Vaccines and Autism: A Comprehensive Review of the Scientific Evidence

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Introduction

The question of whether vaccines cause autism has been one of the most extensively studied topics in modern public health and medical research. Since concerns were first raised in the late 1990s, researchers around the world have conducted numerous large-scale epidemiological investigations to examine the possibility of a relationship between vaccination and autism spectrum disorder (ASD).

Over the past three decades, scientists have evaluated this question using a wide range of research methods, including population-based cohort studies, case-control studies, national registry analyses, prospective surveillance programs, ecological studies, natural experiments, systematic reviews, and meta-analyses. These studies have been conducted across multiple countries, including the United States, Denmark, Finland, the United Kingdom, Sweden, Japan, and Canada, and collectively involve millions of children and families.

The research has examined several specific hypotheses, including:

- Whether the measles, mumps, and rubella (MMR) vaccine causes autism.
- Whether thimerosal, a mercury-containing preservative formerly used in some vaccines, causes autism.
- Whether cumulative exposure to vaccine antigens during infancy increases autism risk.
- Whether receiving multiple vaccines according to the recommended childhood immunization schedule contributes to autism.
- Whether vaccination during pregnancy is associated with autism spectrum disorder in offspring.
- Whether vaccines may trigger autism in genetically susceptible children or in children with a family history of autism.

Across these questions, the scientific findings have been remarkably consistent. Large epidemiological studies, national health registry investigations, independent government research programs, and multiple systematic reviews have found no credible evidence that vaccines cause autism spectrum disorder. This conclusion has remained stable despite extensive efforts to test the hypothesis in different populations, using different study designs, and over several decades of research.

Importantly, the studies included in this bibliography represent evidence from some of the world's most comprehensive health databases and surveillance systems. Many involve hundreds of thousands of participants, while several meta-analyses combine data from more than one million children. The consistency of findings across countries, populations, and methodologies provides a strong and robust body of evidence.

This bibliography has been assembled as a reference resource for healthcare professionals, educators, policymakers, journalists, researchers, and members of the public who wish to examine the primary scientific literature directly. The studies are presented in chronological order to illustrate how the evidence has accumulated over time and how successive investigations have repeatedly tested and failed to support the hypothesis that vaccines cause autism.

While scientific inquiry remains open to new evidence, the current body of peer-reviewed research overwhelmingly supports the conclusion that vaccines do not cause autism spectrum disorder. The publications listed below document the development of that evidence base and provide direct access to the original research for independent review.

Annotated Bibliography: Peer-Reviewed Research Finding No Evidence That Vaccines Cause Autism

1998

1. H Peltola, et al (1998)**. No evidence for measles, mumps, and rubella vaccine-associated inflammatory bowel disease or autism in a 14-year prospective study.** *The Lancet.* https://pubmed.ncbi.nlm.nih.gov/9643797/
   Subjects / study base: Approximately 1.8 million Finnish children vaccinated during national MMR surveillance.
   Annotation: A nationwide prospective Finnish safety follow-up found no evidence of MMR-associated autism or inflammatory bowel disease.

1999

2. B Taylor, et al. (1999). **Autism and measles, mumps, and rubella vaccine: no epidemiological evidence for a causal association.** *The Lancet*; https://pubmed.ncbi.nlm.nih.gov/10376617/
   Subjects: 498 children with autism.
   Annotation: Found no temporal or epidemiologic pattern supporting a causal association between MMR vaccination and autism.

2000

3. A Patja, et al. (2000). **Serious adverse events after measles-mumps-rubella vaccination during a fourteen-year prospective follow-up.** *Pediatric Infectious Disease Journal*. https://pubmed.ncbi.nlm.nih.gov/11144371/
   Subjects / study base: Approximately 1.8 million vaccine recipients; about 3 million MMR doses.
   Annotation: Finnish national surveillance found serious MMR-related adverse events were rare and did not identify autism as a causal outcome.

2001

4. James A Kaye, Maria del Mar Melero-Montes, Hershel Jick (2001**). Mumps, measles, and rubella vaccine and the incidence of autism recorded by general practitioners.** *BMJ.* https://pmc.ncbi.nlm.nih.gov/articles/PMC1071423/
   Subjects: 305 children with autism in the UK General Practice Research Database.
   Annotation: Autism diagnoses increased while MMR coverage remained stable, arguing against MMR as the cause of rising autism diagnoses.

