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Maternal and paternal age linked to child's risk for developing autism or schizophrenia

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A new study published in *Evolution, Medicine, and Public Health* indicates that parents who reproduce later in life are more likely to have children who develop autism disorders. Later reproduction was not, however, associated with increased risk for schizophrenia in offspring.

Multiple studies on this subject for over 30 years have found that risk patterns for these disorders are highly variable and often remain incomparable between public health studies due to substantial differences in study design. Now researchers from the Copenhagen Centre for Social Evolution have analyzed a massive single population sample from Denmark to compare risks based on maternal and paternal age, and parental age difference.

The authors used a sample of about 1.7 million Danish people born between January 1978 and January 2009, out of which approximately 6.5% were diagnosed with autistic or schizophrenic disorders during this time. Their data included the full spectrum of nation-wide autistic and schizophrenic diagnoses for up to 30 years of age and over twenty potentially confounding medical and socio-economic factors that they could statistically control for.

Unique personal identification numbers were used to link individuals' information between different Danish health registries, including the National Patient Registry (holding nationwide hospital admissions since 1977) and the Psychiatric Central Register (with diagnoses for all inpatient admissions since 1969). Combining these data sets also provided the ages of parents when children were born.

Above-average paternal and maternal ages were associated with increased risk of most autistic disorders in offspring and this effect was magnified in offspring of very old fathers. However, advanced maternal and paternal ages were not associated with higher risk of any schizophrenic disorder. In contrast, children of young parents had reduced risks of autism and only children of very young mothers had increased risks of schizophrenia.

More dissimilarly aged parents meant enhanced risk for both autistic and schizophrenic disorders in offspring compared to parents with similar ages at childbirth, but only up to a certain point where risks leveled out. For example, higher risk for autism in offspring of older fathers (or mothers) would tend to be compensated if they had a child with a much younger partner.

"The magnitude of these increases and decreases in statistical risk need to be scaled against the fortunately rather modest absolute risks of being diagnosed with a mental disorder in Denmark, which is 3.7% for all autistic disorders and 2.8% for all schizophrenic disorders up to 30 years of age. The highest increases and decreases that we could relate to paternal and maternal age added only 0.2-1.8% to these absolute risks, but represented changes in relative risk of 76-104%.", says Dr. Sean Byars, the first author of the study.

The study also discusses why these risk patterns continue to exist in modern humans and suggests that they are remnants of our evolutionary past. In an earlier study of the same population the authors showed that autism risks are associated with above average sizes at birth and schizophrenia risks with smaller (but) still normal sizes at birth. The authors highlight that modern families of 1-3 children now typically originate at ages that our ancestors were completing families of 6-8 children provided these children survived.

"Natural selection has shaped how parents, and particularly mothers, allocated their reproductive investments best in the face of uncertain conditions during our prehistory and well into modern historical times," said Professor Jacobus Boomsma, the senior author of the study. "It was not very long ago that most mothers had their first child around the age of 20 and went through 10 pregnancies. Our modern reproductive patterns are thus a poor match to what humans are likely to be naturally adapted to. Our evolutionary interpretations suggest how we can possibly understand recently increased mental disease risks that have no direct medical explanation."

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