Medical Xpress

deCODE study highlights the important role of genes in nurture

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In a study published tomorrow, researchers at deCODE genetics demonstrate that parental genes, both those that are transmitted to the child and those not transmitted, can affect the child's fate through their impact on the parents and the kind of nurturing they provide. The researchers call this phenomenon "genetic nurture."

Genetic nurturing not only plays an important role in traits such as

educational attainment and the age when a person has his/her first child, it also affects health- and nutrition- related traits such as height, HDL levels, and number of cigarettes smoked. Interestingly, but maybe not surprisingly, the magnitude of genetic nurturing effects from fathers and mothers differ for some traits. Moreover, one can also be affected by genetic nurturing from siblings and other relatives. These results can reframe the discussion of nature versus nurture and lead to a deeper appreciation of the evolutionary success of nurturing in humans and other species.

It is also important to note that many of the recent genetic association studies focused on the transmitted alleles only. In light of the results here, it has to be recognized that, in general, their effect estimates captured both direct genetic effects and genetic nurturing effects. The existence of genetic nurture is also relevant to how heritability should be defined and estimated, e.g. whether genetic nurturing effect should be incorporated, and consequentially related to the issue of "missing heritability" that has been a concern of scientists for more than a decade.

Methodologically, this study differs from most large-scale genetic studies published recently in that it employs only probands (the children) who have at least one parent genotyped. By comparing the effects of the transmitted and non-transmitted alleles, direct genetic effects and genetic nurturing effects can be separated from each other. "The nature of nurture: Effects of parental genotypes" is published 26 January in *Science*.

"The discussion of nature (genes) versus nurture is often framed so that the two factors are treated as, if not competitive, independent forces. This study illustrates that not only do genes and nurture often work hand in hand, there is a genetic basis to nurture. For a substantial fraction of the lifespan of a human being, it is nearly completely dependent on the parents for survival. Thus it should not be a surprise that genes would

evolve to have their influence expanded through nurture," noted Augustine Kong, the first author of the paper. He also lamented that: "Having little interest in social science before, this research drastically changed my outlook, particularly regarding my appreciation for the importance of family."

"Understanding the function of the brain remains a great challenge for genetics and biology. The propensity to nurture is a defining trait for a person that is inseparable from the brain, and yet it is most difficult to measure or quantify. Identifying sequence variants that contribute to nurture can thus be an important step towards the understanding of the workings of the human brain and what makes human human," said Kari Stefansson, CEO of deCODE and a corresponding author of the paper. He also noted that "Despite the treasure trove of gene discoveries made though non-family-based association studies in the last decade or so, the results here are a reminder that, without family data, the story can often be, if not distorted, incomplete."

This study leverages deCODE's unique genetics resources in Iceland. In particular, over one-half of the nation is genotyped together with rich phenotypic/trait information. Most importantly, each of the genotyped persons has on average approximately one parent also genotyped, a feature that made the current study possible.

More information: Augustine Kong et al. The nature of nurture: Effects of parental genotypes, *Science* (2018). DOI: 10.1126/science.aan6877

Provided by deCode Genetics