5. Dales, Hammer and Smith (2001). ***Time Trends in Autism and in MMR Immunization Coverage in California.*** *JAMA*. https://pubmed.ncbi.nlm.nih.gov/11231748/

6. **Subjects / study base:** California autism caseload and statewide kindergarten MMR coverage data.
   Annotation: Autism rates rose despite stable MMR coverage, providing no support for a population-level causal association.

7. E Fombonne , S Chakrabarti (2001**)**. **No Evidence for a New Variant of Measles-Mumps-Rubella-Induced Autism**. *Pediatrics*. https://pubmed.ncbi.nlm.nih.gov/11581466/
   Subjects: Children with pervasive developmental disorders in a UK clinical sample.
   Annotation: Found no evidence for a distinct "MMR-induced autism" syndrome or "autistic enterocolitis."

8. C P Farrington , E Miller, B Taylor. (2001**)**. **MMR and autism: further evidence against a causal association**. *Vaccine*. https://pubmed.ncbi.nlm.nih.gov/11395196/
   Subjects: Reanalysis of 498 autism cases from Taylor et al.
   Annotation: Tested whether MMR might trigger autism after a longer induction period and again found no evidence of causation.

9. F DeStefano, R T Chen (2001). **Autism and measles-mumps-rubella vaccination**. *CNS Drugs*. https://pubmed.ncbi.nlm.nih.gov/11700148/
   Subjects: Review article; no single enrolled-subject count.
   Annotation: Reviewed early epidemiologic evidence and concluded that available data did not support an MMR-autism link.

2002

9. K M Madsen et al. (2002). **A Population-Based Study of Measles, Mumps, and Rubella Vaccination and Autism.** *New England Journal of Medicine*. https://pubmed.ncbi.nlm.nih.gov/12421889/
   Subjects: 537,303 Danish children.
   Annotation: Large national cohort study finding no increased autism risk among MMR-vaccinated children.

10. A Mäkelä , J P Nuorti, H Peltola (2002). **Neurologic disorders after measles-mumps-rubella vaccination.** *Pediatrics*. https://pubmed.ncbi.nlm.nih.gov/12415036/
    Subjects: 535,544 Finnish children vaccinated with MMR.
    Annotation: Registry-linkage study found no evidence that MMR vaccination was associated with autism.

2003

11. A Hviid, et al. (2003). **Association Between Thimerosal-Containing Vaccine and Autism.** *JAMA.*https://pubmed.ncbi.nlm.nih.gov/14519711/
    Subjects: 467,450 Danish children.
    Annotation: Found no causal relationship between thimerosal-containing childhood vaccines and autism-spectrum disorders.

12. K M Madsen, et al. (2003)**. Thimerosal and the Occurrence of Autism: Negative Ecological Evidence From Danish Population-Based Data**. *Pediatrics*.

https://pubmed.ncbi.nlm.nih.gov/12949291/
Subjects / study base: Danish national autism incidence data before and after thimerosal removal.
Annotation: Autism rates continued to rise after thimerosal was removed from Danish vaccines, inconsistent with thimerosal causing autism.

13. P Stehr-Green et al. (2003). ***A*utism and Thimerosal-Containing Vaccines: Lack of Consistent Evidence for an Association**. *American Journal of Preventive Medicine* https://pubmed.ncbi.nlm.nih.gov/12880876/
Subjects / study base: Population-level data from Denmark, Sweden, and California.
Annotation: Cross-national trends did not show a consistent association between thimerosal exposure and autism.

14. K Wilson, et al. (2003). **Association of autistic spectrum disorder and the measles, mumps, and rubella vaccine.** *Archives of Pediatrics & Adolescent Medicine*. https://pubmed.ncbi.nlm.nih.gov/12860782/
Subjects / study base: Canadian birth-cohort and vaccination coverage data.
Annotation: Found no association between MMR vaccination coverage and autism spectrum disorder trends.

2004

15. F DeStefano et al. (2004). **Age at First Measles-Mumps-Rubella Vaccination in Children With Autism and School-Matched Control Subjects.** *Pediatrics*. https://pubmed.ncbi.nlm.nih.gov/14754936/
Subjects: 624 children: 256 autism cases and 368 school-matched controls.
Annotation: Found no evidence that earlier MMR vaccination timing increased autism risk.

