

Global research team finds no clear link between maternal diabetes during pregnancy and ADHD in children

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An international research team led by Professor Ian Wong Chi-kei, Head of the Department of Pharmacology and Pharmacy at LKS Faculty of Medicine of the University of Hong Kong (HKUMed) has just provided

valuable evidence through a 20-year longitudinal study to address the longstanding debate concerning the potential impact of maternal diabetes on attention-deficit/hyperactivity disorder (ADHD) in children.

This study, analyzing real-world data from more than 3.6 million mother-baby pairs in China's Hong Kong, Taiwan, New Zealand, Finland, Iceland, Norway and Sweden, showed that maternal diabetes during pregnancy is unlikely to be a direct cause of ADHD. The [findings](#) were published on 8 April in *Nature Medicine*.

Maternal diabetes and ADHD risk

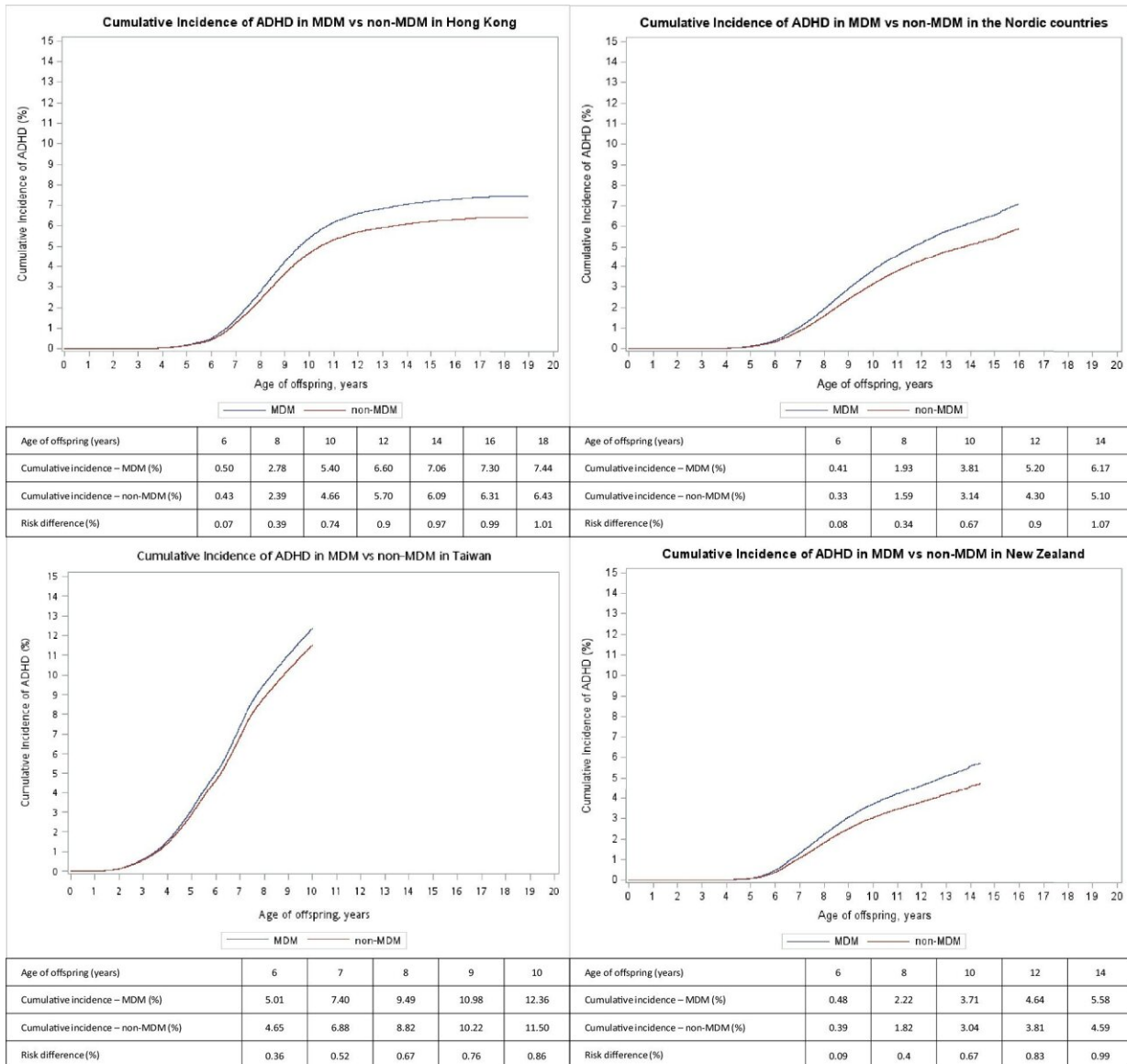
Globally, approximately 16% of women have high blood sugar levels during pregnancy, and the prevalence of diabetes during pregnancy has been on the rise owing to factors like obesity and older maternal age. This can negatively affect the baby's brain and nervous system development.

