Older fathers found to produce less fertile offspring

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(Phys.org)—An international team of researchers has conducted an extensive study of male fertility and aging and has found evidence of older fathers producing less fertile offspring than younger fathers. In their paper published in *Proceedings of the Royal Society B*, the group describes their study of the reproductive success of children from males of different ages from several time periods, and what they found.

Some prior evidence has suggested that as men grow older, they tend to have children that produce fewer offspring than average. In this new effort, the researchers sought to find if that might be true by studying birth records from people in Canada, Germany and Sweden. Officials in those countries have computerized the health, birth and death records of people going back several generations. For their study, the team looked at three populations living during the years 1670 to 1850 and another group of people born in Sweden after 1932. The entire study included over 1.4 million people.

To keep the focus on males and aging, the researchers ruled out the mothers' ages, modern pollutants possibly impacting fertility, and other factors. They report that their study showed that the children of older fathers from all of the groups tended to produce fewer offspring than did those from younger fathers.

Learning more about the impact of older people having children has become important as the average age of parents in the developed world has crept upward. Focusing on the father is important, the researchers note, because offspring get most new genetic mutations from their male parent; these increase as fathers age.

The researchers suggest that one reason for the reduction in offspring fertility could be mutations occurring in the father's sperm as he ages, which could somehow impact the ability of their children to have children themselves. Another possibility is that older fathers may have less involvement with their offspring (known as diminishing paternal investment) or give birth to children with other health or mental problems. Some recent studies, for example, have shown that that children born to older fathers are more likely to develop schizophrenia.

More information: Ruben C. Arslan et al. Older fathers' children have lower evolutionary fitness across four centuries and in four populations, *Proceedings of the Royal Society B: Biological Sciences* (2017). DOI: 10.1098/rspb.2017.1562

Abstract

Higher paternal age at offspring conception increases de novo genetic mutations. Based on evolutionary genetic theory we predicted older fathers' children, all else equal, would be less likely to survive and reproduce, i.e. have lower fitness. In sibling control studies, we find support for negative paternal age effects on offspring survival and reproductive success across four large populations with an aggregate N > 1.4 million. Three

populations were pre-industrial (1670–1850) Western populations and showed negative paternal age effects on infant survival and offspring reproductive success. In twentieth-century Sweden, we found minuscule paternal age effects on survival, but found negative effects on reproductive success. Effects survived tests for key competing explanations, including maternal age and parental loss, but effects varied widely over different plausible model specifications and some competing explanations such as diminishing paternal investment and epigenetic mutations could not be tested. We can use our findings to aid in predicting the effect increasingly older parents in today's society will have on their children's survival and reproductive success. To the extent that we succeeded in isolating a mutation-driven effect of paternal age, our results can be understood to show that de novo mutations reduce offspring fitness across populations and time periods.

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