

Children and young people with autism

Observational study of comorbidity in a whole country population

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- Existing research
- Scotland's Census 2011
- Main findings
- Conclusions

Prevalence of hearing and vision impairments and physical disability:

- systematic review on hearing impairments showed inconsistent findings with only 5 small studies included;¹
- 1.7% median prevalence (range=0-5.9%) for hearing deficits, and 1.3% (range=0-11.1%) for visual deficits in an autism epidemiology review;²
- hearing loss in 1%, and vision impairment in 1% of 8-year-old children with autism in Atlanta;³
- no studies on physical disability prevalence.

1. Beers A N, McBoyle M, Kakance, E et al. (2014). Autism and peripheral hearing loss: A systematic review. *International Journal of Pediatric Otorhinolaryngology*, 78, 96-101.
2. Fombonne E (2003) Epidemiological Surveys of Autism and Other Pervasive Developmental Disorders: An Update. *Journal of Autism and Developmental Disorders* 33(4): 365-382.
3. Van Naarden Braun K, Christensen D, Doernberg N, et al. (2015) Trends in the Prevalence of Autism Spectrum Disorder, Cerebral Palsy, Hearing Loss, Intellectual Disability, and Vision Impairment, Metropolitan Atlanta, 1991–2010. *PLoS One* 10(4): e0124120.

Prevalence of intellectual disabilities:

- ID more common in autism, with estimates in the region of 50-70%, but studies were small, of variable methodology and only from 1966-2001;¹
- autism concepts have changed, so prevalence of comorbid ID is likely to have fallen;
- in 8 year old children from Atlanta, autism prevalence increased from 4.2/1,000 in 1996 to 15.5/1,000 in 2010, but record of ID fell from 59% to 37%;²
- in 1993-2005, 5.1/1,000 Western Australian children had autism of whom 74.5% also recorded to have ID;³
- autism prevalence in the Stockholm Youth Cohort, aged 0–17 years was 11.5/1,000 in 2007, of whom 42.6% had comorbid ID;⁴
- autism recorded in 3.6/1,000 children aged 8 between 2003-2012 in south-western France, of whom 51.2% also had ID.⁵

1. Fombonne E (2003) Epidemiological Surveys of Autism and Other Pervasive Developmental Disorders: An Update. *Journal of Autism and Developmental Disorders* 33(4): 365-382.
2. Van Naarden Braun K, Christensen D, Doernberg N, et al. (2015) Trends in the Prevalence of Autism Spectrum Disorder, Cerebral Palsy, Hearing Loss, Intellectual Disability, and Vision Impairment, Metropolitan Atlanta, 1991–2010. *PLoS One* 10(4): e0124120.
3. Bourke J, de Klerk N, Smith T, et al. (2016) Population-Based Prevalence of Intellectual Disability and Autism Spectrum Disorders in Western Australia: A Comparison With Previous Estimates. *Medicine* 95(21): 1-8.
4. Idring S, Rai D, Dal H, et al. (2012) Autism Spectrum Disorders in the Stockholm Youth Cohort: Design, Prevalence and Validity. *PLoS ONE* 7(7): e41280.
5. Delobel-Ayoub M, Ehlinger V, Klapouszczak D, et al. (2015) Socioeconomic Disparities and Prevalence of Autism Spectrum Disorders and Intellectual Disability. *PLOS ONE* 10(11): e0141964.

Prevalence of mental health conditions:

- population-based study with autism prevalence rate of 11.2/1,000 found that as many as 70% of children with autism may have at least one comorbid psychiatric disorder;¹
- reviews on depression (4.0-34.0%)² and anxiety (11.0-84.0%; 34.8-39.6%)^{3,4} show that rates vary considerably between included studies with small population sizes;
- reviews on suicidal attempts, ideation and behaviour in children and adolescents show higher prevalence, but studies differ in study period, age of individuals, diagnostic criteria and sampling methods;^{5,6}
- in child and youth populations aged 5-18 with autism, bipolar disorder more common in AS than ASD (8.6% vs. 3.0%) and prevalence increases with age (2.3% at age 5 and 10.4% at age 18).⁷

1. Simonoff E, Pickles A, Charman T, et al. (2008) Psychiatric disorders in children with autism spectrum disorders: Prevalence, comorbidity and associated factors in a population-derived sample. *Journal of the American Academy of Child and Adolescent Psychiatry* 47: 921–929.
2. Stewart ME, Barnard L, Pearson J, et al. (2006) Presentation of depression in autism and Asperger syndrome. *Autism* 10(1): 103-116.
3. White SW, Oswald D, Ollendick T, et al. (2009) Anxiety in children and adolescents with autism spectrum disorders. *Clinical Psychology Review* 29: 216-229.
4. Van Steensel FJA, Bögels SM and Perrin S (2011) Anxiety disorders in children and adolescents with autistic spectrum disorders: a meta-analysis. *Clinical Child and Family Psychology Review* 14: 302-317.
5. Hannon G and Taylor EP (2013) Suicidal behaviour in adolescents and young adults with ASD: findings from a systematic review. *Clinical Psychology Review* 33: 1197-1204.
6. Segers M and Rawana J (2014) What do we know about suicidality in autism spectrum disorders? A systematic review. *Autism Research* 7: 507-521.
7. Rosenberg RE, Kaufmann WE, Law JK, et al. (2011) Parent report of community psychiatric comorbid diagnoses in autism spectrum disorders. *Autism Research Treatment* Article ID 405849.

