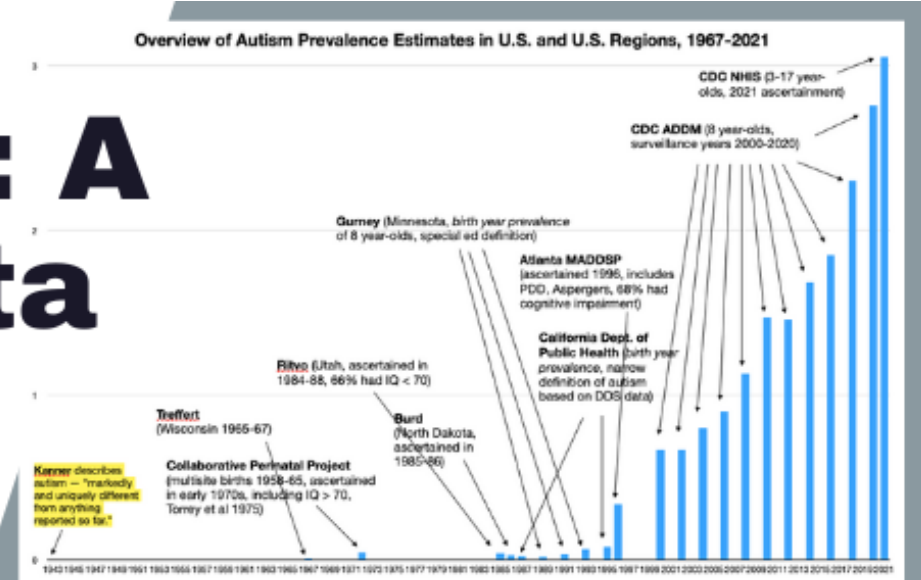


# Autism's Rising Rates: A Deep Dive into the Data

**Jill Escher, Escher Fund for Autism, NCSA**  
**Walter Zahorodny, Rutgers University**

**Thursday, February 15, 2024 6-7.30pm ET**  
**Via Zoom. Free.**

Autism rates have risen dramatically over the past decades. This presentation details the nature and scope of the surge in the U.S. and beyond, and why the evidence overwhelmingly reflects a true increase. Implications for research and policy will be discussed.



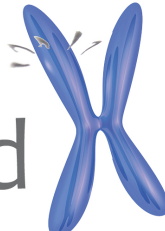
# The Autism Surge: A Deep Dive Into the Data

**Jill Escher**

Founder, Escher Fund for Autism

President, National Council on Severe Autism

Past President and Secretary, Autism Society San Francisco Bay Area

Escher Fund  Humans start as molecules  
for Autism

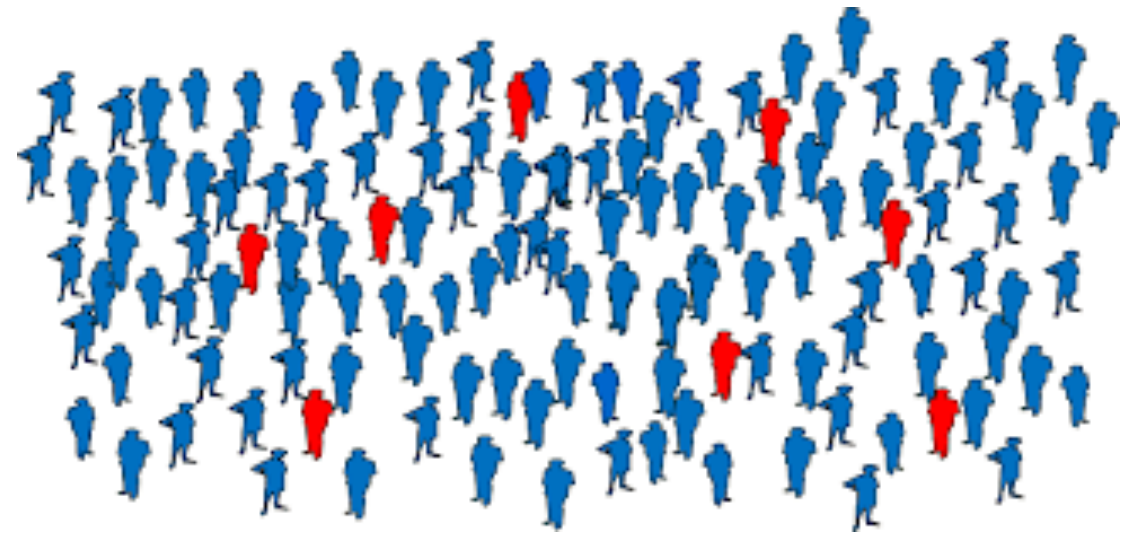
[GermlineExposures.org](http://GermlineExposures.org)

 **Autism Society**  
San Francisco Bay Area

**NCSA** NATIONAL  
COUNCIL  
ON SEVERE  
AUTISM

# **Quick survey**

# Epidemiology and Administrative Data: Some Definitions



## What Is Prevalence?

- Percentage of a particular population who have a condition

## What Is Birth Year Prevalence?

- Percentage of people in a birth year who have a condition



## What Is Incidence?

- In autism, could mean newly identified cases (v **incidence of cases**) in a given year

## What Is Caseload?

- An absolute number of cases in a system

# Overview: Early Autism Prevalence Studies (births 1950s-1980s)

## Wisconsin

Entire state, age 12 and under

Ascertained 1965-67

**.01%**

(1 in 10,000)

Treffert 1970

Note: Wisconsin 2012 births is **2.8%** per CDC ADDM

## Multi-site Study: Collaborative Perinatal Project

East coast public hospitals - more than 20% w IQs above 70; plus all autism-like dx's

Born 1958-1965

**.064%**

Torrey et al. 1975

## Utah

1/3 had IQ > 70

Ascertained  
1984-88

**.04%**

Ritvo et al. 1989

Note: 2012 births is **2.2%** per ADDM

## North Dakota

Ascertained 1986

**.03%**

Burd et al. 1987

Note: A 2020 follow-up study 12 years later by Burd et al found they only omitted 1 other case of autism

## California

Strict-definition Dept of Developmental Services data

Born 1980

**.04%**

Autism in California 2020  
Note: 2014 DDS births is **1.5%**

## Minnesota

Education definition

Born 1989

**.02%**

Gurney et al. 2003  
Note: 2013 study by Miller et al.\* re-ascertained the cases under DSM IV found a somewhat larger population but it did not meaningfully change the prevalence numbers

## England

Middlesex County;  
1/3 had IQ > 55

Born 1955

**.045%**

Lotter 1966;  
Wing et al 1967

## Denmark

Born 1980

**.01%**

Hansen et al.  
2015

## Finland

Northern Finland; almost 50% of the autistic cases had IQ > 70

Born 1981

**.061%**

Kielinen et al. 2000



# Overview: More Recent Prevalence Studies (births in 2000s)

## CDC National Health Interview Survey (NHIS)

Born 2004-2018

**3.05%**

\* Decrease from prior year, a plateau? (but methodology is less reliable than ADDM)

## HRSA National Survey of Children's Health (NSCH)

Born approx 2003-2018

**3.1%**

Wang et al 2023

## Pennsylvania CHOP Care Network

Born approx 2009-2013

**3.2%**

Wallis et al. 2023

## California DDS

Born 2014, **strict definition**

**1.47%**

Autism in California 2020

## CDC ADDM Overall

(37.9% had ID)

Born 2012

**2.76%**

(4.3% of boys)

CDC ADDM Network

## Maryland CDC ADDM

(5 counties in northern MD, 46.8% had ID)

Born 2012

**2.3%**

CDC ADDM Network

## Minnesota CDC ADDM

(Minneapolis-St Paul, 32% had ID)

Born 2012

**3.0%**

CDC ADDM Network

## California CDC ADDM

(Northern San Diego County, 22% had ID, eg 1% of all 8 year-olds as ASD with ID)

Born 2012

**4.5%**

(1 in 22)

CDC ADDM Network

# Some International Studies (births 2003-2014)

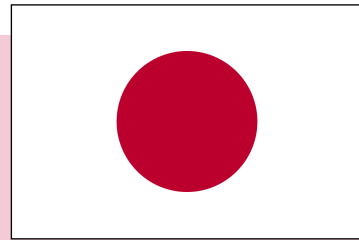


**Israel**

Born 2013

**1.56%**

Dinstein et al. 2024

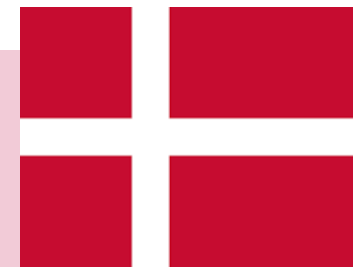


**Japan**

Born 2014

**3.26%**

Sasayama et al. 2021



**Denmark**

Projected cumulative  
incidence

**2.8%**

Schendel and Thorsteinsson 2018



**England**

Born 2004-2008

**2.94%**

O'Nions et al. 2023



**Iceland**

Born 2006-2008

**3.13%**

Delobel-Ayoub et al. 2016

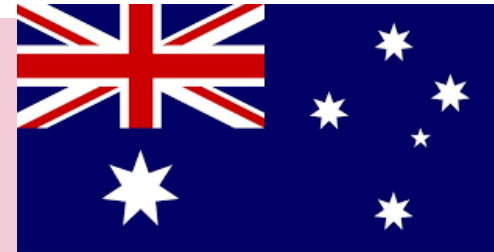


**Australia, LSAC**

Born 2003-2004

**4.36%**

May et al. 2020



**Australia**

Born 2006-2010

**2.75%**

Autism in Australia 2017



**Canada**

Born 2006

**2.16%**

Pelly et al. 2015



# Compare Historic Autism Rates (people about 34+ today) to Birth Year 2012 in CDC ADDM (kids about 12 y.o. today)

Pre- 1990 rates (.05%) v. birth-year 2012 ADDM

**Autism w/ID** (1%):

- **20-fold** increase

20x

Or v. birth year 2012 ADDM **All Autism** (2.76%):

- **55-fold** increase

55x

Over 22 years of births (1 generation), the truth likely lies somewhere between these two poles.



# Autism Prevalence Is Sharply Lower in Lower-Income Countries

## Some Examples:



### India

Palwal, Kangra, Dhenkanal, Hyderabad and North Goa

Born 2000-2010

**1.11%**

Arora N.K. et al. 2018



### Nepal

Makwanpur District

Born  
2001-2004

**.3%**

Heys M. et al. 2018



### Uganda

Kampala and Wakiso Districts

Born 2001-2009

**.68%**

Kakooza-Mwesige A. et al. 2014



### Mexico

Leon, Guanajuato

Born 2003-2004

**.87%**

Fombonne E. et al. 2016



# U.S.: Historical View

## Overview of Autism Birth Year Prevalence Estimates, per 100, in U.S. and U.S. Regions

(With annotations, some birth years are approximate)

CDC NHIS (3-17 year-olds, 2021 ascertainment)

CDC ADDM (8 year-olds, surveillance years 2000-2020)

**Barbaresi** (Olmsted Co. Minnesota b. 1995-97 (found increase confined to children b after 1987), ages < 21)

**Atlanta MADDSP** (ascertained 1996, includes PDD, Aspergers, 68% had cognitive impairment)

**Gurney** (Minnesota, birth year prevalence of 8 year-olds, special ed definition)

**California DDS** (birth year prevalence, narrow definition of autism)

**Barbaresi** (Olmsted Co. Minnesota b. 1980-83, ages < 21)

**Ritvo** (Utah, ascertained in 1984-88, 66% had IQ < 70)\*\*

**Burd** (North Dakota, ascertained in 1985-86)\*

**Treffert** (Wisconsin, 1965-67)

**Kanner** describes autism — “markedly and uniquely different from anything reported so far.”

**Collaborative Perinatal Project** (births 1958-65, inclusive definition IQ > 70 and autism-like traits, Torrey et al 1975)

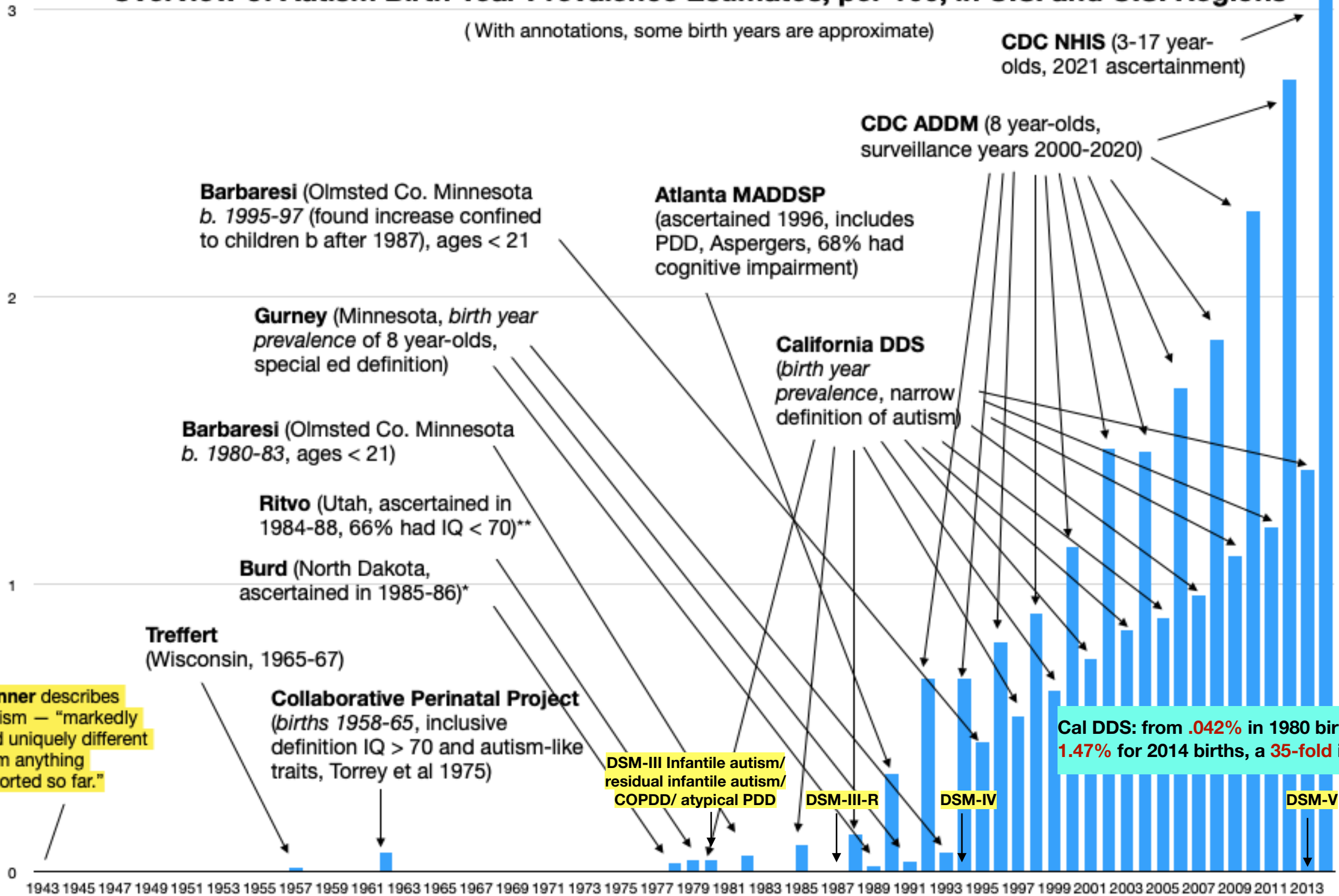
DSM-III Infantile autism/residual infantile autism/COPDD/ atypical PDD

DSM-III-R

DSM-IV

DSM-V

Cal DDS: from .042% in 1980 births to 1.47% for 2014 births, a 35-fold increase



\* A 2000 study by Burd et al. reassessed of the population 12 years later found the original study omitted only 1 case of autism.

\*\* A 2013 study by Miller et al re-ascertained the cases based on DSM-IV and found a somewhat larger population (all with ID) had ASD, however the findings do not meaningfully change the prevalence.