16. N. Andrews et al. (2004). **Thimerosal Exposure in Infants and Developmental Disorders: A Retrospective Cohort Study in the United Kingdom.** *Pediatrics*. https://pubmed.ncbi.nlm.nih.gov/15342825/
Subjects: 109,863 children in the UK General Practice Research Database.
Annotation: Found no evidence that infant thimerosal exposure caused autism or other developmental disorders.

17. L Smeeth, et al. (2004). **MMR Vaccination and Pervasive Developmental Disorders: A Case-Control Study.** *The Lancet*. https://pubmed.ncbi.nlm.nih.gov/15364187/
Subjects: 1,294 cases and 4,469 controls from the UK General Practice Research Database.
Annotation: Found no association between MMR vaccination and autism or other pervasive developmental disorders.

18. F DeStefano, W Thompson (2004). **MMR vaccine and autism: an update of the scientific evidence.** *Expert Review of Vaccines*. https://pubmed.ncbi.nlm.nih.gov/14761240/
Subjects: Review article; no single enrolled-subject count.
Annotation: Concluded that the epidemiologic evidence was convincing against MMR causing autism or autism subtypes.

2005

19. H Honda, Y Shimizu, M Rutter (2005). **No effect of MMR withdrawal on the incidence of autism.** *Journal of Child Psychology and Psychiatry.* https://pubmed.ncbi.nlm.nih.gov/15877763/
Subjects / study base: Yokohama birth cohorts before and after MMR withdrawal.
Annotation: Autism incidence did not decline after MMR vaccination stopped in Yokohama, Japan.

2007

20. T Uchiyama , M Kurosawa, Y Inaba (2007). **MMR-Vaccine and Regression in Autism Spectrum Disorders**. *Journal of Autism and Developmental Disorders*. https://pubmed.ncbi.nlm.nih.gov/16865547/
Subjects: 904 children with autism spectrum disorder.
Annotation: Found no relationship between MMR vaccination and regressive autism.

2008

21. F Han , N Caporale, Y Dan et al. (2008). **Lack of association between measles virus vaccine and autism with enteropathy.** *PLoS ONE.* https://pubmed.ncbi.nlm.nih.gov/18957223/
Subjects: 38 children: 25 with autism and gastrointestinal disturbance, 13 controls with gastrointestinal disturbance.
Annotation: Found no evidence linking measles vaccine virus to autism with gastrointestinal symptoms.

2009

22. J S Gerber, P A Offit (2009). **Vaccines and Autism: A Tale of Shifting Hypotheses.** *Clinical Infectious Diseases.* https://pubmed.ncbi.nlm.nih.gov/19128068/
Subjects: Review article; no single enrolled-subject count.
Annotation: Reviewed the major MMR, thimerosal, and vaccine-schedule hypotheses and concluded that epidemiologic evidence does not support vaccine causation.

2010

23. C S Price et al. (2010). **Prenatal and Infant Exposure to Thimerosal From Vaccines and Immunoglobulins and Risk of Autism.** *Pediatrics*. https://pubmed.ncbi.nlm.nih.gov/20837594/
Subjects: 1,008 children: 256 autism cases and 752 controls.
Annotation: Found no association between prenatal or infant ethylmercury exposure from thimerosal-containing vaccines/immunoglobulins and autism.

2013

24. F DeStefano , C S Price, E S Weintraub (2013). **Increasing Exposure to Antibody-Stimulating Proteins and Polysaccharides in Vaccines Is Not Associated With Risk of Autism.** *Journal of Pediatrics.* https://pubmed.ncbi.nlm.nih.gov/23545349/
Subjects: 1,008 children: 256 autism cases and 752 controls.
Annotation: CDC-led study found that cumulative vaccine antigen exposure during infancy was not associated with autism risk.

2014

25. L E Taylor , A L Swerdfeger , G D Eslick (2014). **Vaccines are not associated with autism: An evidence-based meta-analysis of case-control and cohort studies.** *Vaccine*. https://pubmed.ncbi.nlm.nih.gov/24814559/
Subjects: 1,256,407 children in cohort studies, plus 9,920 cases and 11,231 controls in case-control studies.
Annotation: Meta-analysis found no association between autism and vaccination, MMR, thimerosal, or mercury exposure.