About the Census

- held once every 10 years by the National Records of Scotland
- a snapshot of all people in Scotland on one night
- Scotland's Census 2011 was held on 27th March 2011
- autism was self/proxy-reported
- 94% response rate with remaining 6% imputed

Analysis

- descriptive statistics for the population with and without autism
- logistic regressions with odds ratios (OR; with 95% confidence intervals) of autism predicting comorbidities in the whole population, adjusted for age and gender
- ORs for age and gender predicting comorbidities within the population with autism
- two age groups of 0-15 and 16-24-year olds, with 0-15-year olds as the reference group
- gender was a binary variable, with males as the reference group
- STATA/SE software version 12

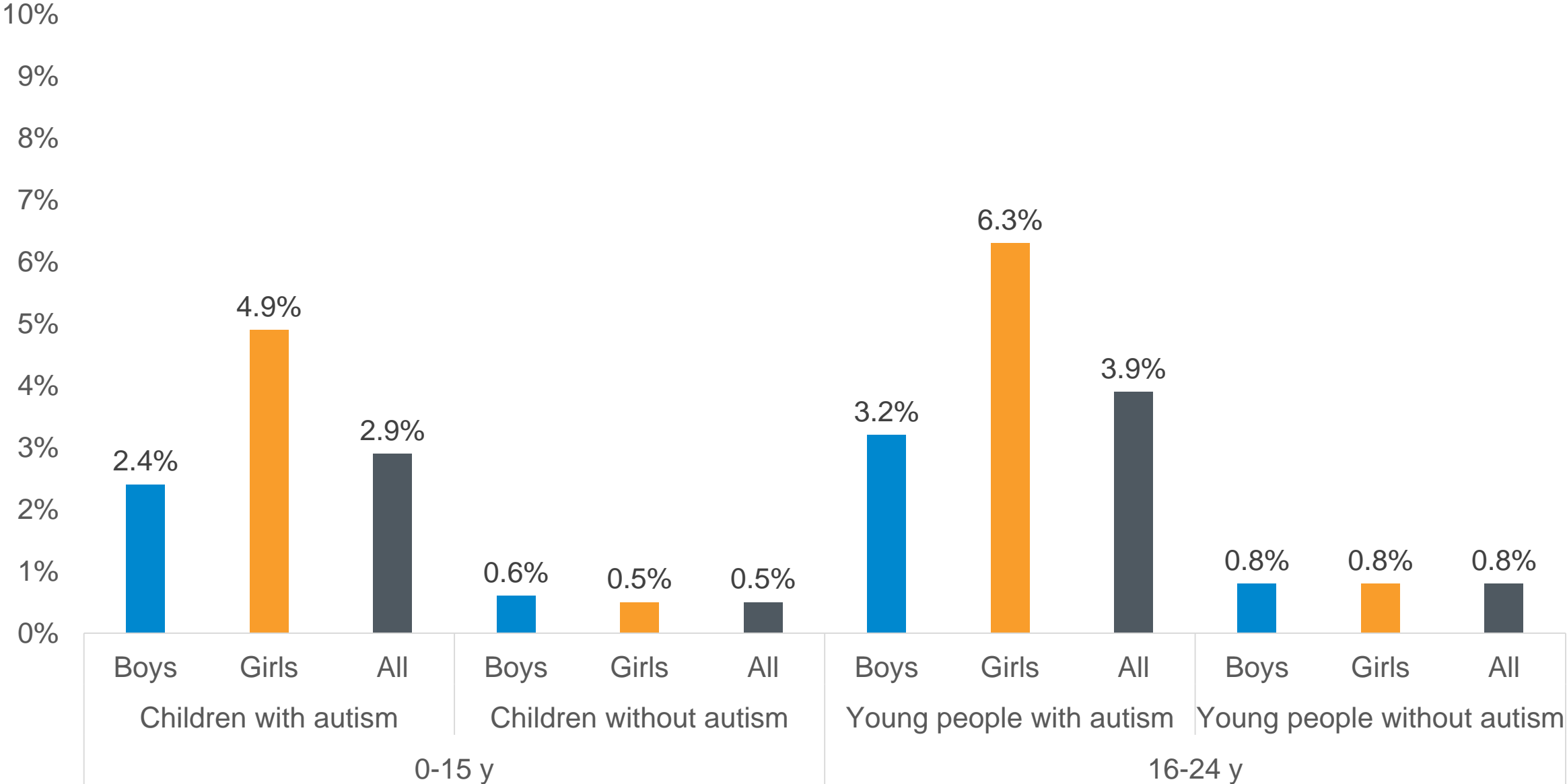
Do you have any of the following conditions which have lasted, or are expected to last, at least 12 months? Tick all that apply.