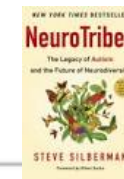
Sources: Kanner *Nervous Child* 1943; Treffert *Arch Gen Psych* 1970; Torrey et al *J Autism and Childhood Schizophrenia* 1975; Ritvo et al *Am J Psych* 1989; Miller et al *Epidemiologic Study* 2013; Burd et al *J Am Acad Child & Adol Psych* 1987; Burd et al *Int J Circumpolar Health* 2000; Gurney et al *Arch Pediatr Adolesc Med* 2003; Yeagain-Allsopp et al *JAMA* 2003; Barbaresi et al 2005; Barbaresi et al 2009; Autism in California 2020: A Report to the Public; CDC ADDM reports 2008-2020; CDC NHIS reports.

# California Department of Developmental Services (DDS) - Active Autism Cases, All Ages, 1989-2023

## With historical notes



**2009:** Study comparing children born from 1990 to 2002 determined the growth could not be fully explained by changes in the population or changes in the way autism was diagnosed (Hertz-Picciotto et al, Rise in Autism and the Role of the Age of Diagnosis, *J. Epidemiol.* 2009).



**Neurotribes, 2015** (book denying any true increase in autism)

**2003:** California enacts more stringent DDS entry criteria



**2006: Combatting Autism Act**



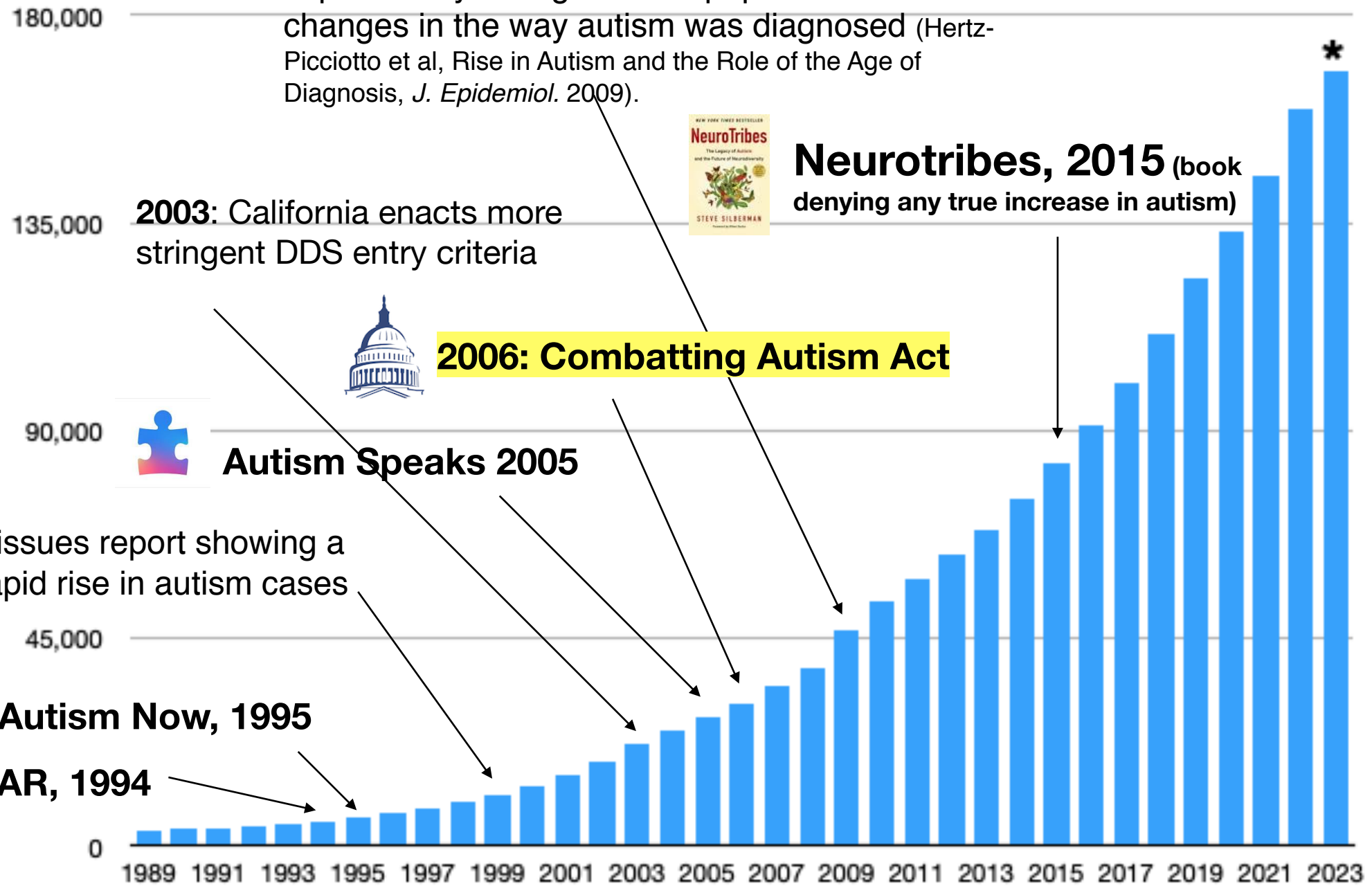
**Autism Speaks 2005**

**1999:** DDS issues report showing a startlingly rapid rise in autism cases



**Cure Autism Now, 1995**

**NAAR, 1994**

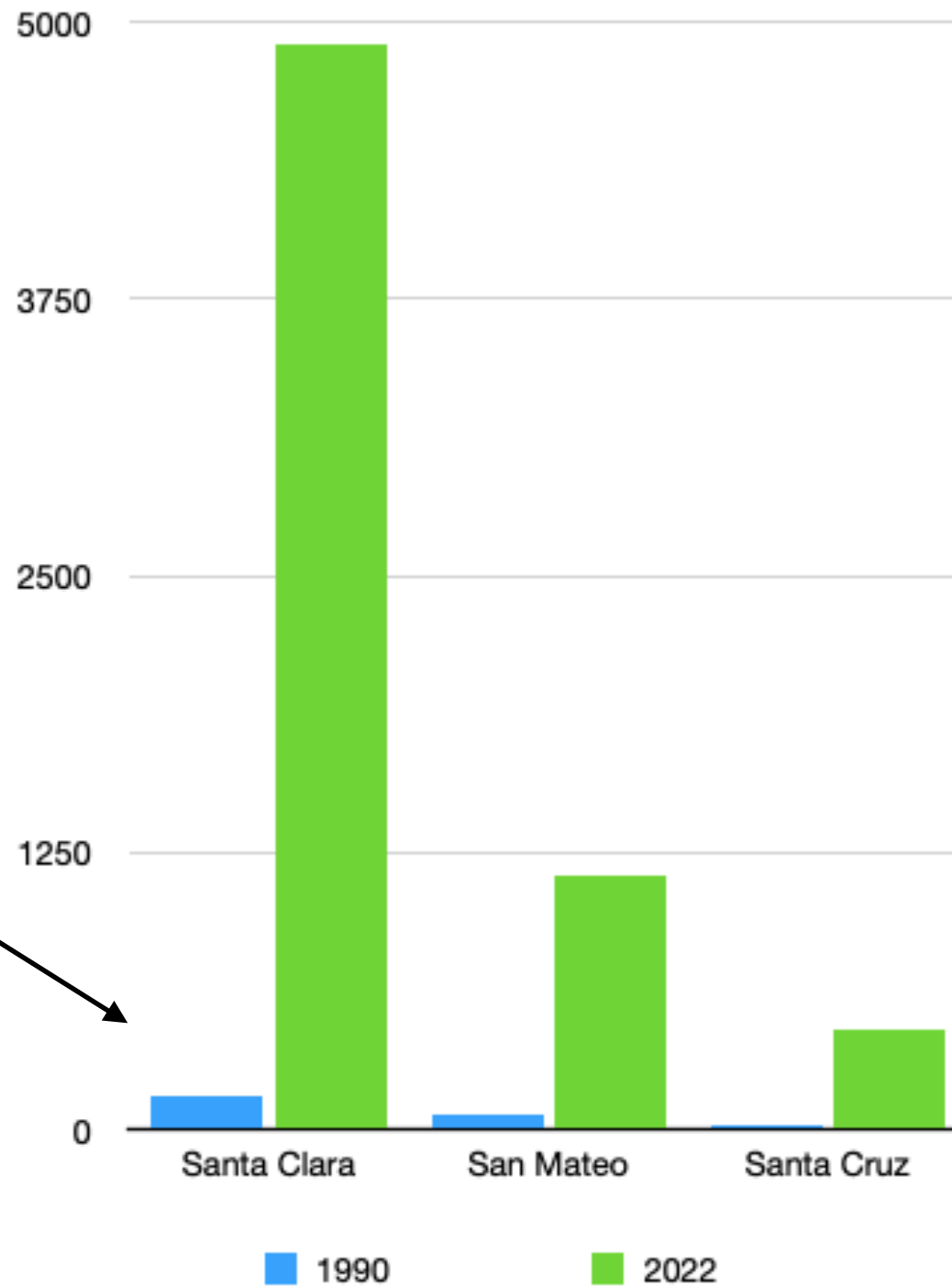


Source: California Department of Developmental Services

\* As of June 2023

# Looking Locally: DDS Autism Caseload in Selected SF Bay Area Counties, 1990 v. 2022

Over 32 years, in Santa Clara County, **33-fold** caseload growth.

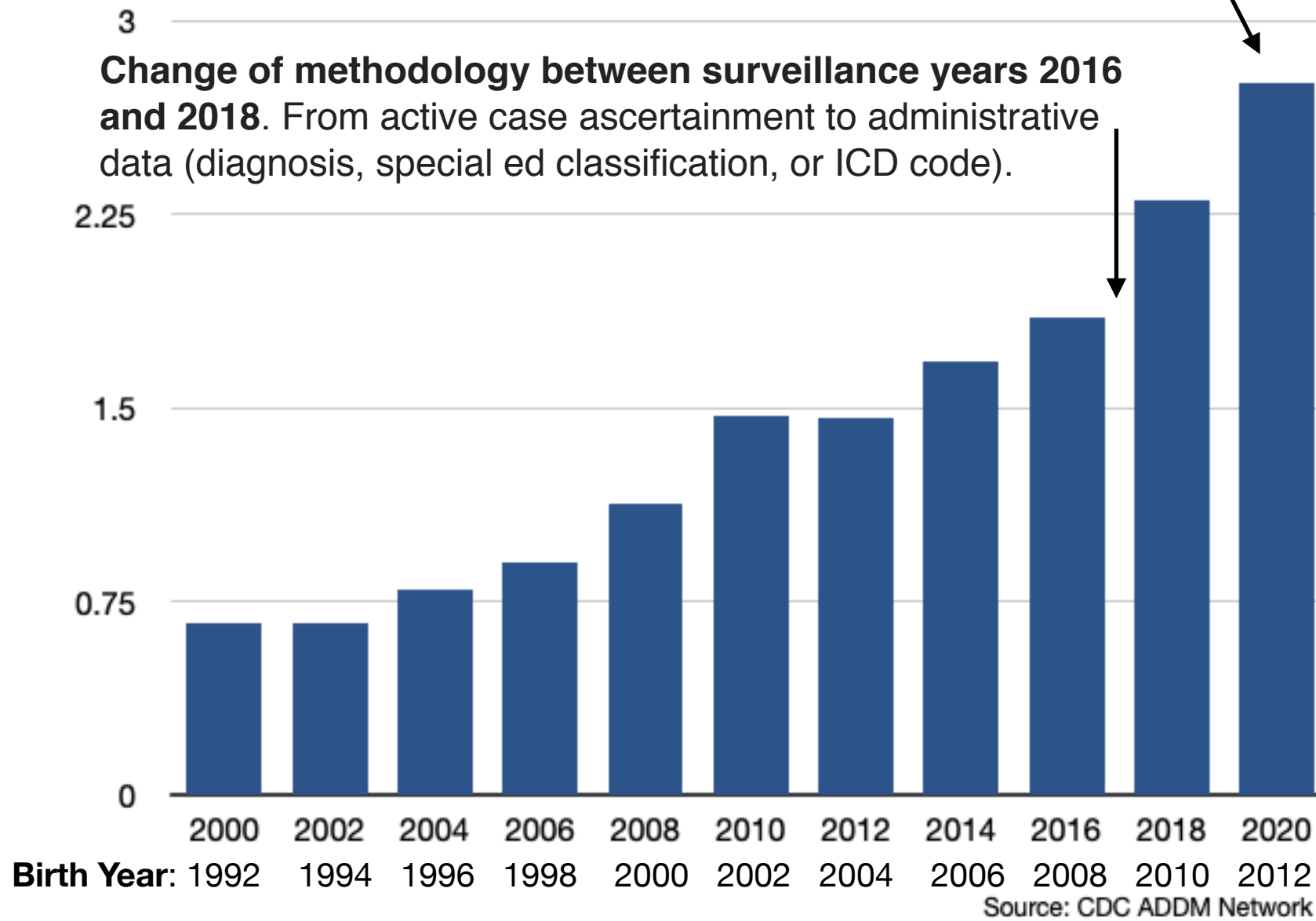


Source: California Department of Developmental Services



# Autism Birth Year Prevalence, 8 Year-Old Children, CDC ADDM Surveillance Years 2000-2020

**2.76%**; higher rates in **non-white children**; **California** (northern San Diego County site) with **4.5%** of 8-year-olds



**1 in 36**

**4.3% of boys**

**1.14% of girls**

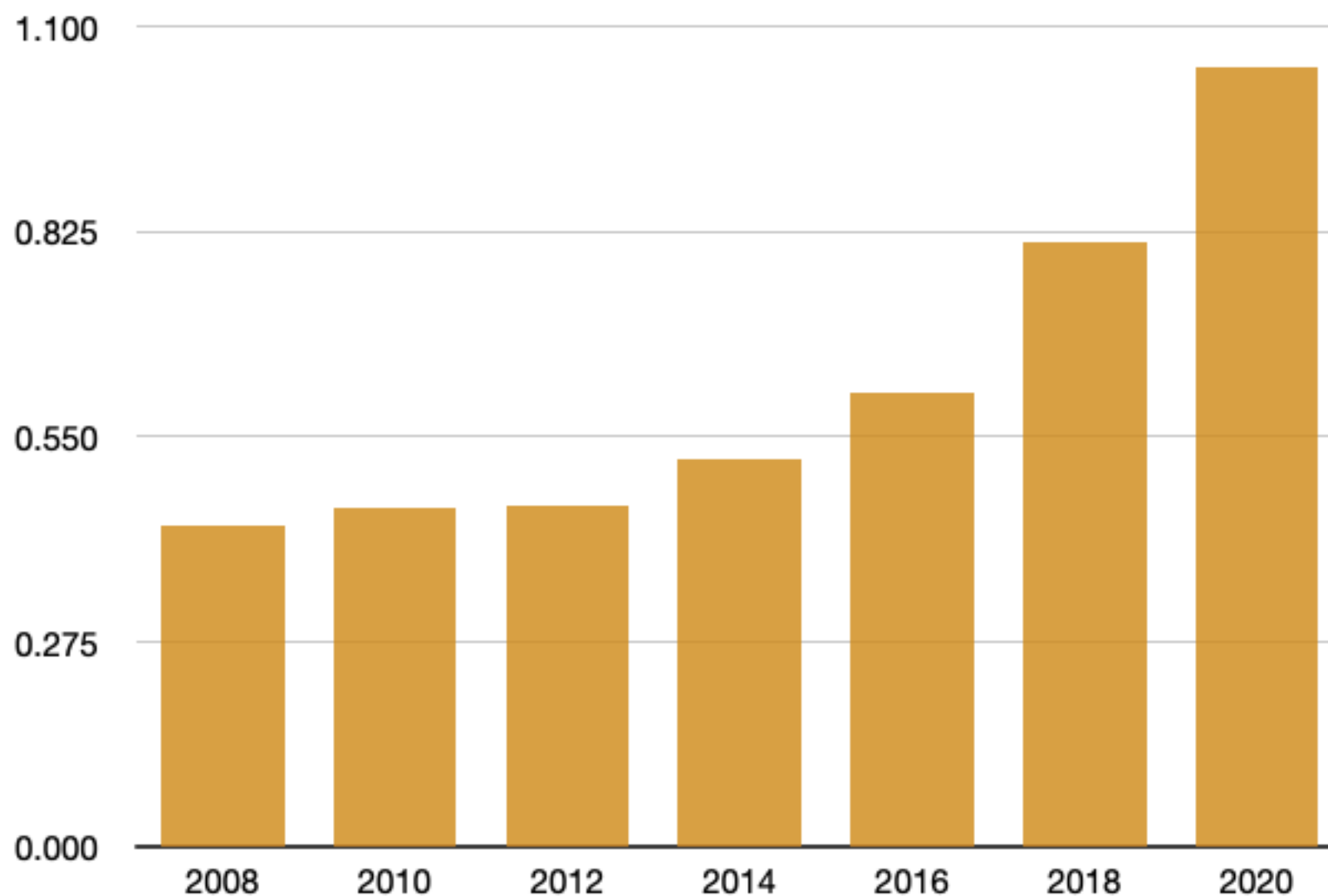
**The high M:F sex bias is among the most durable findings in global autism research over decades.**



