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Nature and nurture: Not a case of either/or

FRA REDAKTØREN

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Even social constructions such as educational attainment are influenced by an unjust genetic lottery.

Photo: Einar Nilsen

In May 1927, a ruling authorising sterilisation was made in the case of *Buck v Bell* in the U.S. Supreme Court: 'Carrie Buck is a feebleminded white woman. She is the daughter of a feebleminded mother in the same institution, and the mother of an illegitimate feebleminded child… Three generations of imbeciles are enough.' Twenty-one-year-old Buck, who had been a keen student before her foster parents removed her from school in order to help out at home, was sterilised. She thought that she was having her appendix removed (1).

In the last century, forced sterilisation – and later systematic killing – of persons who were assumed to have low cognitive ability fortunately left deep scars in Europe and the United States. It therefore arouses opposition when molecular genetic studies confirm what we already know: That the length of education you receive depends not only on the environment in which you grow up, but also on what genes you have. The results of the largest study to date of the association between genes and educational attainment were published this summer. DNA from more than one million people was analysed. As many as 1271 independent single-nucleotide polymorphisms were significantly associated with educational attainment, while a polygenic risk score explained a little more than 10 % of the variation in phenotype within this population (2).

We know from twin and family studies that length of education has a heritability of around 40 %. This means that around 40 % of the difference between individuals in a group can be

explained by genetic differences between the same individuals (3). The difference between estimates of heritability based on known genetic kinship between study participants and explained variance based on molecular genetic studies, is partly attributable to the negligible effect of each gene.

Molecular genetic studies may also help us to understand social influence and the interplay between genetic and environmental factors. A recently published study showed, for example, that among siblings who had grown up together, the one with the highest genetic score had the longest period of education (4). Thus, despite apparently identical conditions of upbringing, their genes had a certain effect. On the other hand, a correlation was found between the mother's genetic score (the father's score was not measured) and the child's education, adjusted for the mother's genetic score. This is interpreted as meaning that the mother's genes have a bearing on how she shapes the child's environment – which in turn influences his/her educational attainment. For example, the mother's genes may help to decide how many books there are in the home, what leisure activities the child engages in, and how much help the child receives with homework.

But do we need genetic studies of social constructs such as educational attainment? Critics ask few questions about the findings themselves, but wonder what they will be used for (5). The psychologist Kathryn Paige Harden wrote in the New York Times this summer that she hopes the results of the study examining the effect of genetic factors on length of education may increase our understanding of the injustice of the meritocracy (6). We have no influence over the genes that we are born with. Society should therefore not be organised in such a way that those who gain the most learning reap the greatest rewards. To take one example: Increasing upper secondary school dropout rates are obviously not due to changes in the genes, but in conjunction with other factors, they may be a result of the failure of current forms of teaching to adapt to the biological heterogeneity of a broadly diverse student population.

Social changes occur much, much more rapidly than changes in the human genome, and thereby these two factors fall out of alignment. The trend towards overweight is explained by a complex interplay between (very many) genetic and environmental factors. The obesity epidemic in the last 20–30 years is not due to genetic changes at population level, but unlimited access to energy-rich (and nutritionally poor) food presumably allows a genetic disposition to overweight to unfold in a different way than previously (7). And, like social inequality, overweight cannot be remedied by the individual alone, but should be fought through a combination of individually targeted, political interventions.

Violation of human rights and systematic bestiality had no need for today's molecular genetic knowledge to be given free rein. Eugenics and racial hygiene were based on an erroneous, deterministic understanding of the heritability of complex conditions and traits – as well as a despicable view of humanity (8). Research on the influence of our genes on social constructions, and the influence of the environment on our genes, should therefore be welcomed.

REFERENCES:

1. Offit PA. Pandora's lab: seven stories of science gone wrong. Washington, DC Natl Geogr Mag 2016; 108 - 11.

2. Lee JJ, Wedow R, Okbay A et al. Gene discovery and polygenic prediction from a genome-wide association study of educational attainment in 1.1 million individuals. Nat Genet 2018; 50: 1112 - 21. [PubMed][CrossRef]

3. Branigan AR, McCallum KJ, Freese J. Variation in the heritability of educational attainment: an international meta-analysis. Soc Forces 2013; 92: 109 - 40. [CrossRef]

4. Belsky DW, Domingue BW, Wedow R et al. Genetic analysis of social-class mobility in five longitudinal studies. Proc Natl Acad Sci U S A 2018; 115: E7275 - 84. [PubMed][CrossRef]

5. Warner J. Why we shouldn't embrace the genetics of education. Inside Higher Ed 26.7.2018. https://www.insidehighered.com/blogs/just-visiting/why-we-shouldnt-embrace-genetics-education (2.9.2018).

6. Harden KP. Why progressives should embrace the genetics of education. New York Times 24.7.2018. https://www.nytimes.com/2018/07/24/opinion/dna-nature-genetics-education.html (31.8.2018).

7. Walter S, Mejía-Guevara I, Estrada K et al. Association of a genetic risk score with body mass index across different birth cohorts. JAMA 2016; 316: 63 - 9. [PubMed][CrossRef]

8. Lombardo PA. The power of heredity and the relevance of eugenic history. Genet Med 2018. [PubMed][CrossRef]

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