26. M A Maglione et al. (2014). **Safety of Vaccines Used for Routine Immunization of U.S. Children: A Systematic Review**. *Pediatrics.* https://pubmed.ncbi.nlm.nih.gov/25086160/
Subjects: Systematic review; no single enrolled-subject count.
Annotation: Found strong evidence that MMR vaccination is not associated with autism.

2015

27. A Jain, et al. (2015). **Autism Occurrence by MMR Vaccine Status Among US Children With Older Siblings With and Without Autism.** *JAMA.* https://pubmed.ncbi.nlm.nih.gov/25898051/
Subjects: 95,727 children with older siblings.
Annotation: Found no increased autism risk after MMR vaccination, including among children with an older sibling with autism.

2017

28. O Zerbo, et al. (2017). **Influenza Infection and Vaccination During Pregnancy and Risk of Autism Spectrum Disorder.** *JAMA Pediatrics*. https://pubmed.ncbi.nlm.nih.gov/27893896/
Subjects: 196,929 children.
Annotation: Maternal influenza vaccination was not associated with autism spectrum disorder in offspring.

2018

29. T Becerra-Culqui, et al. (2018). **Prenatal Tdap Vaccination and Autism Spectrum Disorder.** *Pediatrics.* https://pubmed.ncbi.nlm.nih.gov/30104424/
Subjects: 81,993 children.
Annotation: Prenatal Tdap vaccination was not associated with increased autism risk.

2019

30. A Hviid, et al. (2019). **Measles, Mumps, Rubella Vaccination and Autism: A Nationwide Cohort Study.** *Annals of Internal Medicine* https://pubmed.ncbi.nlm.nih.gov/30831578/
Subjects: 657,461 Danish children.
Annotation: Found MMR vaccination did not increase autism risk, did not trigger autism in susceptible children, and was not associated with clustering of autism diagnoses after vaccination.

31. F DeStefano, T Shimabukuro (2019). **The MMR Vaccine and Autism**. *Annual Review of Virology*. https://pubmed.ncbi.nlm.nih.gov/30986133/
Subjects: Review article; no single enrolled-subject count.

Annotation: Reviewed decades of MMR-autism evidence and concluded that MMR vaccine does not cause autism.

2020

32. J Ludvigsson, et al. (2020). **Maternal H1N1 Influenza Vaccination During Pregnancy and Risk for Autism Spectrum Disorder in Offspring.** *Annals of Internal Medicine* https://pubmed.ncbi.nlm.nih.gov/32866418/
Subjects: 69,102 children.
Annotation: Found no association between maternal H1N1 vaccination during pregnancy and autism in offspring.

2021

33. C Gidengil, et al. (2021). **Safety of Vaccines Used for Routine Immunization in the United States: An Update.** Vaccine. https://pubmed.ncbi.nlm.nih.gov/34049735/
Subjects: Systematic review; no single enrolled-subject count.
Annotation: Updated vaccine-safety review reaffirming evidence against an association between routine vaccines and autism.

2022

34. T Becerra-Culqui, et al. (2022). ***Prenatal Influenza Vaccination or Influenza Infection and Autism Spectrum Disorder*.** JAMA Pediatrics. https://pubmed.ncbi.nlm.nih.gov/35174388/
Subjects: 123,824 children.
Annotation: Found neither prenatal influenza vaccination nor influenza infection was associated with autism spectrum disorder.

2023

35. D Foo, et al. (2023). **Maternal Influenza Vaccination and Neurodevelopmental Disorders in Childhood.** *Vaccine*. https://pmc.ncbi.nlm.nih.gov/articles/PMC10423464/
Subjects: Population-based cohort; consult full article tables for analytic cohort denominators by outcome.
Annotation: Found no increased risk of autism or other neurodevelopmental disorders after maternal influenza vaccination.

Summary

This expanded bibliography includes major peer-reviewed evidence from Finnish national surveillance, UK General Practice Research Database studies, Danish national registry studies, CDC-led U.S. studies, Japanese natural-experiment data, pregnancy-vaccination cohort studies, and systematic reviews. Across these study designs and populations, the findings consistently show no evidence that vaccines cause autism.