# Is It Just Mild Cases We Are Just Noticing? No

CDC ADDM: **Autism with Intellectual Disability**

**Estimated prevalence of U.S. 8 year-old children with ASD and Intellectual Disability (IQ  $\leq$  70)  
Surveillance years 2008-2020**



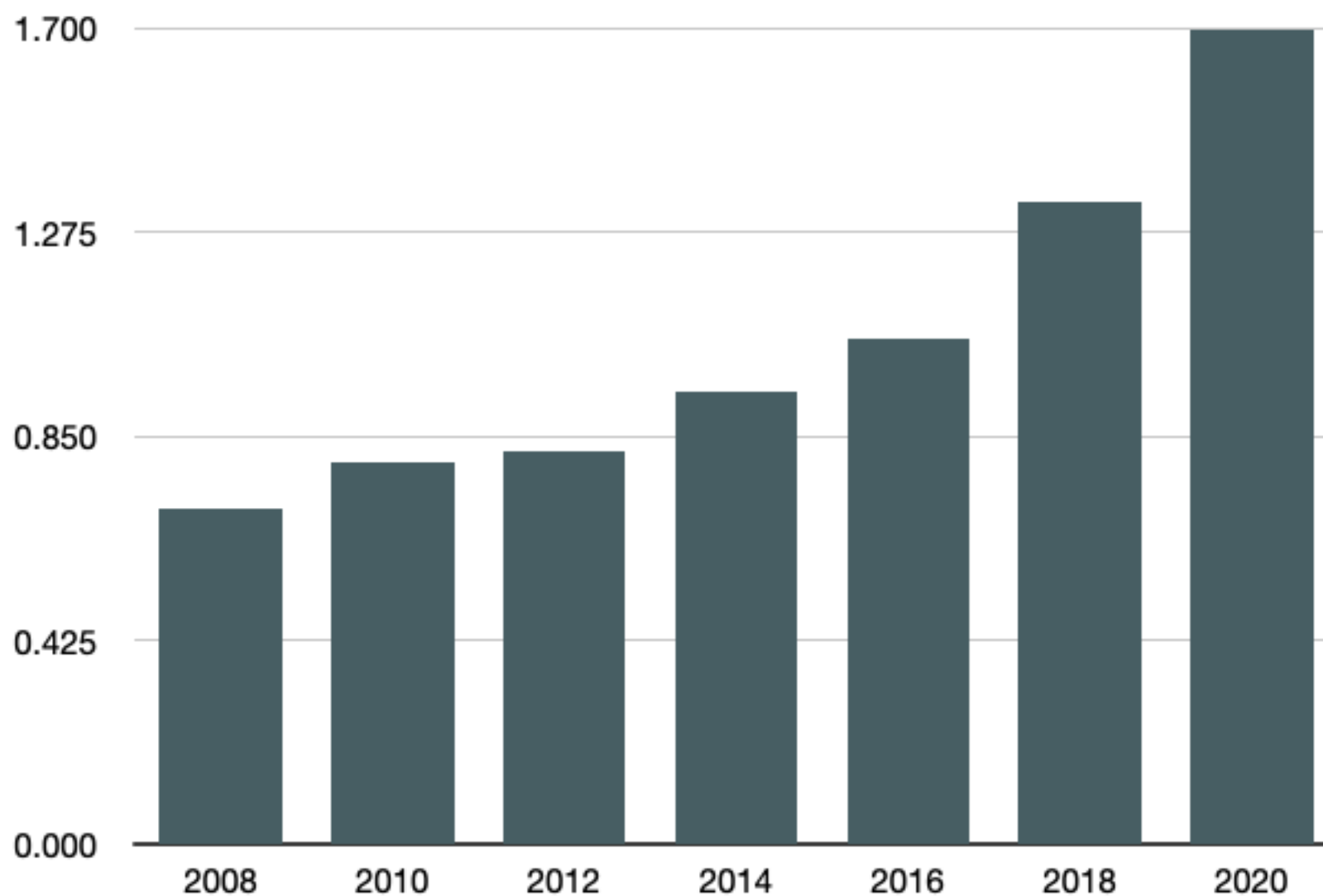
Source: CDC ADDM Network



# Is It Just Mild Cases We Are Just Noticing? No

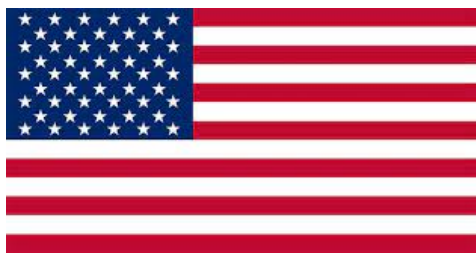
CDC ADDM autism with **Intellectual Disability and Borderline ID**

**Estimated prevalence of U.S. 8 year-old children with ASD and IQs  $\leq$  85, 2008-2020**



Source: CDC ADDM Network data

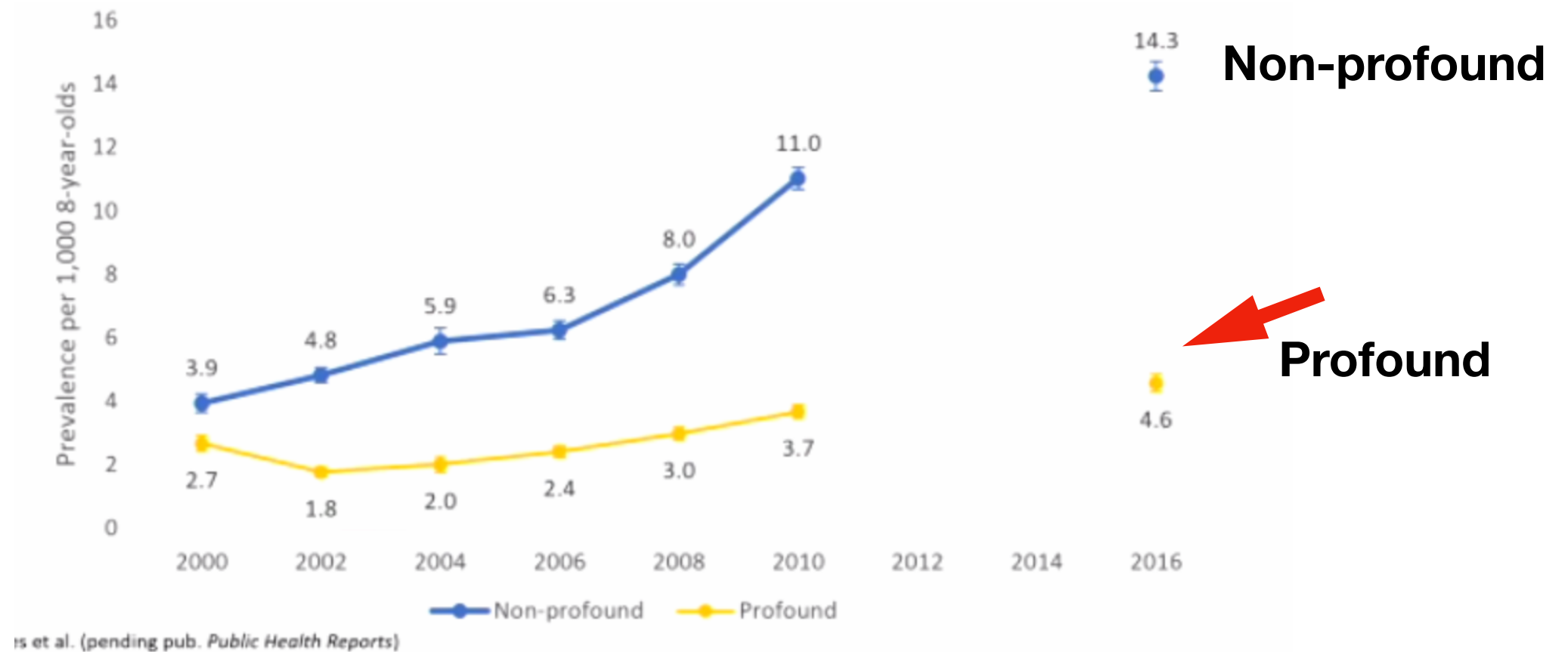




# Is It Just Mild Cases We Are Just Noticing? No

## Prevalence of Profound v Non-Profound Autism in 8 Year-Olds, Surveillance Years 2000-2016, CDC Study

(Profound = IQ < 50 or non- or minimally verbal)



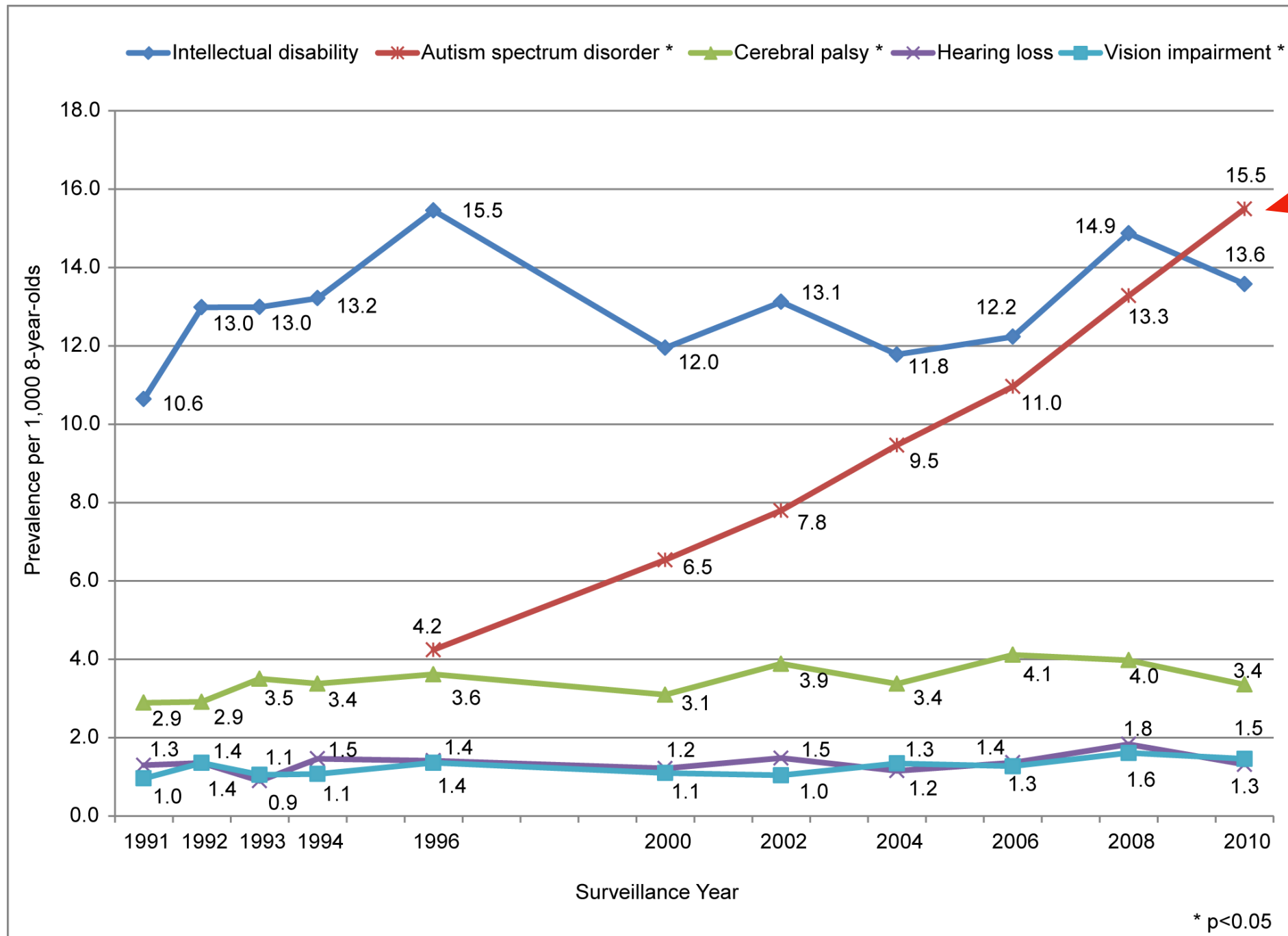
- Prevalence of profound autism, 2000-2016 (birth years 1992-2008), **nearly doubled**, from **.27%** to **.46%** of U.S. 8 year-olds
- Overall, **27.6%** of 8 year-old children with ASD had profound autism

Source: Hughes, M.M., Shaw, K.A., DiRienzo, M., Durkin, M.S., Esler, A., Hall-Lande, J., Wiggins, L., Zahorodny, W., Singer, A. and Maenner, M.J., 2023. The Prevalence and Characteristics of Children With Profound Autism, 15 Sites, United States, 2000-2016. *Public Health Reports*, p.00333549231163551.



# Diagnostic Switch From ID to Autism? Not in CDC MADDSP

## Metropolitan Atlanta, Georgia (MADDSP), Surveillance Years 1991-2010

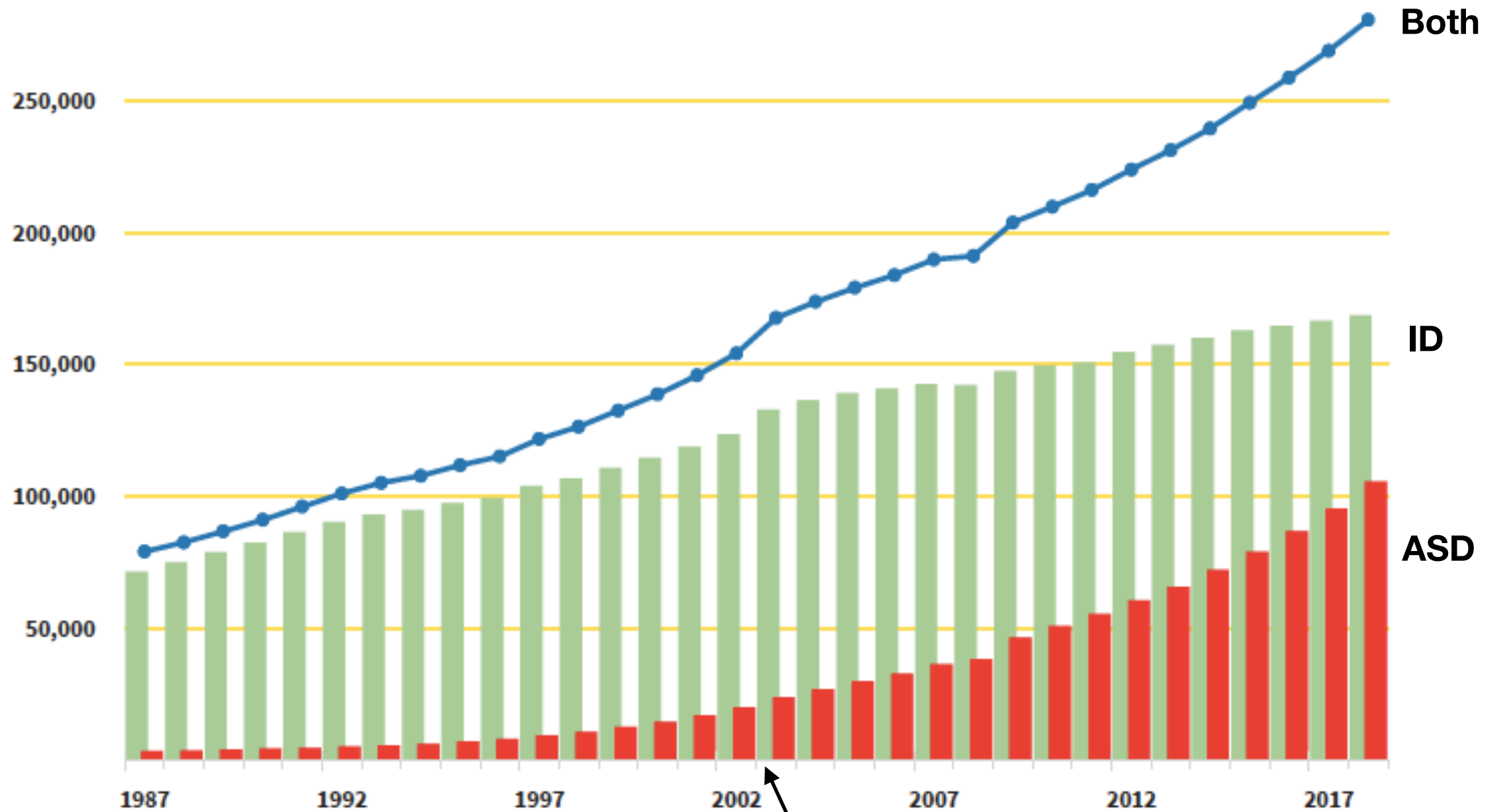


The researchers only found plausible ID → ASD diagnostic substitution for non-hispanic black females, a small subset.



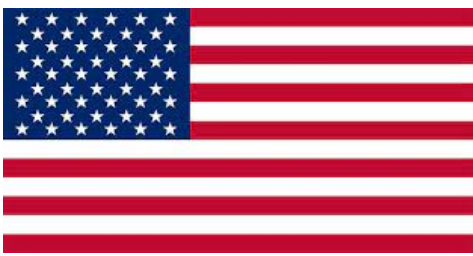
# Diagnostic Switch? Not in California DDS

## AUTISM AND INTELLECTUAL DISABILITY HAVE BOTH GROWN IN CALIFORNIA



2003: California enacts more stringent eligibility criteria

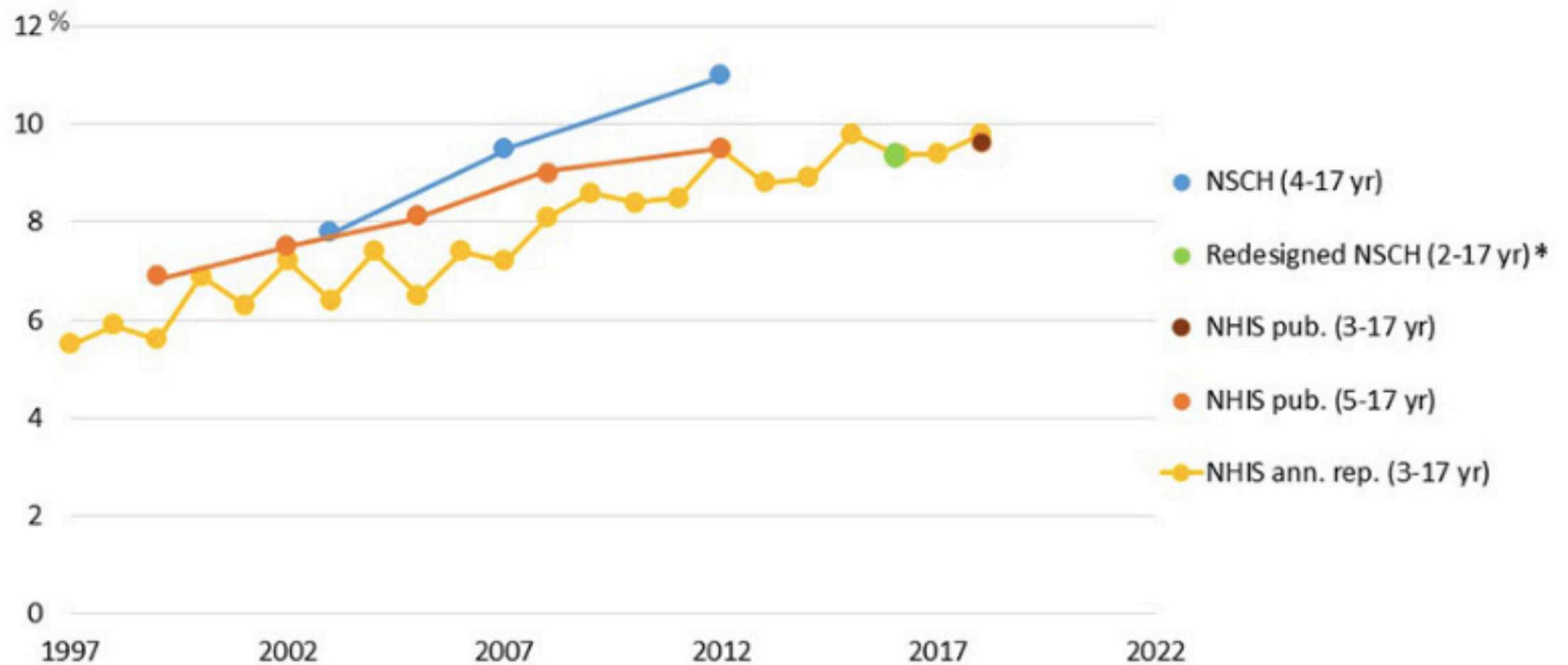
Image source: Spectrum News, Autism by the Numbers, 2021



# ADHD Prevalence Has Also Increased Markedly

ADHD diagnosis throughout the years: Estimates from published nationally representative survey data

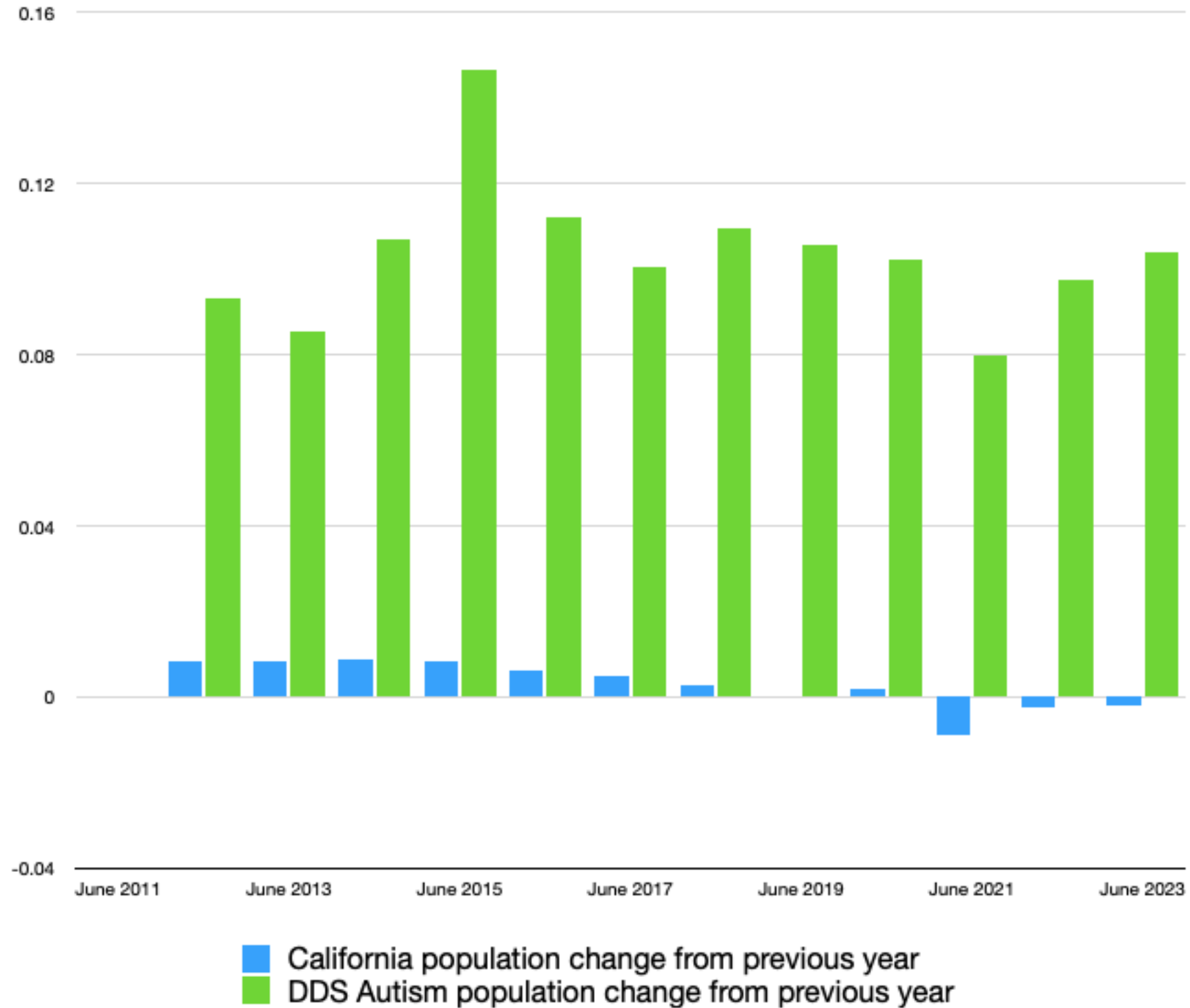
(Percent of children with a parent-reported ADHD diagnosis)





# ASD Driven by Population Increase? No

California Population Change v DDS Autism Population Change, as a Percent from Previous Year, 2012-2023





# Cal DDS Autism: From a Small Sliver to **Half the Caseload** Over 31 Years

## DDS Fact Book - 1993 Data

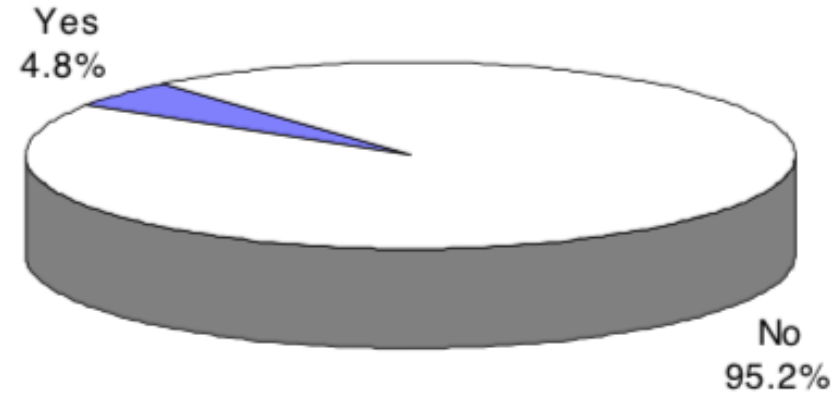
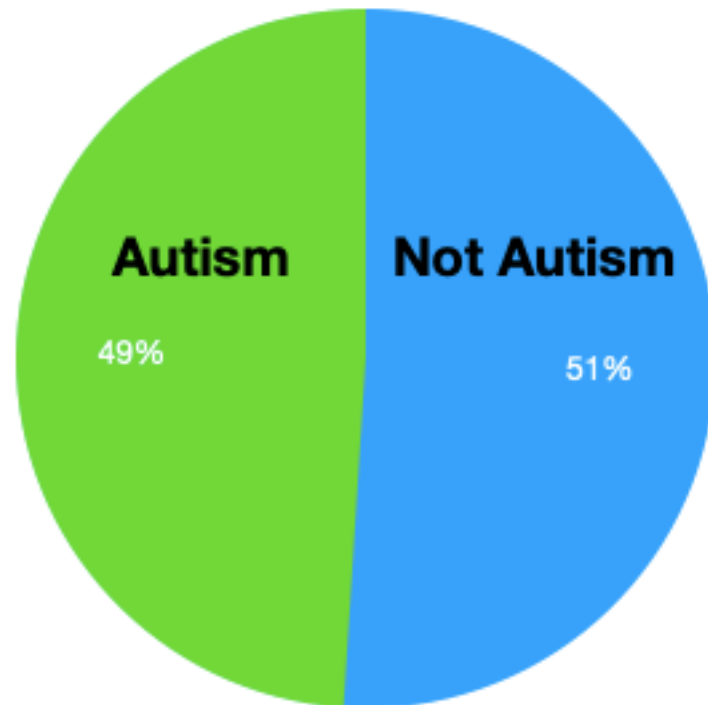
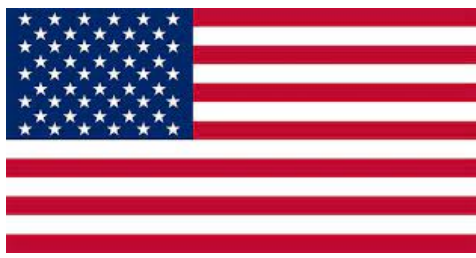


Image source: DDS Fact Book, Second Ed.

## DDS Cases, Autism v Not Autism, June 2023



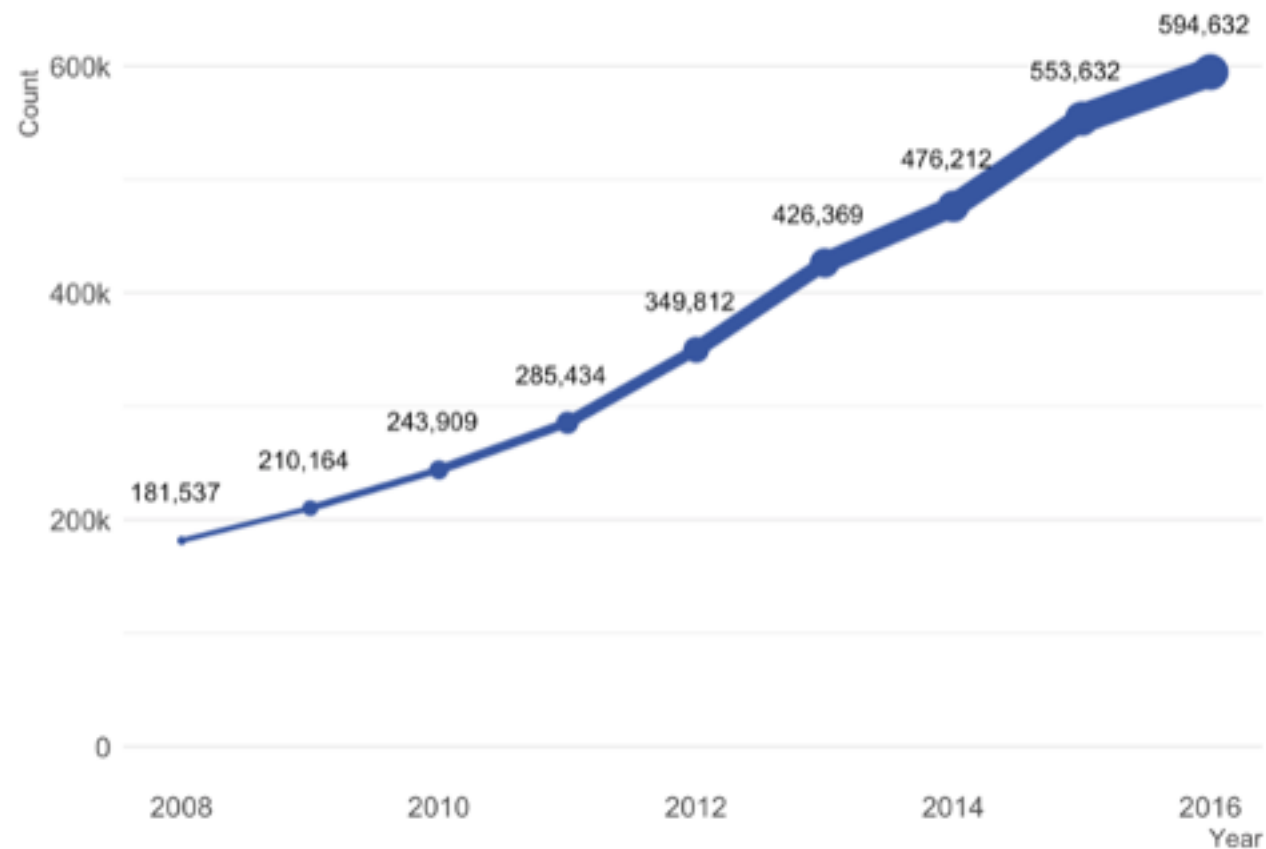
**Over 31 years: an increase from 4.8% of cases in 1993 to 49% in 2023**



# Medicaid Definition: More than **3x Growth** Between 2008-2016

**Dramatic Increases Even Under a Strict Definition  
(eg, needing an institutional level of care)**

The number of autistic people enrolled in Medicaid **more than tripled** between 2008 and 2016.



Nearly 70% of these enrollees were children.

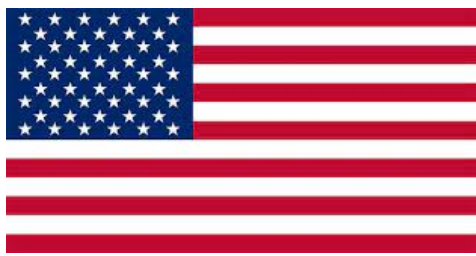
Most enrollees with autism qualify for Medicaid based on disability, versus poverty or other reasons.

Source: National Autism Indicators Report <https://policyimpactproject.org/brief-report-medicaid/>

And earlier, from 2006-2008: a **38% increase in the prevalence of autism**

Source: Jariwala-Parikh, K., Barnard, M., Holmes, E.R., West-Strum, D., Bentley, J.P., Banahan, B. and Khanna, R., 2019. Autism prevalence in the Medicaid program and healthcare utilization and costs among adult enrollees diagnosed with autism. *Administration and Policy in Mental Health and Mental Health Services Research*, 46, pp.768-776.

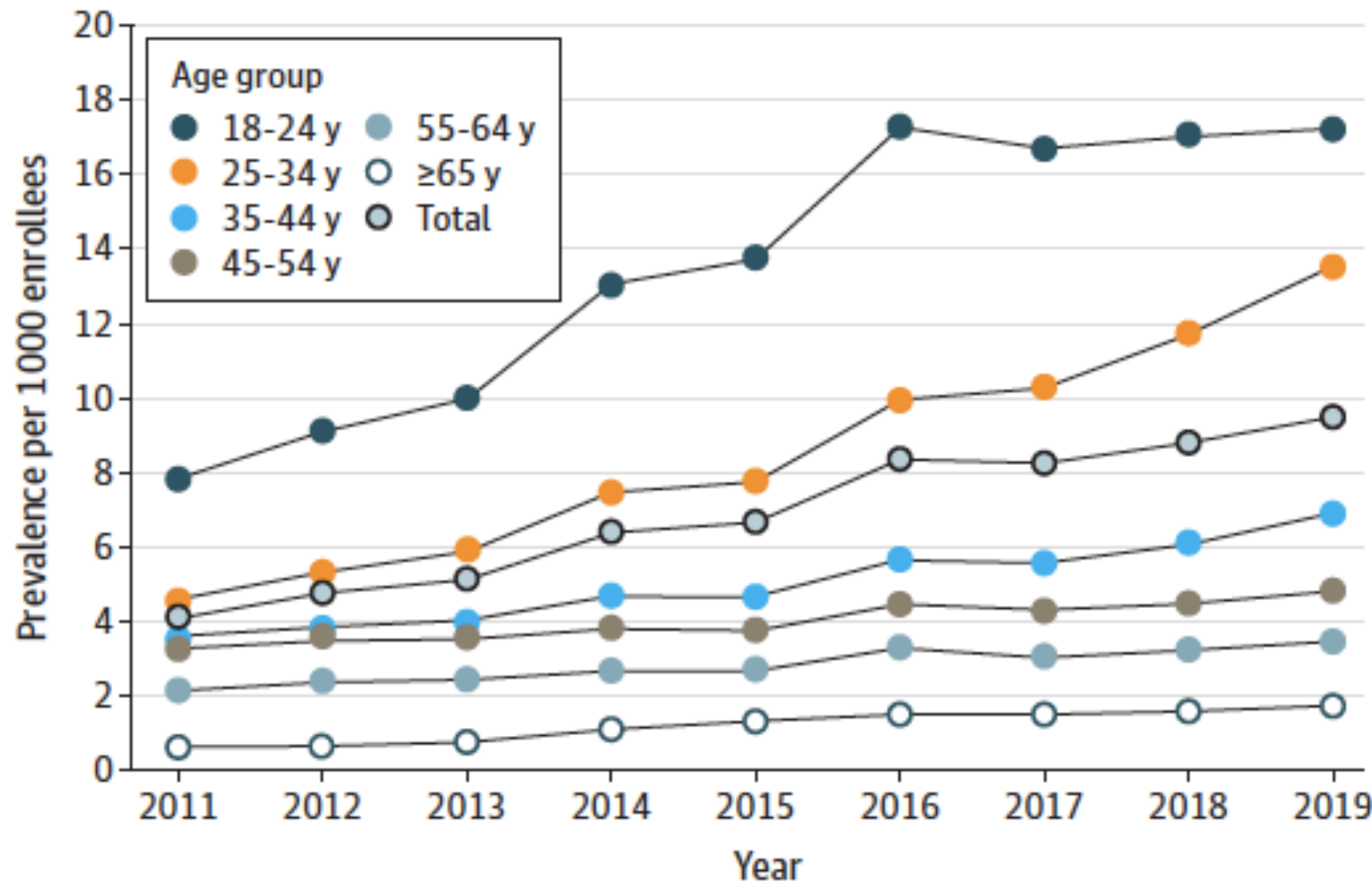




# Medicaid, limited to adults – Prevalence of autism cases **more than doubled** over 8 years

From 0.42% in 2011 to 0.95% in 2019

Figure 1. Autism Prevalence in Medicaid-Enrolled Adults Aged 18 Years or Older, 2011-2019



**18-24 y**

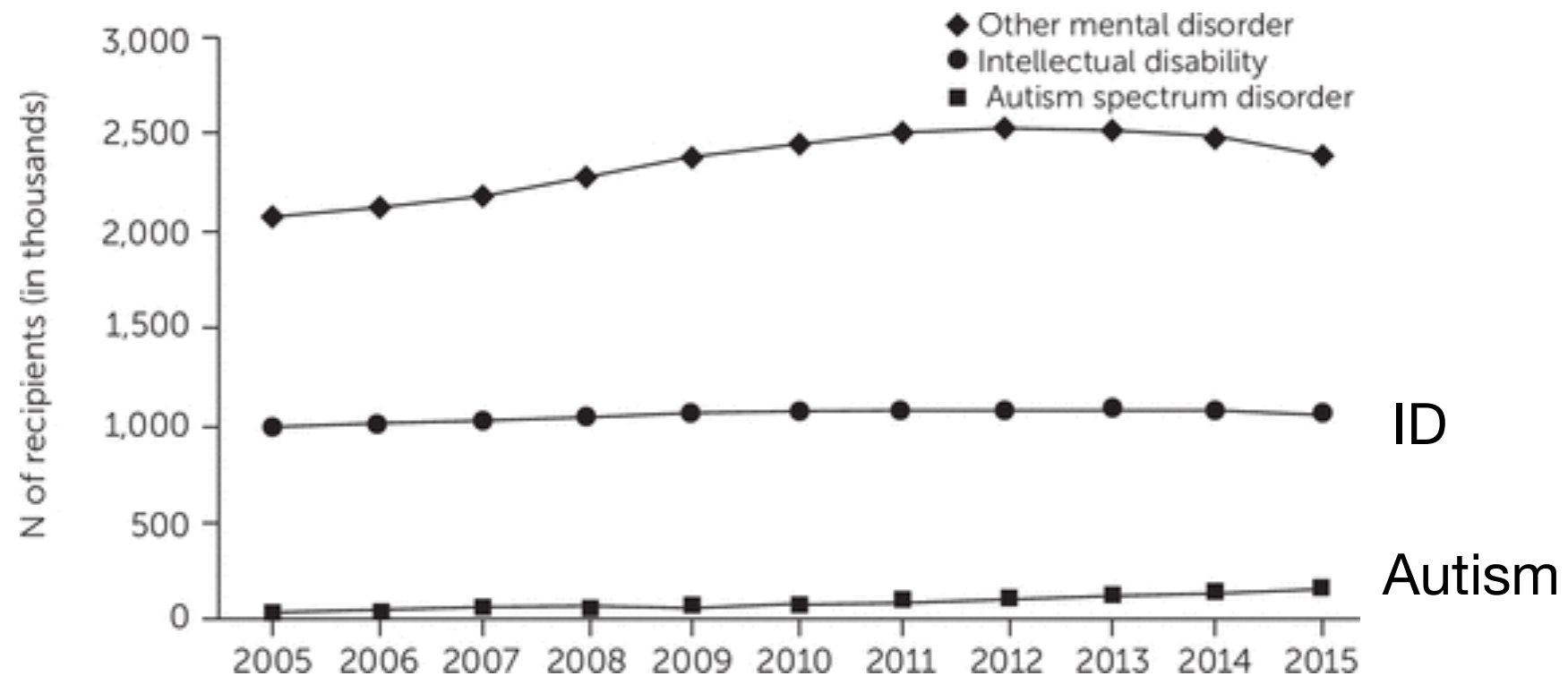
**25-34 y**



The largest increases were in the younger cohorts.



# Supplemental Security (SSI) – Autism cases **more than tripled** over 10 years (ie, people deemed too disabled to work)



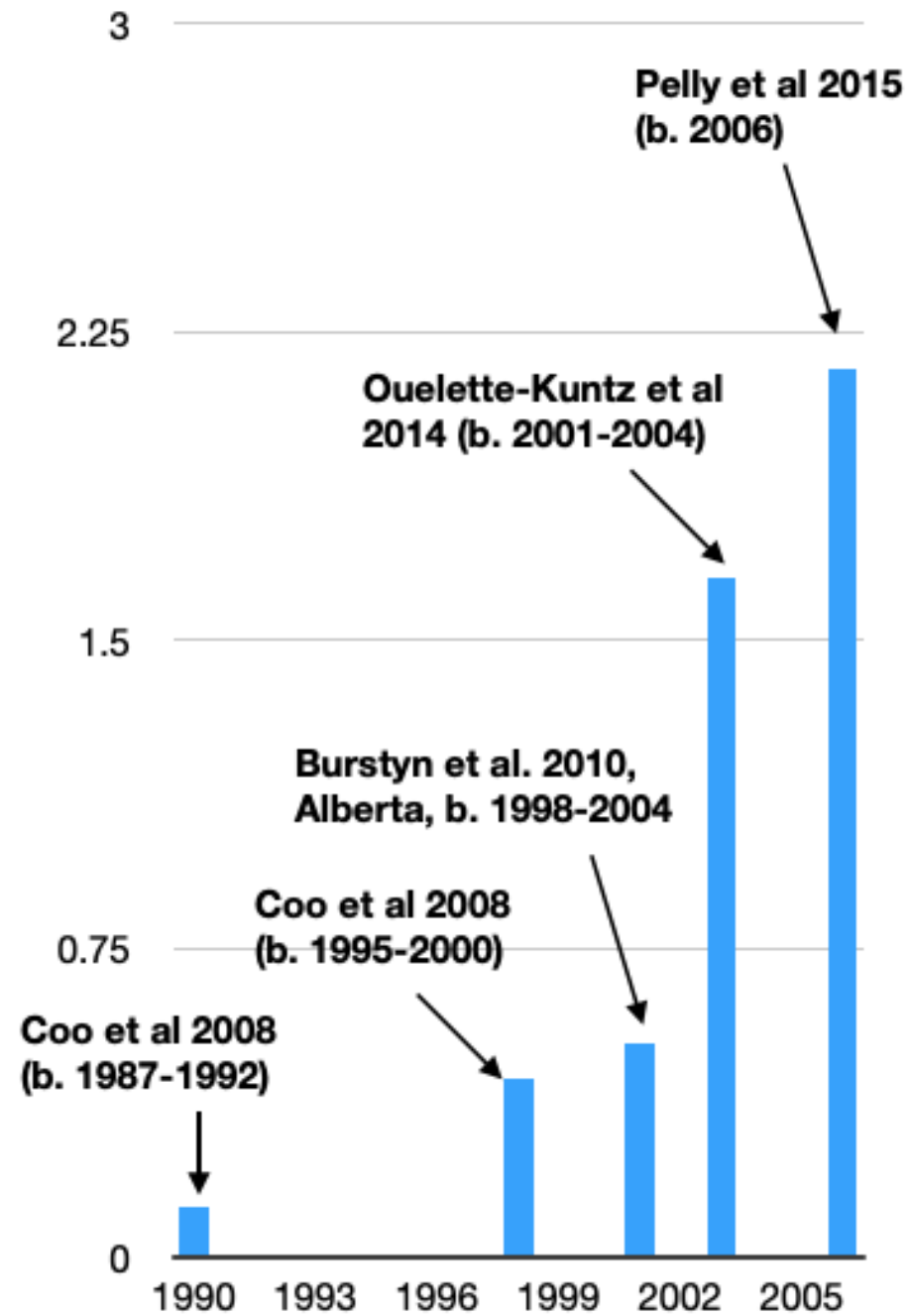
- Adults with ASD represented a growing share of the total first-time SSI awards given to adults with mental disorders, with percentages increasing from 1.3% in 2005 to **5.0% in 2015**.
- In 2015, **158,105 adults with ASD received SSI benefits, a 326.8% increase since 2005**.
- Federal SSI payments to adults with ASD increased by **383.2%** during the same period (totaling roughly \$1.0 billion in 2015).

Source: Anderson, K.A., Hemmeter, J., Rast, J.E., Roux, A.M. and Shattuck, P.T., 2020. Trends in supplemental security income payments to adults with autism. *Psychiatric Services*, 71(6), pp.602-607.



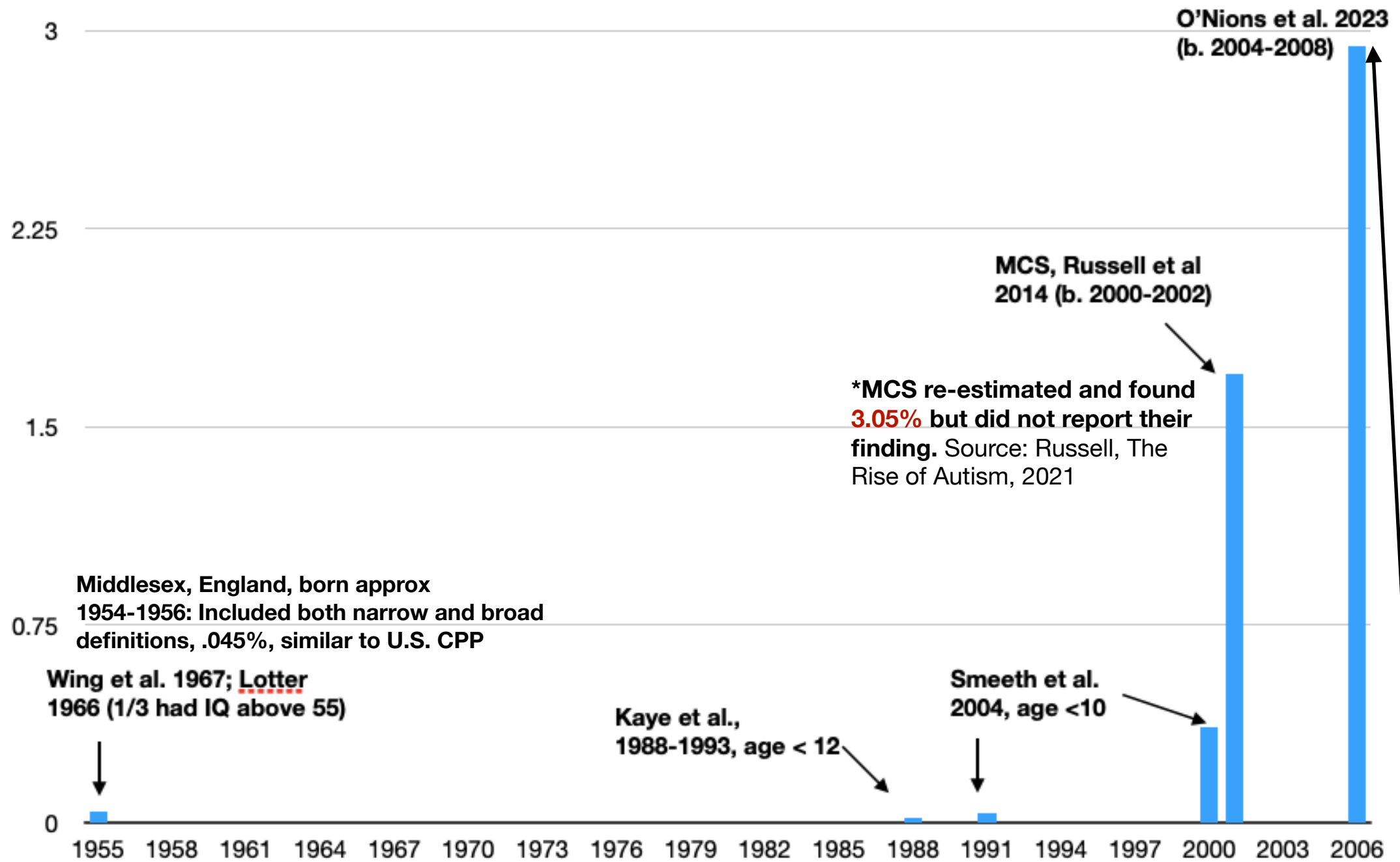
# Similar Pattern Seen in Canada

## Overview of Autism Birth Year Prevalence, for Birth Years 1987-2006





# Similar Pattern Seen in England Autism Prevalence for Birth Years 1955-2006



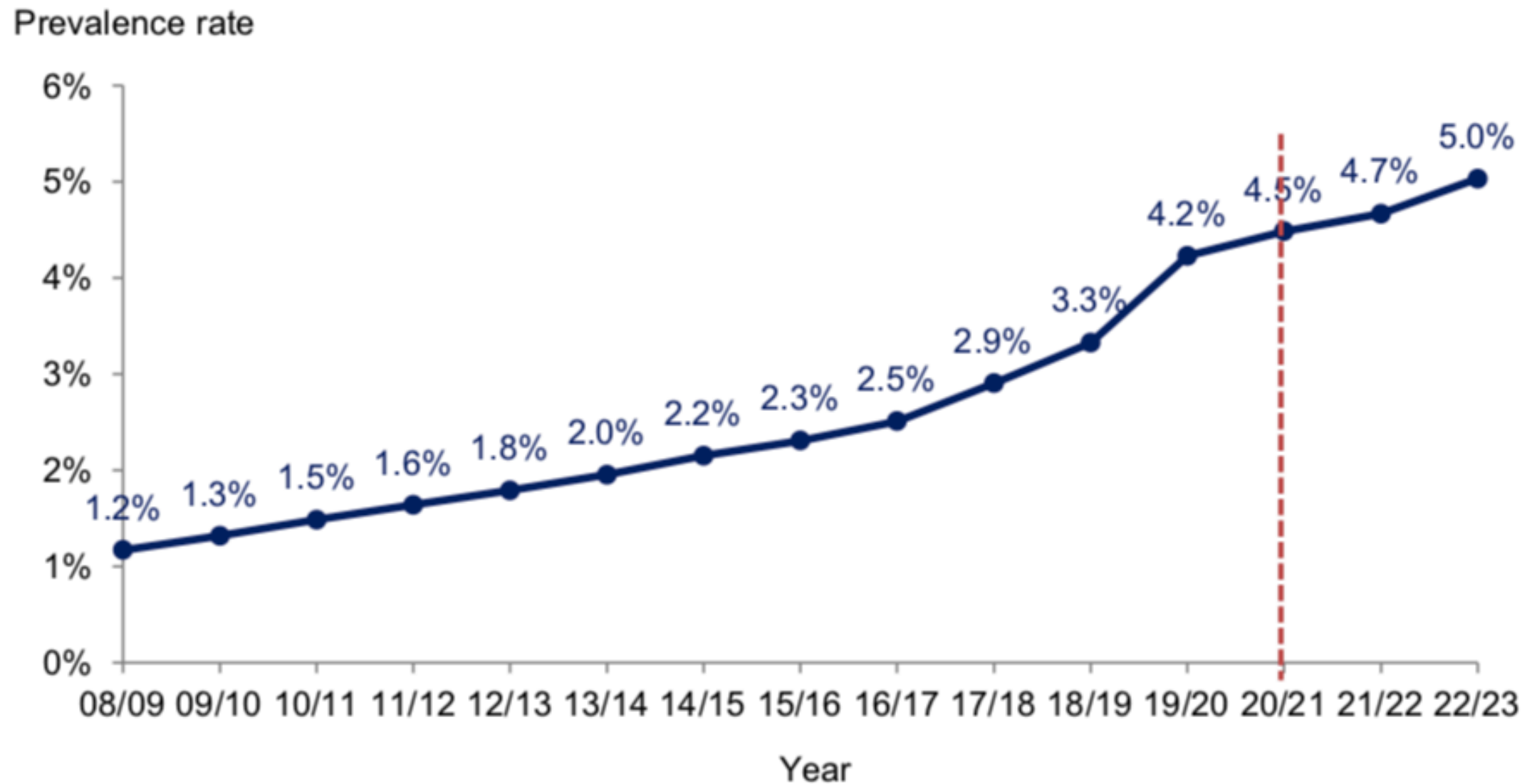
Nearly **3%** (2.95%) of children born in 2004-2008 compared to **0.02%** ages 70+

**Note:** Massive increases in autism also seen in UK schools (“the rate of increase shows little sign of abating and may indeed be accelerating.”)

Source: McConkey R. The rise in the numbers of pupils identified by schools with autism spectrum disorder (ASD): a comparison of the four countries in the United Kingdom (2020).



# Northern Ireland - Autism Prevalence in School Aged Children, 2000/09 - 2022/23



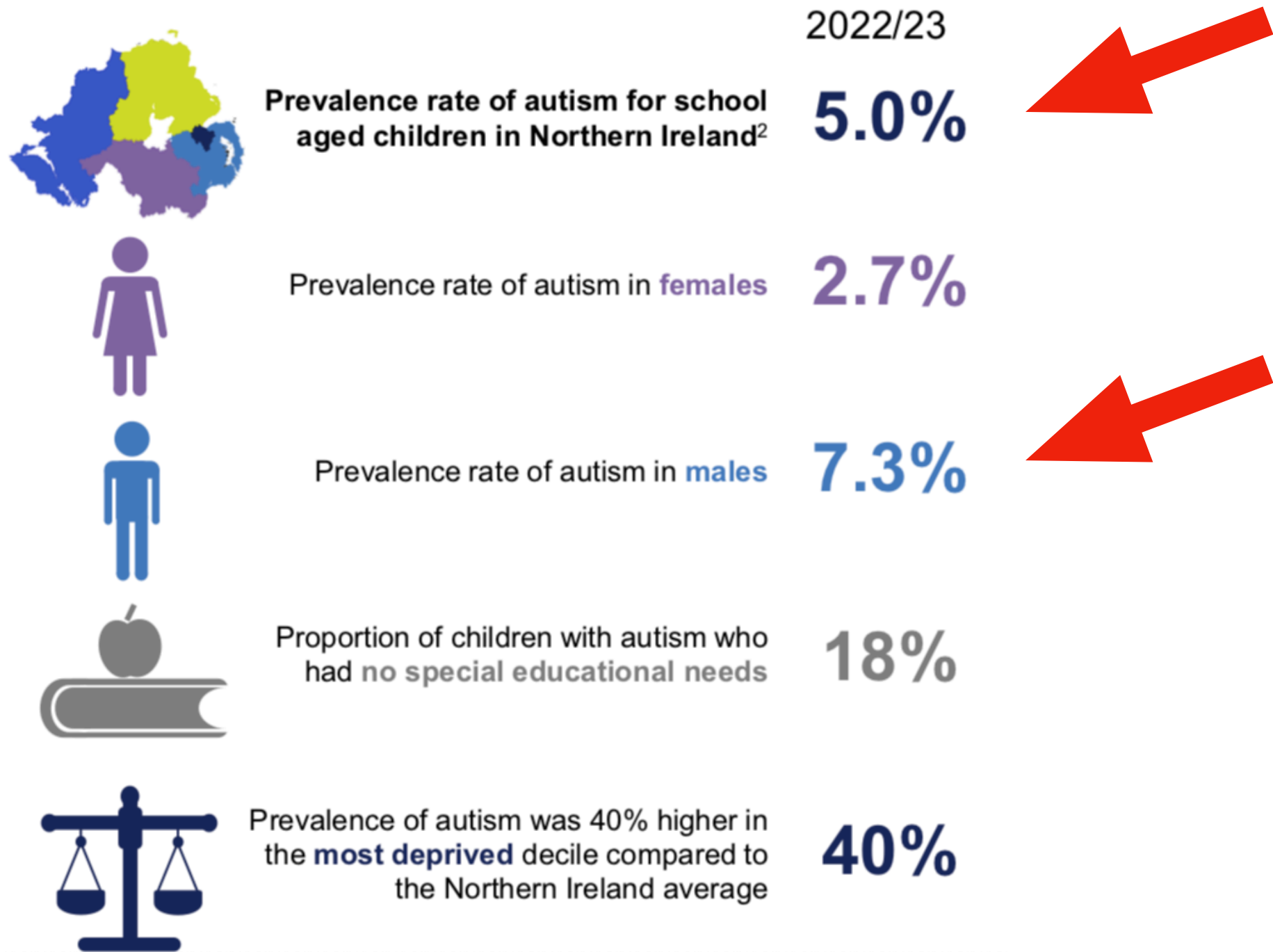
Source: Northern Ireland School Census

- - - Please note that due to a change in the data collection, the years up to and including 2018/19 are not directly comparable with 2019/20 figures onwards.

Source: Information Analysis Directorate, Prevalence of Autism (including Asperger Syndrome) in School Age Children in Northern Ireland, Annual Report (2023)

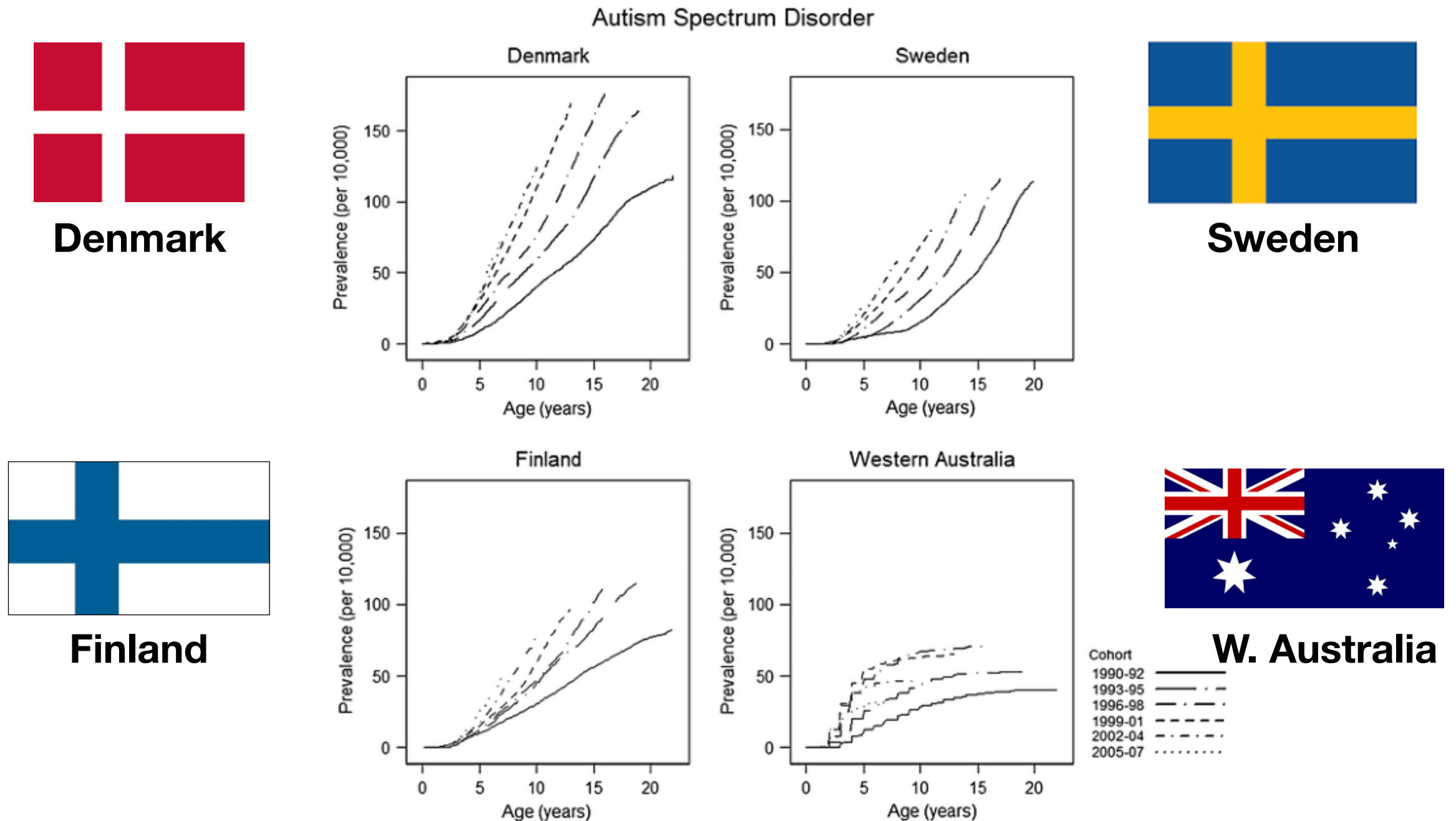


# Northern Ireland - Autism in School Aged Children, 2022-23





# Age-specific prevalence of ASD among children and adolescents born in Denmark, Sweden, Finland and Western Australia from 1990 to 2007



**18-Year Trend: Consistently higher ASD rates in each successive birth cohort.**





## Iceland: Huge Growth Over 10 Years

- Children born between **1994 and 1998** and followed until 2009, the prevalence was **1.2%**

Source: Sæmundsen, E., Magnússon, P., Georgsdóttir, I., Egilsson, E. and Rafnsson, V., 2013. Prevalence of autism spectrum disorders in an Icelandic birth cohort. *BMJ open*, 3(6).

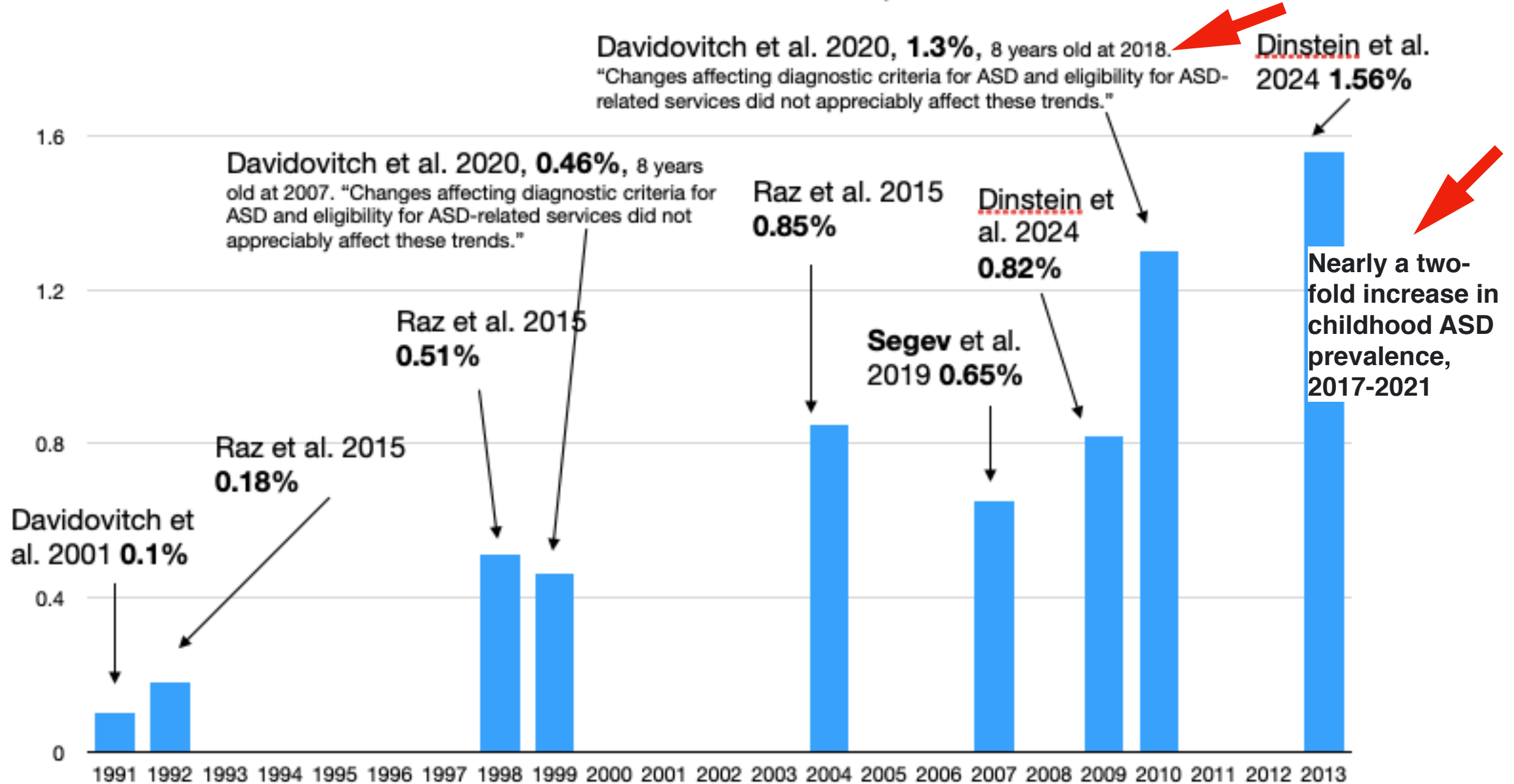
- Children **born approx 2006-2008**, 7–9 year-old children in 2015, with follow-up into adolescence. Prevalence was **3.13%**

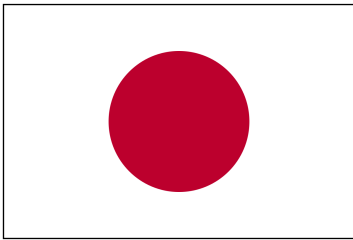
Delobel-Ayoub, M., Saemundsen, E., Gissler, M., Ego, A., Moilanen, I., Ebeling, H., Rafnsson, V., Klapouszczak, D., Thorsteinsson, E., Arnaldsdóttir, K. M., Roge, B., Arnaud, C., & Schendel, D. (2020). Prevalence of autism Spectrum disorder in 7–9-year-old children in Denmark, Finland, France and Iceland: a population-based registries approach within the ASDEU project. *Journal of Autism and Developmental Disorders*, 50(3), 949–959.



# Similar Pattern in Israel

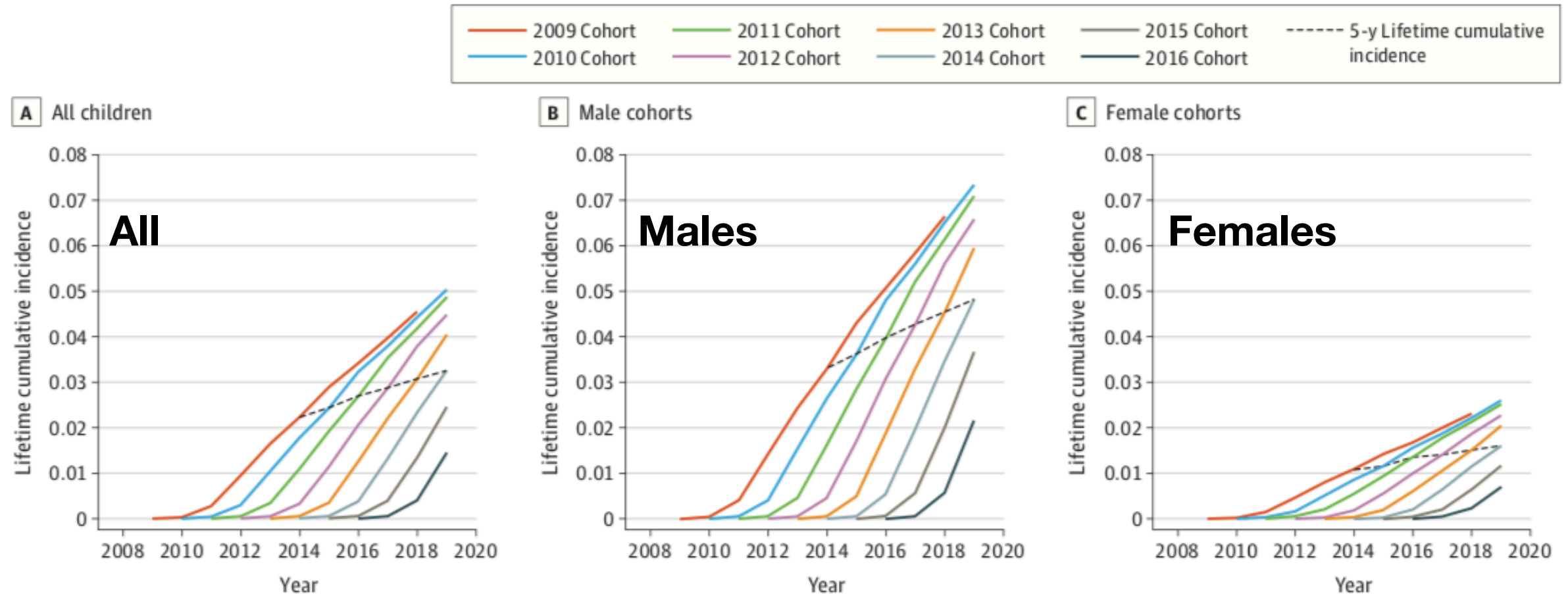
## Overview of Autism Prevalence in Israel, Birth Years 1991-2013





# Cumulative Incidence of ASD in Japan Among Children Born 2009-2016, to Age 5

Figure 1. Cumulative Incidence of Autism Spectrum Disorder in Japan Among Children Born in Fiscal Years 2009 to 2016



The lifetime cumulative incidence values each year for all children (A), boys (B), and girls (C) were rounded to the nearest fourth decimal place and plotted. Each curve shows the lifetime cumulative incidence of ASD in children born in each fiscal year. The 5-year lifetime cumulative incidence of ASD increased during the study years.

**The cumulative incidence for each birth cohort showed a steady increase, from 2.23% for the 2009 cohort to 3.26% for the 2014 cohort.**

# "But... That Denmark Study – it's just ascertainment"

## Original Investigation

January 2015

### Explaining the Increase in the Prevalence of Autism Spectrum Disorders The Proportion Attributable to Changes in Reporting Practices

Stefan N. Hansen, MSc<sup>1</sup>; Diana E. Schendel, PhD<sup>2,3,4</sup>; Erik T. Parner, PhD<sup>1</sup>

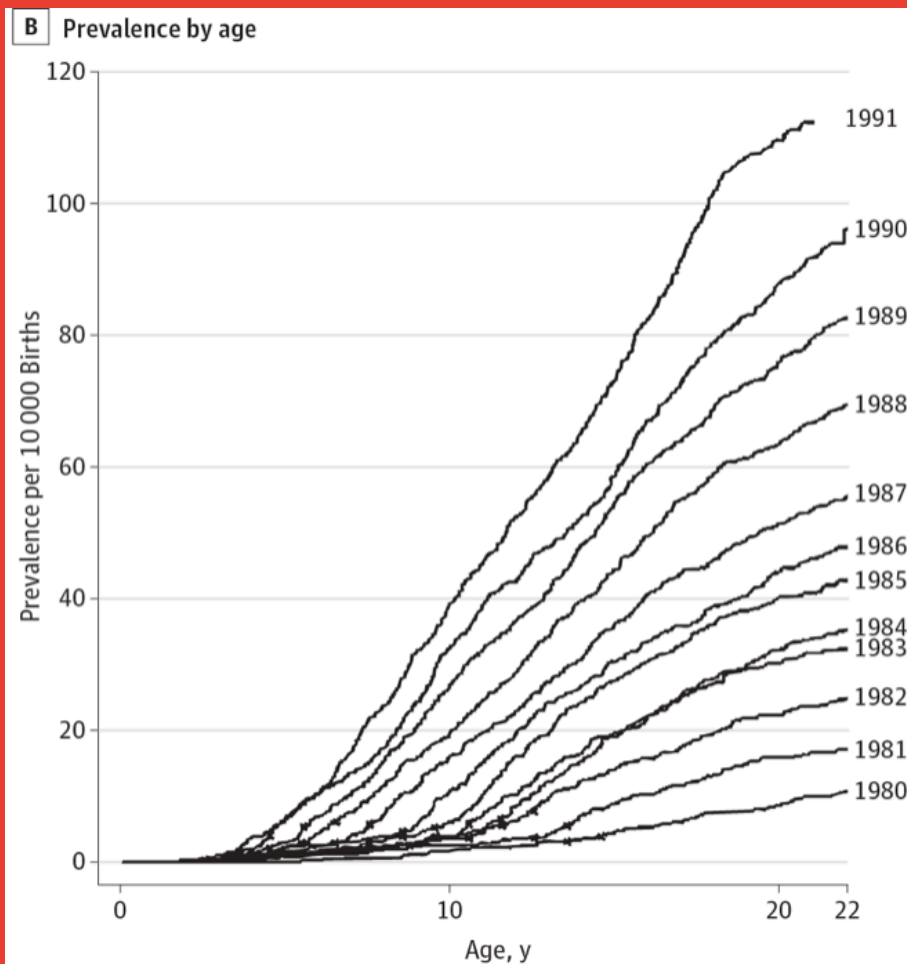
[» Author Affiliations](#) | [Article Information](#)

*JAMA Pediatr.* 2015;169(1):56-62. doi:10.1001/jamapediatrics.2014.1893

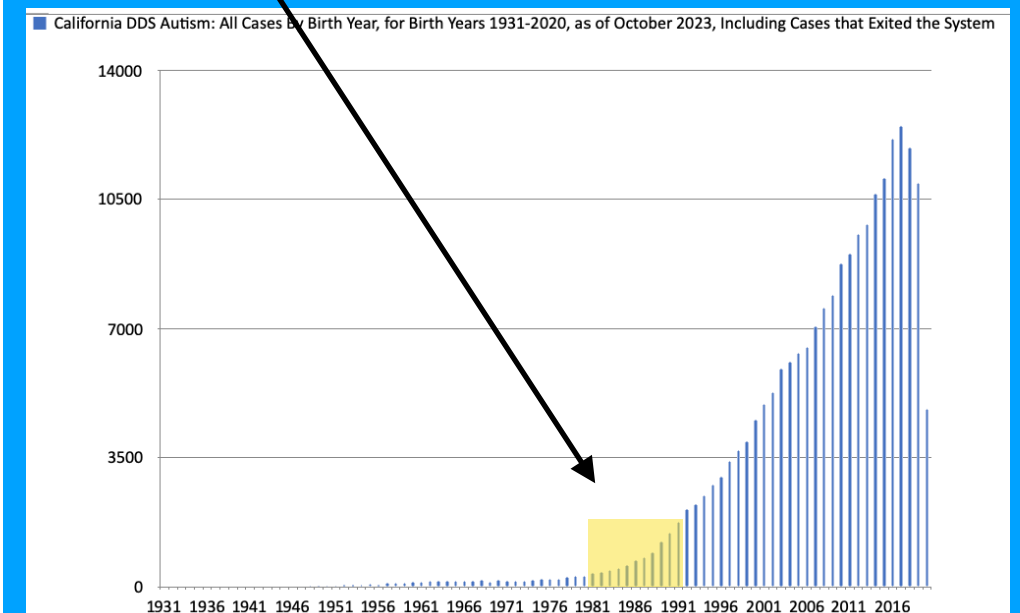
FREE

- Dramatic increase in autism prevalence, children born in Denmark, **1980-1991**
- Change in diagnostic criteria in 1994 and the inclusion of outpatient diagnoses in 1995 (**specific to Denmark**)
- **40%** of increase not due to diagnostic factors; speculate that 60% caused by change of practice
- Studies **after** this showed **tremendous increases** in prevalence (recently **2.8%** per Schendel and Thorsteinsson 2018)

## Denmark: Huge increases in prevalence, 1980-1991 birth years



## Timeframe for comparison: 1980-1991 autism births in CA DDS





## "But those Brugha studies in England – The rate in adults is same as children"

### 2011 Paper:

- Looking for autism in persons aged 16+
- Convoluted experimental methodology
- Subjects seemed very high functioning based on self-report methodology
- Study conclusions of **1%** age 16+ prevalence, based on just **19 cases**



Traolach Brugha, U Leicester, England

Source: Brugha TS, McManus S, Bankart J, Scott F, Purdon S, Smith J, et al. Epidemiology of autism spectrum disorders in adults in the community in England. *Arch Gen Psychiatry* 2011;68:459-65

### 2016 Report:

- Based on “experimental statistics”: “Statistics relating to autism in this report are experimental.”
- Methods were “validated” only by Brugha and his team.
- Prevalence of adult autism estimated to be **.8%**, with a wide confidence interval.
- Based on **31 cases** from combined 2007 and 2014 samples -“small for subgroup analysis and means caution with interpretation is required.”
- Strange findings, eg: “Among 16 to 64 year olds, employment status was not significantly related to whether or not someone was identified with autism.”

Source: Brugha TS et al. Autism Spectrum Disorder, in McManus S, Bebbington P, Jenkins R, Brugha T. (eds.) *Mental health and wellbeing in England: Adult Psychiatric Morbidity Survey 2014*. Leeds: NHS Digital (2016). <https://discovery.ucl.ac.uk/id/eprint/1518055/>

- **Despite obvious shortcomings, it has become popular to characterize this data as sufficient to conclude there has been no true increase in autism**
- **And the .8%-1% prevalence is far lower than the nearly 3% prevalence reported in children**

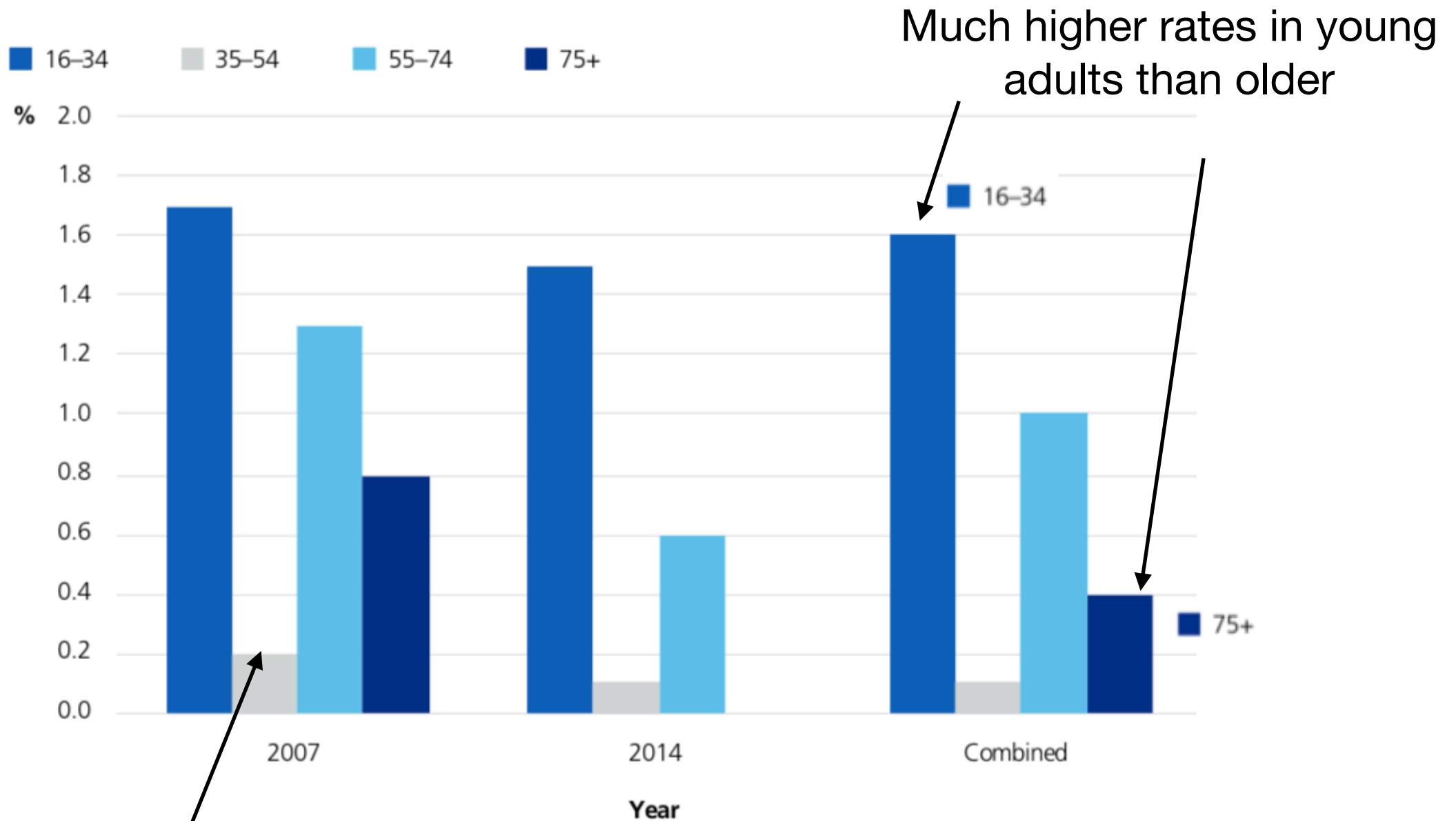


# Brugha: The Kicker

Even his study found increasing birth year prevalence!

Figure 6B: Autism in 2007, 2014 and combined years, by age


Base: all adults



Very bizarre data - hints at poor quality study



# Brugha: Scientific Cherry Picking at the Highest Level




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Primer | [Published: 16 January 2020](#)

## Autism spectrum disorder

[Catherine Lord](#) , [Traolach S. Brugha](#), [Tony Charman](#), [James Cusack](#), [Guillaume Dumas](#), [Thomas Frazier](#), [Emily J. H. Jones](#), [Rebecca M. Jones](#), [Andrew Pickles](#), [Matthew W. State](#), [Julie Lounds Taylor](#) & [Jeremy Veenstra-VanderWeele](#)

[Nature Reviews Disease Primers](#) 6, Article number: 5 (2020) | [Cite this article](#)

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- ***Nature Reviews Disease Primer 2020*— viewed as a definitive consensus statement about autism**
- **Discussion on autism prevalence was by Brugha** (per email from lead author Dr. Cathy Lord)
- **It denies an increase in autism; says “no clear evidence of a change in the prevalence of autism in the community between 1990 and 2010.”**
- **Of the 6 studies cited, 3 are to work by Brugha!**
- **The other 3 studies offered no data to support the assertion of no increase**

Source: Lord, C., Brugha, T.S., Charman, T., Cusack, J., Dumas, G., Frazier, T., Jones, E.J., Jones, R.M., Pickles, A., State, M.W. and Taylor, J.L., 2020. Autism spectrum disorder. *Nature reviews Disease primers*, 6(1), pp.1-23.





**"But there are 1 million undiagnosed autistic adults in England!"**

- O’Nions et al 2023 found rates of diagnosed autism in children/young people were much higher than in adults/older adults
- As of 2018, **2.94% of 10- to 14-year-olds** (born approx 2004-2008) had a diagnosis (1 in 34), vs. **0.02% aged 70+** (1 in 6,000). (*That’s a 147-fold increase.*)
- New diagnoses: 1 in 250 5-9 year-olds had a newly-recorded ASD diagnosis in 2018, vs. 1 in 4000 20-49 year-olds, v. 1 in 18,000 aged 50+
- **Absurd interpretation: Assuming a constant birth year prevalence (no empirical evidence), the researchers suggested this data means that between 435,700 and 1,197,300 may be autistic and undiagnosed.**

Source: O’Nions, E., Petersen, I., Buckman, J. E. J., Charlton, R., Cooper, C., Corbett, A., Happé, F., Manthorpe, J., Richards, M., Saunders, R., Zanker, C., Mandy, W., & Stott, J. (2023). Autism in England: assessing underdiagnosis in a population-based cohort study of prospectively collected primary care data. *The Lancet Regional Health Europe*, 29, 100626. <https://doi.org/10.1016/J.LANEPE.2023.100626>



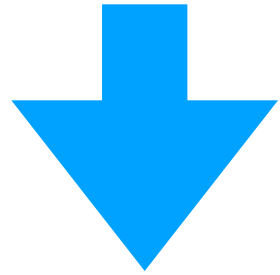
**"But 5.4 million (1 in 45) adults in the U.S. have autism!"**

- **CDC also assumed constant birth year prevalence (no empirical evidence)**

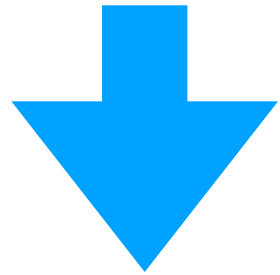
Source: Dietz, P.M., Rose, C.E., McArthur, D. and Maenner, M., 2020. National and state estimates of adults with autism spectrum disorder. *Journal of autism and developmental disorders*, 50(12), pp.4258-4266.



# Summary



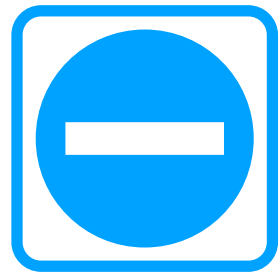
There were **exceedingly low rates of autism** in children born through the 1980s. Prevalence from many studies was consistently about **0.01-0.05%** (eg, 5 out of 10,000) of children. These often included broader definition, including Aspergers.



Across multiple countries, we see a dramatic surge in the same timeframe: starting around 1990.



The evidence for a true increase in autism is overwhelming, even apples:apples: between 20- and 55-fold.



No empirical evidence for **diagnostic switch** or “**awareness**” causing this massive increase. The commonly heard “but Denmark,” “but Brugha,” “but undiagnosed adults” rationalizations do not withstand scrutiny.



No empirical evidence for these rates in cohort of **older adults** (eg, born before 1990, ie, who are 34+ now) disabled by autism — no “hidden horde” in epidemiology, or school, medical system, insurance, or public benefits records.

## Some Thing or Things Must Be Causing This



A decent hypothesis must tick these 6 boxes:

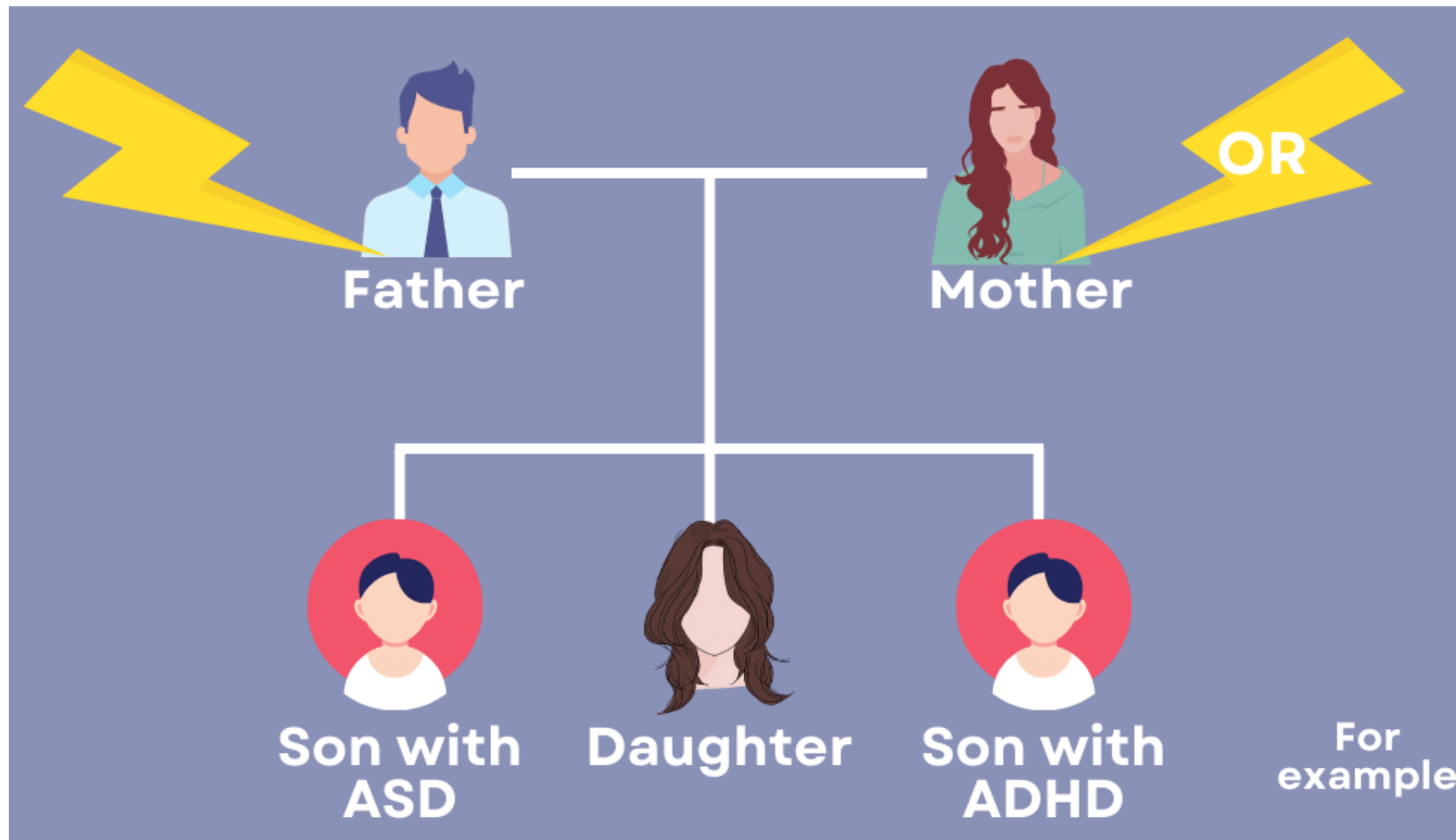
- Strong growth in **late 1980s/early 1990s births**
- The **continued increasing prevalence** from that point
- The **strong heritability of autism**, particularly sharply **increased sibling risk**
- The **dysregulation of early brain development** (+ disruption of GABAergic system)
- The **high M:F ratio**, around 4:1
- Regional variability, particularly **higher rates in wealthier countries**

So far nothing has come close to explaining this (genetics fails all but no. 4, and it's not vaccines).

This is the greatest medical mystery of our time — and the people who are supposed to be solving this are acting like there is no problem to solve.

# Emerging Hypothesis

The rise in ASD is in part attributable to unforeseen heritable impacts of certain toxic germ cell (sperm/egg) exposures.



**F1:** Exposure to F1 parent or parents (germ cells)

Change in germ cell epigenome, or even genome, "transcriptional landscape"

**F2:** Perturbed brain development and abnormal behaviors in F2 offspring, particularly males

But what exposure(s)?

# Example: Modern Agents of General Anesthesia



Modern inhalation anesthetics, eg: isoflurane (1981), desflurane (1993), sevoflurane (1995)

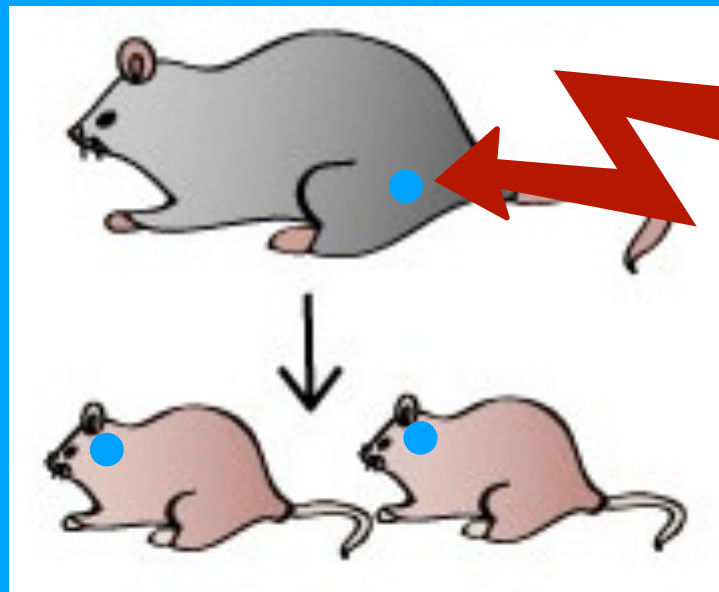
- Also **I.V. anesthetics** eg propofol (1989)
- Extremely **common, toxic** exposures
- Neurotoxic, genotoxic, reprotoxic; reach gonads



Most common inhalation anesthesia today:  
**Sevoflurane**

- A highly fluorinated methyl isopropyl ether
- Modulator of the GABA<sub>A</sub> receptor
- Steadily increasing use since 1995

## Heritable Impacts of Sevoflurane: Findings in Animal Models



**F1:** GA exposure to parent (germ cells) — at any stage of life

**F2:** Dysregulation of brain development, ASD traits in F2 offspring, particularly males

References: see EscherFund.org

Idea: In humans, low absolute risk, but broad population risk.

## This hypothesis ticks all 6 boxes:

- ✓ The inflection point in **late 1980s/early 1990s births** — but complex bc many different chemicals, and lag between F1 exposure and F2 birth
- ✓ The **continued increasing prevalence** — continued increase in population exposure
- ✓ The **strong heritability of autism**, particularly sharply **increased sibling risk** — yes, because of perturbation of pool of F1 germ cells
- ✓ The **dysregulation of early brain development** (+ disruption of GABAergic system) — yes, due to mechanism of action and animal study findings
- ✓ The **high M:F ratio**, around 4:1 — yes, much more acute impacts in male F2s
- ✓ Regional variability, particularly **higher rates in wealthier countries** — yes, higher rates of use in wealthier countries (eg, sevoflurane)

**Research is desperately needed.**



# Final Thoughts



The evidence for a true increase in autism epidemic is **overwhelming**.



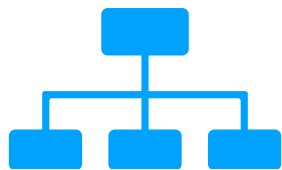
**We face a national (international) emergency** with which we cannot cope, it portends an unimaginably bleak future for countless individuals and families.



Urgent to **radically expand treatments and systems of care**: serving huge variety of needs. System reform depends on accepting the reality of the surge.



**The denialism must stop, we need answers now. It is grossly irresponsible to** treating autism — a serious neurodevelopmental abnormality condemning shocking portions of our children to lives of disability and dependence — as a “diversity.”



The most promising hypothesis so far relates to **parental germline exposure**, eg, to potent modern agents of general anesthesia, but this line of inquiry is ignored in favor of genomics.




**Thank you!**

More info:

[JillEscher.com](http://JillEscher.com)

[EscherFund.org](http://EscherFund.org)

[GermlineExposures.org](http://GermlineExposures.org)

Escher Fund  Humans start as molecules  
for Autism

[GermlineExposures.org](http://GermlineExposures.org)