

## First Trimester Ultrasound and Autism

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Two research papers were published this month evaluating possible associations between ultrasound examination during the first trimester of pregnancy and autism spectrum disorder (ASD) in childhood. The papers had very different methods and reached very different conclusions.

The work of [Hoglund-Carlsson and colleagues](#) from Gothenburg University in Sweden reported long-term follow-up results from a randomized clinical trial of almost 30,000 women conducted from 1999 to 2003. Half the women were randomly assigned to have an ultrasound exam in the first trimester (12 weeks of pregnancy) and half were assigned to have an ultrasound exam in the 2<sup>nd</sup> trimester (18 weeks). The rate of ASD by the end of 2014 was 1.2% in both groups. This study supports the conclusion that 1<sup>st</sup> trimester ultrasound does *not* increase the rate of autism.

The work of [Webb and colleagues](#) from University of Washington in Seattle reported on a group of 1,749 children who had a diagnosis of autism. The researchers asked the parents about various exposures during pregnancy, including ultrasound. The study found that those children whose parents reported having a first-trimester ultrasound tended to have more severe autism than those whose parents did not report having a first-trimester ultrasound. The researchers did *not* conclude that 1<sup>st</sup> trimester ultrasound caused autism. Rather, they simply urged caution in the use of ultrasound for any reasons other than medical diagnosis.

The two studies represent a very different level of evidence. A randomized clinical trial like the Hoglund-Carlsson study is considered the highest level of evidence. One reason is that the exposure (1<sup>st</sup> trimester ultrasound or no 1<sup>st</sup> trimester ultrasound) is known, documented, and under the control of the researchers. Another reason is that those with the exposure and those without the exposure should have equivalent risks for ASD in their children.

The Webb study is called a retrospective observational study, which is considered a much lower level of evidence. Such studies are subject to a number of biases that can lead to the wrong conclusion. First,

the researchers had no direct knowledge of whether the mothers actually had a 1<sup>st</sup> trimester ultrasound exam but relied only on the recall of the parents. This can lead to “recall bias” in which parents with more severely affected children are more likely to look for reasons and are therefore more likely to recall having had an ultrasound exam than parents with less severely affected children. Another potential bias is “acquisition bias” in that those mothers who had a 1<sup>st</sup> trimester ultrasound may have had some other pregnancy problems such as bleeding while mothers who did not have bleeding were less likely to have had a 1<sup>st</sup> trimester ultrasound. Also, the mothers who recalled having ultrasound were older than those who did not. It may be that bleeding, the mother’s age, or some other unknown problem was the real reason for a higher severity of ASD, not the ultrasound itself. A detailed critique of the Webb study was provided by [Willingham](#) (see references). Finally, the Webb study did not include any children *without* ASD, so it cannot and does not claim that 1<sup>st</sup> trimester ultrasound increases the rate of ASD, only that those children who actually had ASD tended to have a more severe form if they also had a 1<sup>st</sup> trimester ultrasound.

Considering their relative strengths and limitations, these studies do not provide credible evidence that 1<sup>st</sup> trimester ultrasound causes ASD. However, the cautionary conclusion of the Webb study is reasonable: ultrasound should only be used for medical diagnosis and not for entertainment purposes.

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### References

Hoglund Carlsson L, Saltvedt S, Anderlid B-M, Westerlund J, Gillberg C, Westgren M, Fernell E. Prenatal ultrasound and childhood autism: long-term follow-up after a randomized controlled trial of first- vs second-trimester ultrasound. [Ultrasound in Obstetrics and Gynecology 48:285-288, 2016.](#)

Webb SJ, Garrison MM, Beriner R, McClintic, King BH, Mourad PD. Severity of ASD symptoms and their correlation with the presence of copy number variations and exposure to first trimester ultrasound. [Autism Research, DOI: 10.1002/aur.1690.](#)

Willingham E. Let’s take a look at that autism-ultrasound link. <http://www.forbes.com/sites/emilywillingham/2016/09/06/lets-take-a-look-at-that-autism-ultrasound-link/-d2b78506f2c9>