THE OBSTETRICAL DILEMMA: A CLASSIC EVOLUTIONARY TRADE-OFF, REVISITED

The dilemma was well described by Mitteroecker and Fischer[1].

Taking advantage of the vast genetic and imaging resources of the UK Biobank, Xu et al.[2] used deep learning and genome-wide association studies (GWAS) on over 31,000 pelvic scans to revisit the long-standing obstetrical dilemma—the idea that human evolution faced a trade-off between narrow pelvises for bipedal locomotion and larger infant heads due to increased brain size.

Key findings:

- Pelvic shape is highly heritable: between 32% and 48% of pelvic variation is due to genetics. The study identified 180 genetic loci associated with pelvic proportions.
- Sex-specific genetic architecture: birth canal–related traits, such as the subpubic angle, showed different genetic patterns in men and women, highlighting reproductive specialization.
- Childbirth trade-offs: narrower birth canals were linked to a higher risk of obstructed labor and emergency C-sections.
- Locomotion effects: narrower pelvises correlated with faster walking speeds, but also an increased risk of back pain and knee disorders.
- Pelvic floor consequences: wider pelvises (more favorable for childbirth) were associated with increased risks of incontinence and genital prolapse, adding a new dimension to the evolutionary trade-offs.
- No support for shortened gestation as a solution: the study found no genetic evidence linking pelvic dimensions to gestation length, contradicting the long-standing idea that human evolution addressed the childbirth challenge by having babies earlier (with smaller heads). This hypothesis, once thought to help resolve the dilemma, lacks empirical support.

Conclusion:

Rather than being resolved by shortened pregnancy, the obstetrical dilemma appears to reflect coevolution between the shape of the pelvis and the size of the human head, with additional constraints from pelvic floor health and locomotor demands. This large-scale, data-rich study offers a modern, more complex view of a foundational hypothesis in human evolutionary biology.

1. https://www.ajog.org/article/S0002-9378(22)00733-5/fulltext
2. https://www.science.org/doi/10.1126/science.adq1521?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed