

Vaccines and Autism: What is Myth and What is Reality

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Autism is one of the greatest mysteries of our time

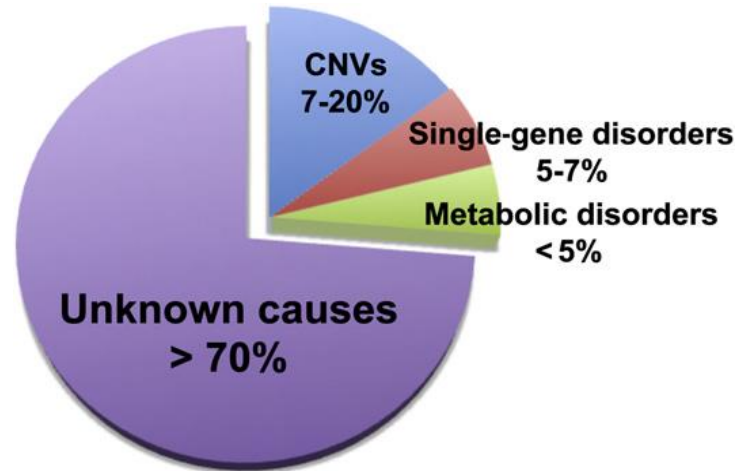
Defined by:

- limited ability to communicate (verbally and non-verbally)
- abnormal social interaction
- routine, repetitive behaviors

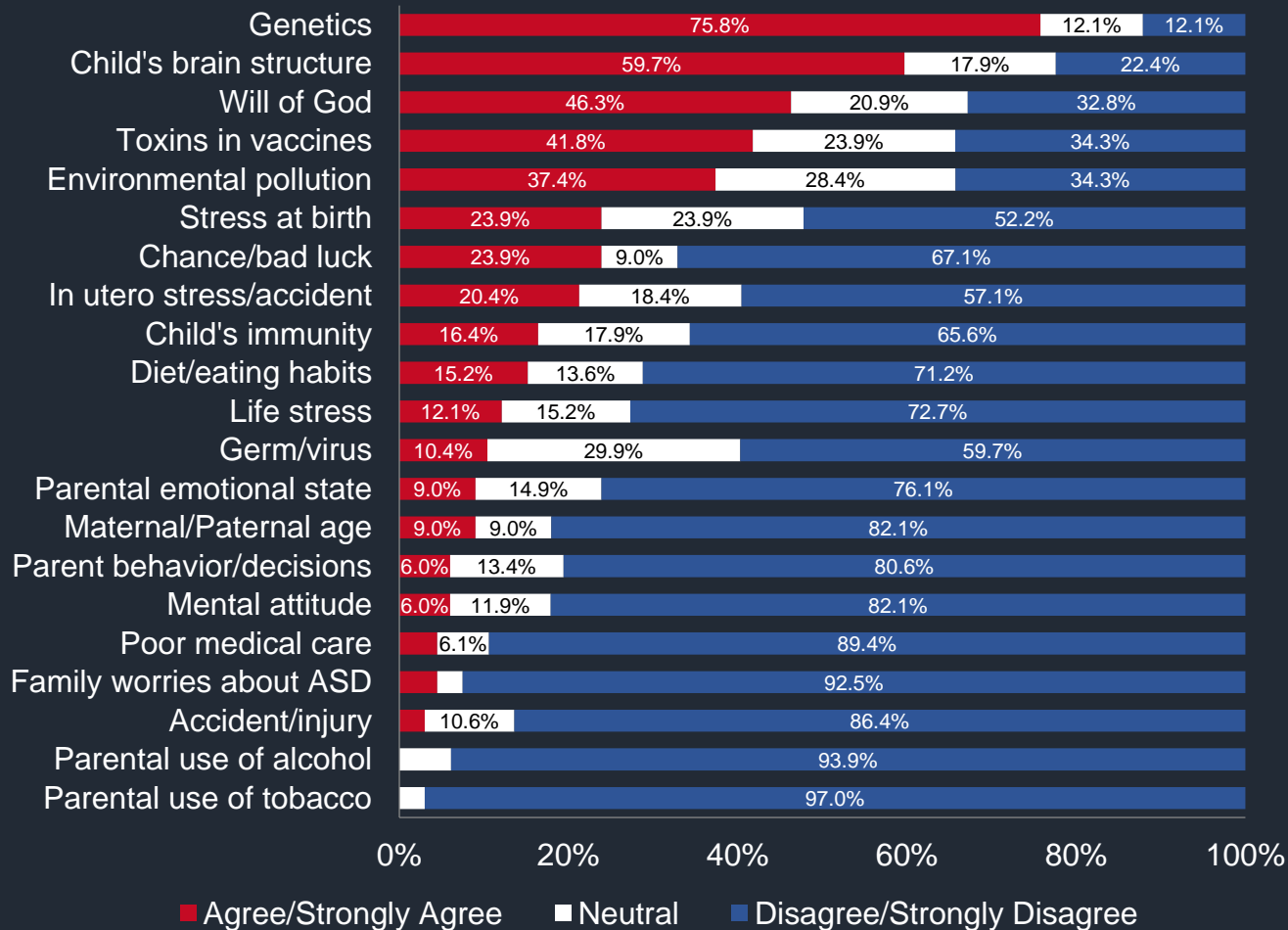


Autism is a Complex and Heterogeneous Spectrum of Disorders

- 1 in 59 (CDC, 2017) compared to 1 in 25,000 in 1988
- Genetic heterogeneity leaves >70% patients with diagnosis of idiopathic autism
- No quantitative biomarker for diagnosis of autism
- No specific biological targets



Do vaccines cause autism?



Parents whose children regressed tend to believe vaccines cause autism

	No Regression	Regression	
	<i>M (SD)</i>	<i>M (SD)</i>	
Genetics	3.0 (1.1)	2.7 (1.3)	1.06 (1, 65)
Environmental Pollution	1.7 (1.4)	2.3 (1.0)	3.25 (1, 66)†
Will of God	2.1 (1.4)	2.0 (1.4)	0.04 (1, 55)
Child's Brain Structure	2.5 (1.4)	2.3 (1.2)	0.62 (1, 66)
Toxins in Vaccines	1.8 (1.3)	2.4 (1.2)	3.74 (1, 66)*

History

- Andrew Wakefield and colleagues suggested that the vaccine caused intestinal inflammation that allowed the chemicals in the vaccine to enter the bloodstream, travel to the brain, and cause autism (*Lancet*, 1998)
- 12 children participated in a study examining GI disturbances
- 8 reportedly exhibited behavioral worsening—akin to regressive-onset autism—shortly after receiving the MMR vaccine

The aftermath

- Many families in the UK chose not to vaccinate their children for fear of ASD
 - Two died of measles
- In 2004, the British Medical Council launched an investigation into the team's ethical misconduct
- It was realized that the children with autism already had symptoms prior to receiving the vaccine and that many of the data did not match what was indicated in the children's medical records

Autism is not caused by vaccines

- The Wakefield (1998) study sparked epidemiological investigations around the globe, examining vaccines as a risk factor for ASD (e.g., DeStefano & Chen, 2001; Fombonne & Chakrabarti, 2001; Madsen et al., 2002; Parker et al., 2004; Taylor et al., 2002)
- The vast majority of data do not support a link between vaccines and ASD
- However, thimerisol was removed in U.S. vaccines shortly after 1999
- And the rates of ASD have continued to rise

Wakefield today



WHO: Anti-vaxxers now one of the greatest threats to world health

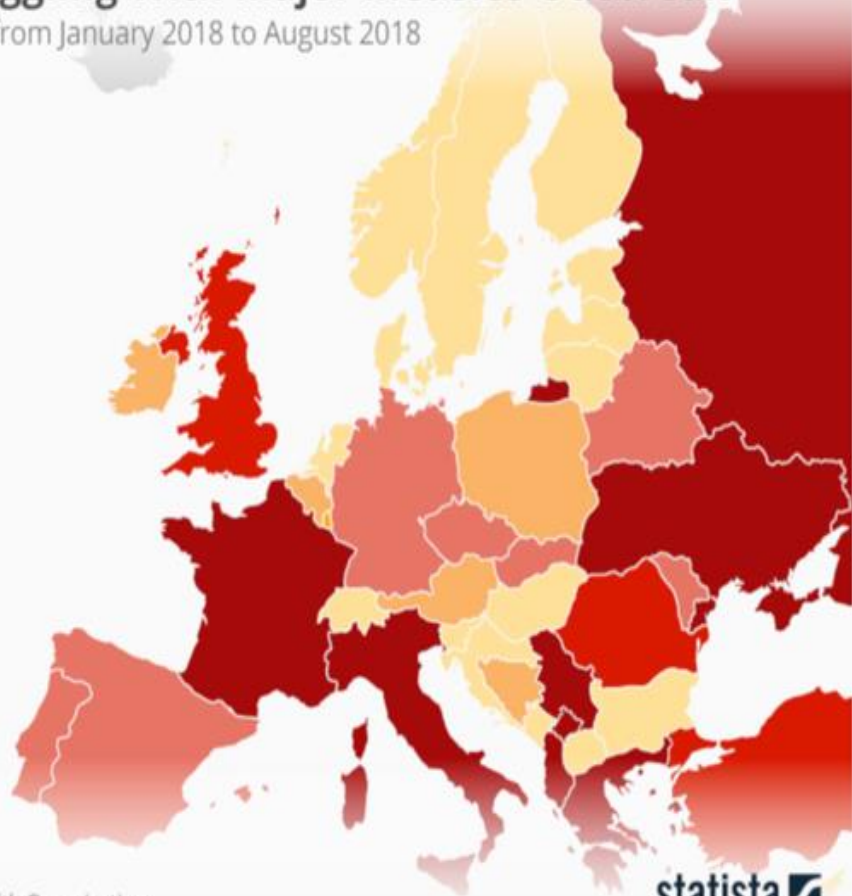
- Vaccine-exemption data show that childhood vaccine receipt continues to decline^{Mellerson et al. (2018)}
 - Allowance of personal-belief exemptions
- Recent outbreaks of measles, pertussis, varicella, and haemophilus influenza type b have been linked to pockets of children who were unvaccinated because of parents' personal beliefs
 - Disneyland—2016, New York—2018

Fear about an autism-vaccine connection is proposed as a leading explanation behind increases in vaccine exemption



Europe Still Struggling With Major Measles Outbreak

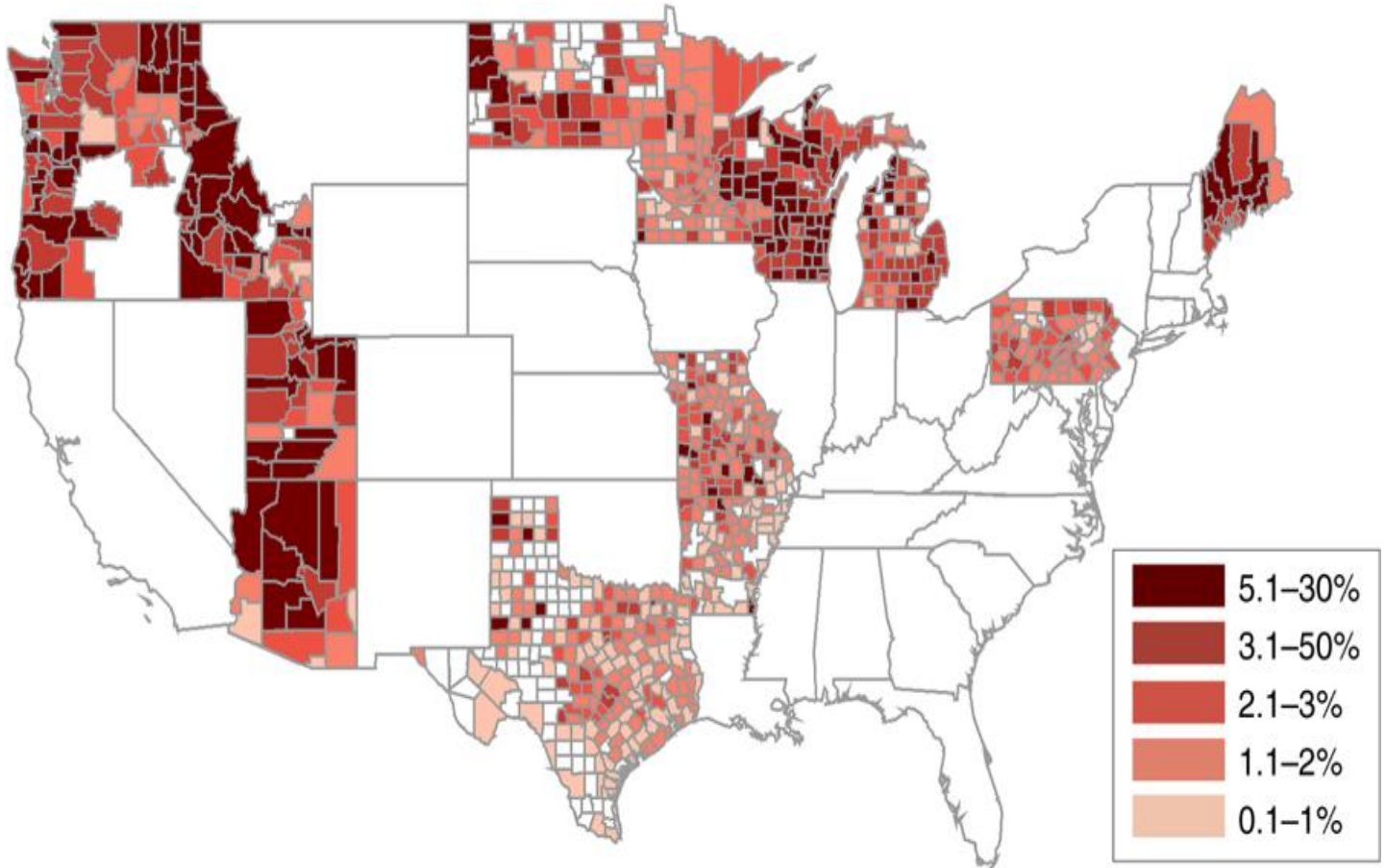
Measles cases in Europe from January 2018 to August 2018



@StatistaCharts Source: World Health Organization

statista

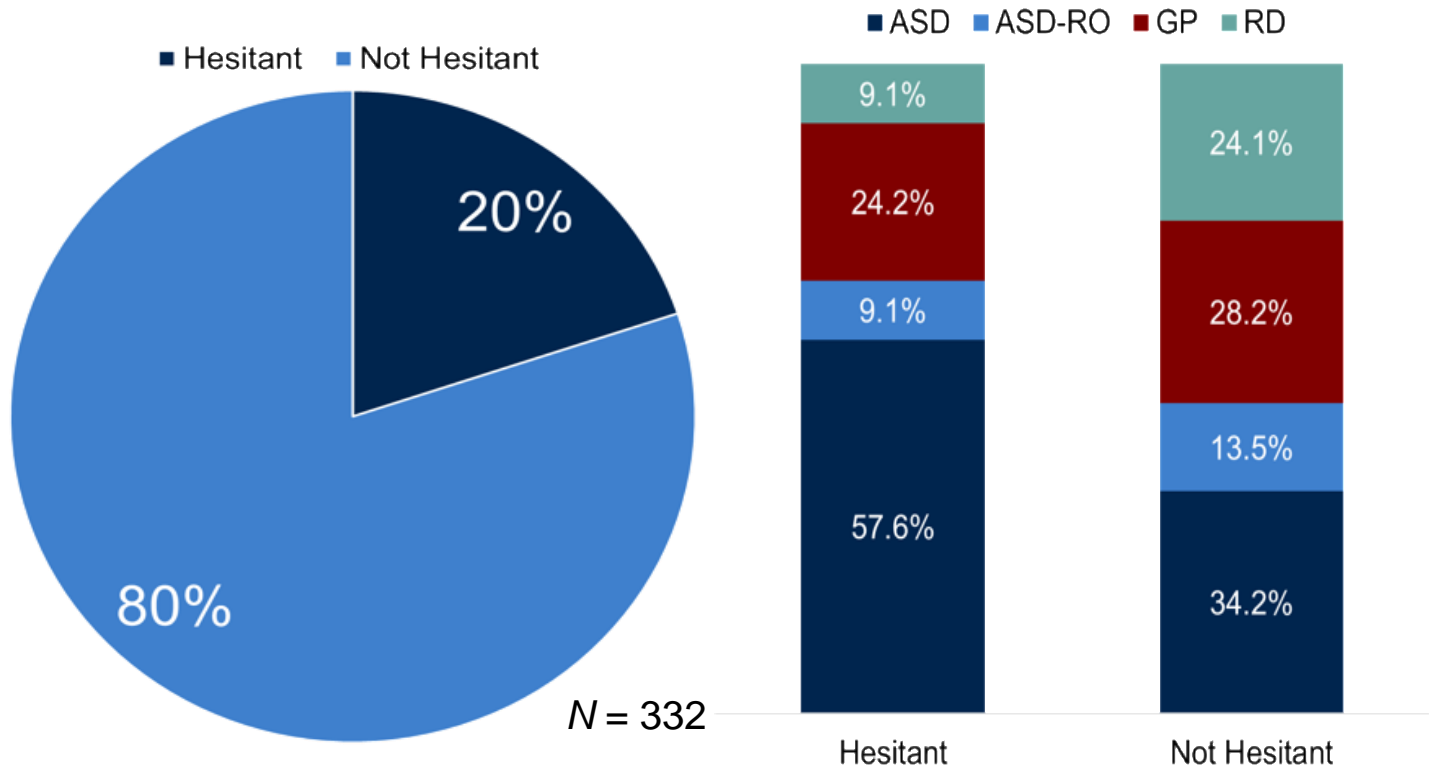
Heat map of county-level NME rates in 2016-2017



NME, nonmedical exemption.

Olive et al., *PLoS Medicine* 2018

Fear of autism drives vaccine hesitancy

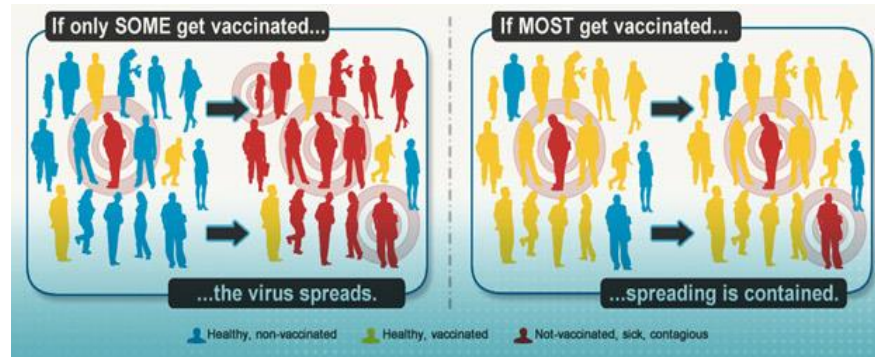


Vaccination Patterns After ASD Diagnosis

- Study examined vaccination rates among children with ASD and their younger siblings compared to matched controls
- Children with ASD were significantly under-vaccinated for vaccines recommended between 4-6 years of age (80% vs. 94%)
- Siblings were significantly under-vaccinated at any age (73% vs. 85%)

Broader Public Health Relevance

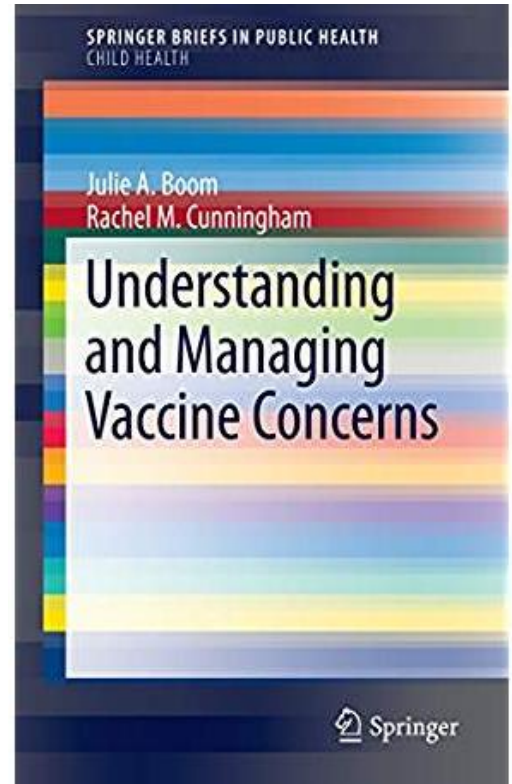
- Community immunity
 - Protects infants, immunocompromised patients, or those without immunities
- Perpetuation of fear about an ASD-vaccine link transmits to the general population
- Growth in the numbers of vaccine delays/refusals has led to a dilemma in some clinics regarding whether to refuse service to patients who are under-vaccinated



Source: Center for
Disease Control and
Prevention

What can we do?

- Addressing parental vaccine hesitancy with scientific information alone is rarely successful
- Little is known about the content and format of vaccine-safety information that resonates most with hesitant parents
- Randomized intervention of different vaccine-education messages did not improve intent to vaccinate and actually increased *misperceptions* among some parents (Nyhan et al., 2014)
- Open dialogue with trusted healthcare providers



Thank you!

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