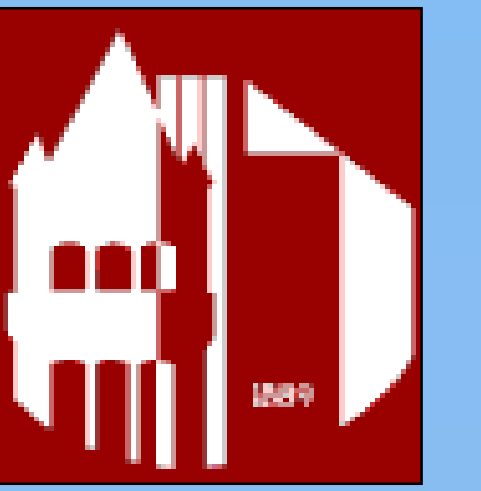


# The Effect of Advanced Parental Age on Prevalence of Autism Spectrum Disorder



## Introduction:

Possible etiologies of autism spectrum disorder (ASD) have long been debated and speculated (Idring et al., 2014). There have been several attempts to link vaccinations, environmental exposures and genetics to the disorder (Parner et al., 2012). This literature review is being conducted with the goal of exploring a possible correlation between maternal and paternal age and the likelihood of parenting a child with autism spectrum disorder. The spike in ASD diagnoses over the last decade has sparked considerable interest in what is causing this disorder (Idring et al., 2014). The age at which many couples are having children has increased over the last decade in the Western world; this fact and the increase in ASD diagnosis has sparked interest in the two possible associations (Idring et al., 2014). In recent years, parental age has been studied as a possible contributing factor to the development of autism (Lampi et al., 2013). Possible associations have been speculated to be increased gene mutations, genetics, high risk pregnancy and lifestyle (Idring et al., 2014). The literature to date indicates possible associated factors, but the associations are not yet definitive. This literature review will discuss the results of several studies and the recommendations for future research.

## Autism Spectrum Disorder:

ASD has been known to manifest itself in a variety of ways, with varying characteristics and related issues (American Psychiatric Association, 2013). According to the Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (DSM), ASD is characterized by several qualities including deficits in social communication and social interactions and/or restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013). Diagnosis of ASD is not contingent on possessing all characteristics; qualities can manifest in a variety of ways and on varying time lines (American Psychiatric Association, 2013). This disorder impacts all genders, ethnicities and socioeconomic groups (American Psychiatric Association, 2013). All of the studies referenced in this literature review have similar and equivalent definitions of ASD that were used to identify a population and sample (Hultman, Sandin, Levine, Lichtenstein & Reichenberg, 2011; Idring et al., 2014; Lampi et al., 2013; Parner et al., 2012; Quinlan, McVeigh, Driver, Govind & Karpati, 2015).

## Parental Age as a Risk Factor:

All of the studies within this literature review found similar results (Hultman et al., 2011; Idring et al., 2014; Lampi et al., 2013; Parner et al., 2012; Quinlan, McVeigh, Driver, Govind & Karpati, 2015). Each study found some level of correlation between advancing maternal and/or paternal age and the risk of having a child with ASD. The reason for this increased risk is not clear but speculations have been made. The degree to what any one risk factor impacts the likelihood of having a child with ASD is unknown. It is very possibly that one or many of these factors could be playing a role in the development of ASD.

### Paternal Risks:

- De novo mutations and epigenetic alterations (Figure 1) (Idring et al., 2014; Lampi et al., 2013; Quinlan et al., 2015)
- Epigenetic modifications (Lampi et al., 2013)
- Spontaneous genomic alterations (Parner et al., 2012; Quinlan et al., 2015)

### Maternal Risk:

- Cumulative environmental exposures (Idring et al., 2014)
- Perinatal and obstetric complications (Idring et al., 2014; Lampi et al., 2013; Quinlan et al., 2015)
- Increased risk for additional factors associated with ASD (Idring et al., 2014)
  - Autoimmunity, metabolic conditions, nutritional deficiencies (Idring et al., 2014)
- Increased risk of chromosomal abnormalities (Lampi et al., 2013)
- Spontaneous genomic alterations (Parner et al., 2012; Quinlan et al., 2015)

Figure 1: De novo gene mutation



Yirka, B. (2018, February 07). Autism study finds de novo mutations associated with motor skill deficiencies. Retrieved from <http://medicalxpress.com/new/2018-02-autism-de-novo-mutation-motor.html>

