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## Lasting consequences of early environments on health

### What adoption studies tell us about breaking the cycle of disadvantage

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Environments in early life play a central role in shaping health, educational, and labour market outcomes over the life course. Evidence from studies of income shocks, neighbourhood quality, and early childhood interventions shows that disadvantage in childhood is associated with worse outcomes in adulthood.<sup>1-3</sup> While these long run consequences are well established, important questions remain about their durability and the mechanisms through which they operate. Recent work suggests that even relatively modest early-life shocks can have lasting effects, although these impacts are often heterogeneous and shaped by family resources and child baseline differences in health and development.<sup>2</sup> In this context, a linked observational study by Liao and colleagues ([doi:10.1136/bmj-2025-087844](https://doi.org/10.1136/bmj-2025-087844)) provides important new evidence on the extent to which improving children's home environments can offset early disadvantage and whether such gains persist across the life course or even generations.<sup>4</sup>

The authors used Swedish population registers and, building on earlier work, study siblings discordant for adoption, comparing those raised by their biological parents with those adopted into non-relative families, and following both groups, as well as their offspring, over time.<sup>5,6</sup> This quasi-experimental sibling comparison design is well established in the literature and substantially reduces confounding from shared genetic and familial factors that typically limit observational studies.<sup>7</sup> Compared with siblings who remained in the biological home, adopted individuals had a lower risk of psychiatric disorders, criminal convictions, and receiving social welfare, alongside higher educational attainment, cognitive ability, and non-cognitive skills. These patterns held across both full sibling and maternal half sibling samples. Although attenuated, the benefits also extended to the next generation, with offspring of adoptees exhibiting improved psychosocial outcomes.

The study's population based data that capture a wide range of health and academic outcomes, long follow-up period, and empirical design are key strengths.<sup>8</sup> Important limitations remain, however, and point to directions for future research. Adoption is not randomly assigned across siblings, and residual differences within families, such as a child's health or other unobserved characteristics, may still influence both adoption decisions and subsequent outcomes. For example, a firstborn child with complexity may strain family resources and affect the likelihood that a younger sibling is adopted. To alleviate these concerns, the authors presented extensive sensitivity analyses which, together with the institutional context, supported the interpretation

that adoptions were primarily driven by contemporaneous family circumstances rather than child specific characteristics. Nonetheless, because residual bias cannot be fully excluded, future research should seek settings that more closely approximate random assignment to strengthen causal interpretation.<sup>9</sup>

A second key limitation was the lack of insight into underlying mechanisms. Although the study showed that children adopted into more advantaged environments experienced better long term outcomes than their siblings who remained with the biological family, it remains unclear which features of those environments drove these effects. Factors may include differences in parental time and practises, stability, material resources, or neighbourhood context. Clarifying these mechanisms and complex ways in which they might interact<sup>10,11</sup> will be essential for translating the findings into actionable interventions for clinicians and policymakers.

Finally, generalisability of these findings warrants consideration. The study drew on Swedish adoptions that occurred decades ago, in a setting with a relatively strong social welfare system. This may limit the extent to which the findings translate to contemporary settings, different countries, and welfare systems. In addition, some forms of selection, such as the possibility that adoptees were more vulnerable at baseline<sup>12</sup> and experienced additional disruption from separation from their biological family, may mean that the estimated effects understated the potential benefits of improved environments.<sup>13,14</sup>

For patients, clinicians, and policymakers, the findings offer both reassurance and caution. They reinforce that early-life environments shape long term mental health, functioning, and life chances, particularly for children growing up in adversity. However, adoption itself is not a scalable solution; it is a selective and complex intervention. The more relevant implication is that improving children's environments through greater stability, resources, and support for caregivers may yield lasting benefits. For clinicians, this underscores the importance of addressing social determinants of health, whereas for policymakers it highlights the need to identify and scale the specific mechanisms that drive these gains.

Overall, this study provides compelling quasi-experimental evidence that enriched early-life environments can improve long term outcomes across multiple domains. It advances the evidence base but does not provide a definitive solution: important questions remain about the mechanisms at work and how these insights can be translated into concrete,

**scalable policies and interventions. The challenge now is to move beyond exceptional circumstances and identify approaches that can support children and families more broadly.**

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