ADHD is one of the most common neurodevelopmental disorders in [children](#), which can have severe negative consequences. Individuals with ADHD are prone to poor outcomes such as [emotional problems](#), [self-harm](#), substance misuse, educational underachievement, exclusion from school, difficulties in employment and relationships, and even criminality.

The impact of maternal diabetes on the risk of ADHD in children has been a subject of debate because of inconsistent findings in previous studies. As a result, concerns regarding pregnancies in women with diabetes and the potential connection to the risk of ADHD in children have persisted.

Recognizing the importance of identifying [risk factors](#) for ADHD, especially for women of childbearing age, the cross-regional study

utilized population-based data from China's Hong Kong, Taiwan, New Zealand, Finland, Iceland, Norway and Sweden to comprehensively assess the association between maternal diabetes and the risk of ADHD in offspring.



Cumulative incidence of ADHD in different comparison groups from the main analyses. Abbreviations: ADHD, attention-deficit/hyperactivity disorder; MDM, maternal diabetes mellitus. Credit: *Nature Medicine* (2024). DOI:

Findings challenge previous studies

This extensive study, which included a remarkable sample size of more than 3.6 million mother-child pairs from 2001 to 2014, with follow-up until 2020, yielded crucial observations regarding the association between maternal diabetes during pregnancy and the risk of ADHD.

The research team first found that children born to mothers with any type of diabetes, whether before or during pregnancy, had a slightly higher risk of ADHD compared to unexposed children, with a hazard ratio of 1.16. The study further identified elevated risks of ADHD for both gestational diabetes (diabetes during pregnancy) and pregestational diabetes (diabetes before pregnancy).

The hazard ratio for gestational diabetes was 1.10, indicating a modestly increased risk, whereas the hazard ratio for pregestational diabetes was 1.39, suggesting a more substantial association.

However, an intriguing finding emerged when the research team compared the risk of ADHD between siblings with discordant exposure to gestational diabetes and found no significant difference.

This unexpected result indicates that the previously identified risk of ADHD when children were exposed to gestational diabetes during pregnancy is likely due to shared genetic and familial factors, rather than gestational diabetes per se. These findings challenge previous studies that suggested maternal diabetes during or before pregnancy could heighten the risk of ADHD in children.

Research significance

According to Professor Ian Wong Chi-kei, Lo Shiu Kwan Kan Po Ling Professor in Pharmacy, and Head of the Department of Pharmacology and Pharmacy, HKUMed, the process of coordinating with scholars from around the world analyzing cross-regional cases spanning more than 20 years was no mean feat. This collaborative effort aimed to establish a comprehensive understanding of the matter at hand.

"In contrast to previous studies, which hypothesized that maternal diabetes during pregnancy could significantly increase the risk of ADHD, our study found only a modest association between maternal diabetes and ADHD in children after considering the intricate interplay of various influential factors. Notably, sibling comparisons showed this association is likely influenced by shared genetic and familial factors, particularly in the case of gestational diabetes," explained Professor Wong.

He highlighted the need for deliberate consideration and future research. "This implies that women who are planning [pregnancy](#) should look at their holistic risk profile rather than focusing solely on [gestational diabetes](#)," he said. "Moving forward, it is crucial for future research to investigate the specific roles of genetic factors and proper blood sugar control during different stages of embryonic brain development in humans."

More information: Adrienne Y. L. Chan et al, Maternal diabetes and risk of attention-deficit/hyperactivity disorder in offspring in a multinational cohort of 3.6 million mother–child pairs, *Nature Medicine* (2024). [DOI: 10.1038/s41591-024-02917-8](https://doi.org/10.1038/s41591-024-02917-8)

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