Study	Population	Results
Hultman, C. M., Sandin, S., Levine, S. Z., Lichtenstein, P., & Reichenberg, A. (2011).	Swedish Birth Cohort	- Advancing parental age increased the risk of childhood ASD - Paternal risks increased at 30 years old, showed plateau at age 40 and increase after age 50
Idring, S., Magnusson, C., Lundberg, M., Ek, M., Rai, D., Svensson, A., & ... Lee, B. (2014).	Swedish Population Based Cohort	- Advancing parental age increased the risk of childhood ASD - Maternal age effects → nonlinear - Paternal age effects → linear
Lampi, K. M., Hinkka-Yli-Salomäki, S., Lehti, V., Helenius, H., Gissler, M., Brown, A. S., &... Sourander, A. (2013).	Finnish National Birth Cohort	- Advancing parental age increases the risk of childhood ASD (35 years or more) - An association with teenage mothers and childhood ASD
Parner, E. T., Baron-Cohen, S., Lauritsen, M. B., Jorgensen, M., Schieve, L. A., Yeargin-Allsopp, M., &... Obel, C. (2012).	Danish Medical Birth Registry	- Both maternal and paternal age were associated with a greater risk of ASD in offspring

## Conclusions:

In conclusion, this literature review was successful in identifying several studies that found a relationship to parental age and the prevalence of ASD (Hultman et al., 2011; Idring et al., 2014; Lampi et al., 2013; Parner et al., 2012; Quinlan et al., 2015). However, more research needs to be done to further substantiate the claims being made. Confounding factors need to be taken into account and assessed as to the contamination of the study as a whole. Throughout this literature review, it has become clear that there may be a correlation between parental age and ASD but the question remains, what is the purpose of this research and continued investigations?

## Future Considerations:

The purpose of this research and continued research is to assess the risk of potentially having a child with ASD. The knowledge base needs to be expanded upon to find links to genes and genetic mutations. This could allow for genetic testing and more information before conception occurs. Future research should attempt to control confounding factors to achieve more accurate data.

## Confounding Factors:

- Socioeconomic status (Lampi et al., 2013)
- Maternal/paternal occupation at birth (Lampi et al., 2013; Idring et al., 2014)
- Number of previous births (Lampi et al., 2013)
- Child's weight at gestational age (Hultman et al., 2011; Lampi et al., 2013)
- Child's intellectual disability (Lampi et al., 2013)
- Maternal/paternal psychiatric history (Lampi et al., 2013; Idring et al., 2014)
- Maternal/paternal education level (Hultman et al., 2011; Idring et al., 2014; Quinlan et al., 2015)
- Maternal race/ethnicity (Quinlan et al., 2015)
- Child's gestational age (Quinlan et al., 2015)

## References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Hultman, C. M., Sandin, S., Levine, S. Z., Lichtenstein, P., & Reichenberg, A. (2011). Advancing paternal age and risk of autism: New evidence from a population-based study and a meta-analysis of epidemiological studies. *Molecular Psychiatry*, 16(12), 1203-1212. doi:10.1038/mp.2010.121
- Idring, S., Magnusson, C., Lundberg, M., Ek, M., Rai, D., Svensson, A., & ... Lee, B. (2014). Parental age and the risk of autism spectrum disorders: Findings from a Swedish population-based cohort. *International Journal of Epidemiology*, 43(1), 107-115. doi:10.1093/ije/dyt262
- Lampi, K. M., Hinkka-Yli-Salomäki, S., Lehti, V., Helenius, H., Gissler, M., Brown, A. S., & ... Sourander, A. (2013). Parental age and risk of autism spectrum disorders in a Finnish national birth cohort. *Journal of Autism and Developmental Disorders*, 43(11), 2526-2535. doi:10.1007/s10803-013-1801-3
- Parner, E. T., Baron-Cohen, S., Lauritsen, M. B., Jorgensen, M., Schieve, L. A., Yeargin-Allsopp, M., & ... Obel, C. (2012). Parental age and autism spectrum disorders. *Annals of Epidemiology*, 22(3), 143-150. doi:10.1016/j.annepidem.2011.12.006
- Quinlan, C. A., McVeigh, K. H., Driver, C. R., Govind, P., & Karpati, A. (2015). Parental age and autism spectrum disorders among New York City children 0-36 months of age. *Maternal and Child Health Journal*, 19(8), 1783-1790. doi:10.1007/s10995-015-1692-3
- Yirka, B. (2018, February 07). Autism study finds de novo mutations associated with motor skill deficiencies. Retrieved from <http://medicalxpress.com/new/2018-02-autism-de-novo-mutation-motor.html>