoritarian parenting style is not uncommon, so it can be a challenge to adopt a warmer style without being permissive. This study provides good evidence that we can share with mothers to nudge them to shift their caregiving approach towards a more authoritative one," said Associate Professor Helen Chen, co-author of the study and Senior Consultant, Department of Psychological Medicine, KK Women's and Children's Hospital.

Study citation:

Kee MZL, Phua DY, Chen HY, et al. Distinct Roles of Positive and Negative Maternal Mental Health in Parenting Styles and Child Development. JAACAP Open (2025). <https://doi.org/10.1016/j.jaacop.2025.11.007>

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About GUSTO

Set up in 2009, GUSTO (Growing Up in Singapore Towards healthy Outcomes) is a nationwide birth cohort study involving collaborators from KK Women's and Children's Hospital (KKH), National University Health System (NUHS), National University of Singapore (NUS), and A*STAR Institute for Human Development and Potential (A*STAR IHDP). It is a longitudinal study of Singaporean mothers and their offspring. Since its inception, the study has recruited 1,247 Singaporean pregnant women as volunteers. These volunteers are studied extensively during their pregnancy, and their offspring are closely followed up as they grow up. GUSTO aims to understand how conditions during pregnancy and early childhood may affect the mothers' and children's health, growth and development, as well as metabolic, neurodevelopmental and other conditions – all of which are of major public health and economic importance in Asia and around the globe.

The research spans across four themes, where the results from monitoring both mother and child help in developing public health policies; clinically-valuable, testable interventions; reduce the burden of childhood obesity and non-communicable diseases,

e.g. diabetes; and improve neurodevelopmental outcomes in children. The study is supported by the National Research Foundation (NRF) under the Open Fund-Large Collaborative Grant (OF-LCG) administered by the Singapore Ministry of Health's National Medical Research Council (NMRC), and the Agency for Science, Technology and Research (A*STAR). In RIE2025, GUSTO is supported by funding from the NRF's Human Health and Potential (HHP) Domain, under the Human Potential Programme. Find out more at www.gusto.sg.

About A*STAR Institute for Human Development and Potential

A*STAR Institute for Human Development and Potential (A*STAR IHDP) is host to a range of research activities that emphasise human potential and opportunities to improve health and well-being across the life course. We enable this through our research, as well as the support and participation of multiple ecosystem partners within and beyond A*STAR.

Through our work, we hope to enable communities and societies to be better versions of themselves, through opportunities to understand and access ladders for improved health and well-being. These include observational studies, pilot interventions, and evidence recommendations to practitioners and policy makers.

Our aim is to be a lead institute contributing to Singapore's vision to build human capital and potential, as part of the Human Health and Potential domain in RIE2025. Our strong foundational capabilities in translational research, renewed focus areas and commitment to supporting Singapore's needs in population health will help advance human potential, health and well-being. Find out more at www.a-star.edu.sg/ihdp.

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About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector R&D agency. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit the economy and society. As a Science and Technology Organisation, A*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by improving societal outcomes in healthcare, urban living, and sustainability. A*STAR plays a key role in nurturing scientific talent and leaders for the wider research community and industry. A*STAR's R&D activities span biomedical sciences to physical sciences and engineering, with research entities primarily located in Biopolis and Fusionopolis. For ongoing news, visit www.a-star.edu.sg.

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About KK Women's and Children's Hospital

KK Women's and Children's Hospital (KKH) is Singapore's largest tertiary referral centre for obstetrics, gynaecology, paediatrics and neonatology. The academic medical centre specialises in the management of high-risk conditions in women and children.

Driven by a commitment to deliver compassionate, multidisciplinary care to patients, KKH leverages research and innovation to advance care. In 2021, the hospital launched the Maternal and Child Health Research Institute (MCHRI) to support the growth of every woman and child to their fullest potential and transform national health in the region.

Some of the hospital's breakthroughs include uSINE[®], a landmark identification system for the administration of spinal epidural, the discovery of new genetic diseases like Jamuar Syndrome, and a series of guidelines for women and children to improve population health.

KKH has also successfully piloted several significant national initiatives including Singapore's first and only donor human milk bank and the KidSTART@KKH Kids 0-3 that pioneers comprehensive care from pregnancy through the child's second birthday.

The academic medical centre is also a major teaching hospital for Duke-NUS Medical School, Yong Loo Lin School of Medicine and Lee Kong Chian School of Medicine. In addition, KKH runs the largest specialist training programme for Obstetrics and Gynaecology, and Paediatrics in Singapore.

Founded in 1858, KKH marked its centenary as a maternity hospital and welcomed its 1.6 millionth baby in 2024. For more information, visit www.kkh.com.sg

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About National University of Singapore (NUS)

The National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education, research and entrepreneurship, with a focus on Asian perspectives and expertise. We have 15 colleges, faculties and schools across three campuses in Singapore, with more than 40,000 students from 100 countries enriching our vibrant and diverse campus community. We have also established our NUS Overseas Colleges programme in more than 15 cities around the world.

Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, 30 university-level research institutes, research centres of excellence and

corporate labs focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research and cybersecurity.

For more information on NUS, please visit www.nus.edu.sg.

About the NUS Yong Loo Lin School of Medicine (NUS Medicine)

The NUS Yong Loo Lin School of Medicine is Singapore's first and largest medical school. Our enduring mission centres on nurturing highly competent, values-driven and inspired healthcare professionals to transform the practice of medicine and improve health around the world.

Through a dynamic and future-oriented five-year curriculum that is inter-disciplinary and inter-professional in nature, our students undergo a holistic learning experience that exposes them to multiple facets of healthcare and prepares them to become visionary leaders and compassionate doctors and nurses of tomorrow. Since the School's founding in 1905, more than 12,000 graduates have passed through our doors.

In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives.

The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in the world (Times Higher Education World University Rankings 2026 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2025).

For more information about NUS Medicine, please visit <https://medicine.nus.edu.sg/>