- deafness or partial hearing loss
 - blindness or partial sight loss
 - learning disability (for example, Down's Syndrome)
 - learning difficulty (for example, dyslexia)
 - **developmental disorder (for example, ASD or Asperger's Syndrome)**
 - physical disability
 - mental health condition
 - long-term illness, disease or condition
 - other condition, please write in
- or
- no condition

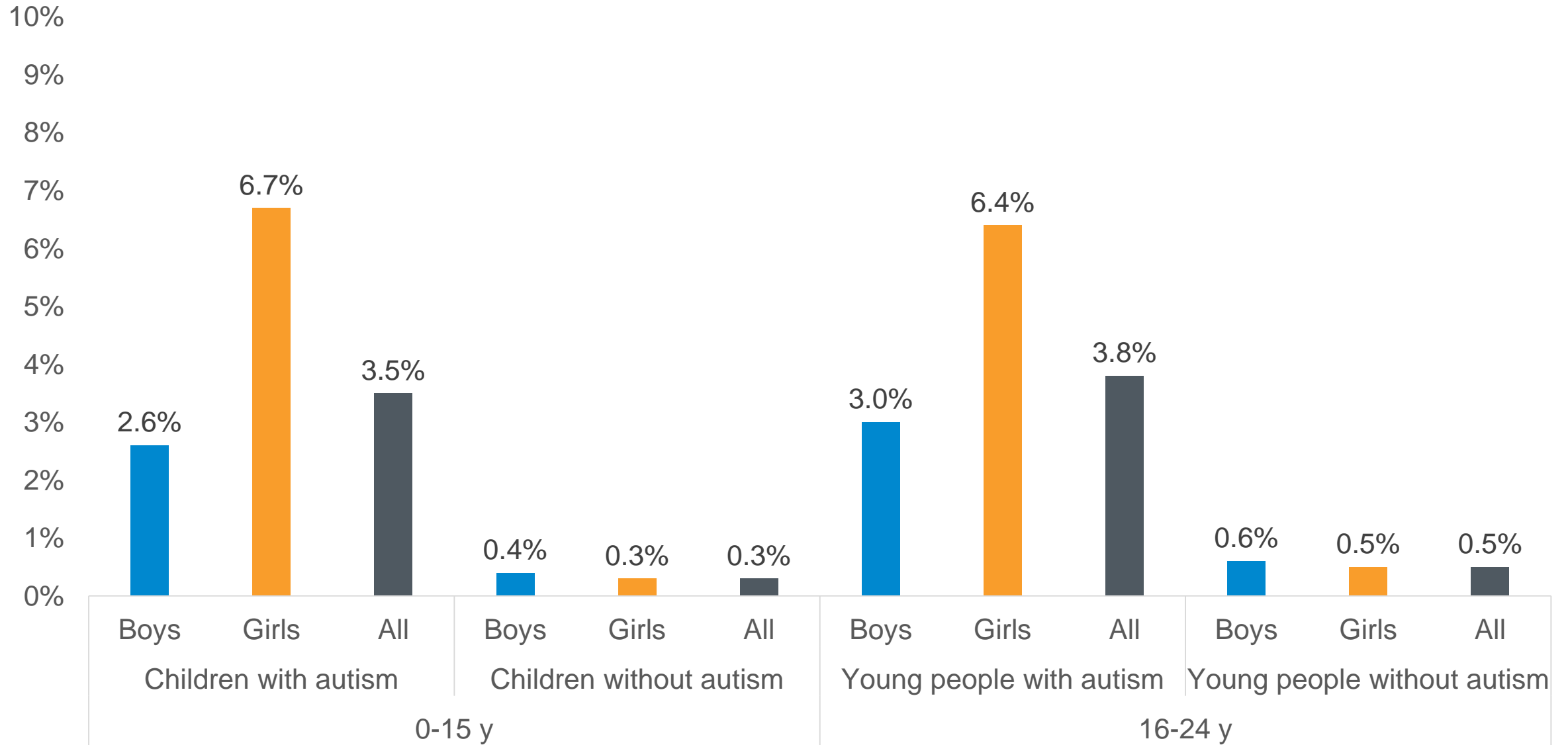
Study population:

- 5,295,403 people;
- 916,331 children aged 0-15 years:
 - 17,348 (1.9%) had autism;
- 632,488 young people aged 16-24 years:
 - 7,715 (1.2%) had autism;
- 25,063/1,548,819 (1.6%) of all children and young people had autism;
- 766,109 (50.3%) males and 757,647 (49.7%) females without autism;
- 19,880 (79.3%) males and 5,183 (20.7%) females with autism.

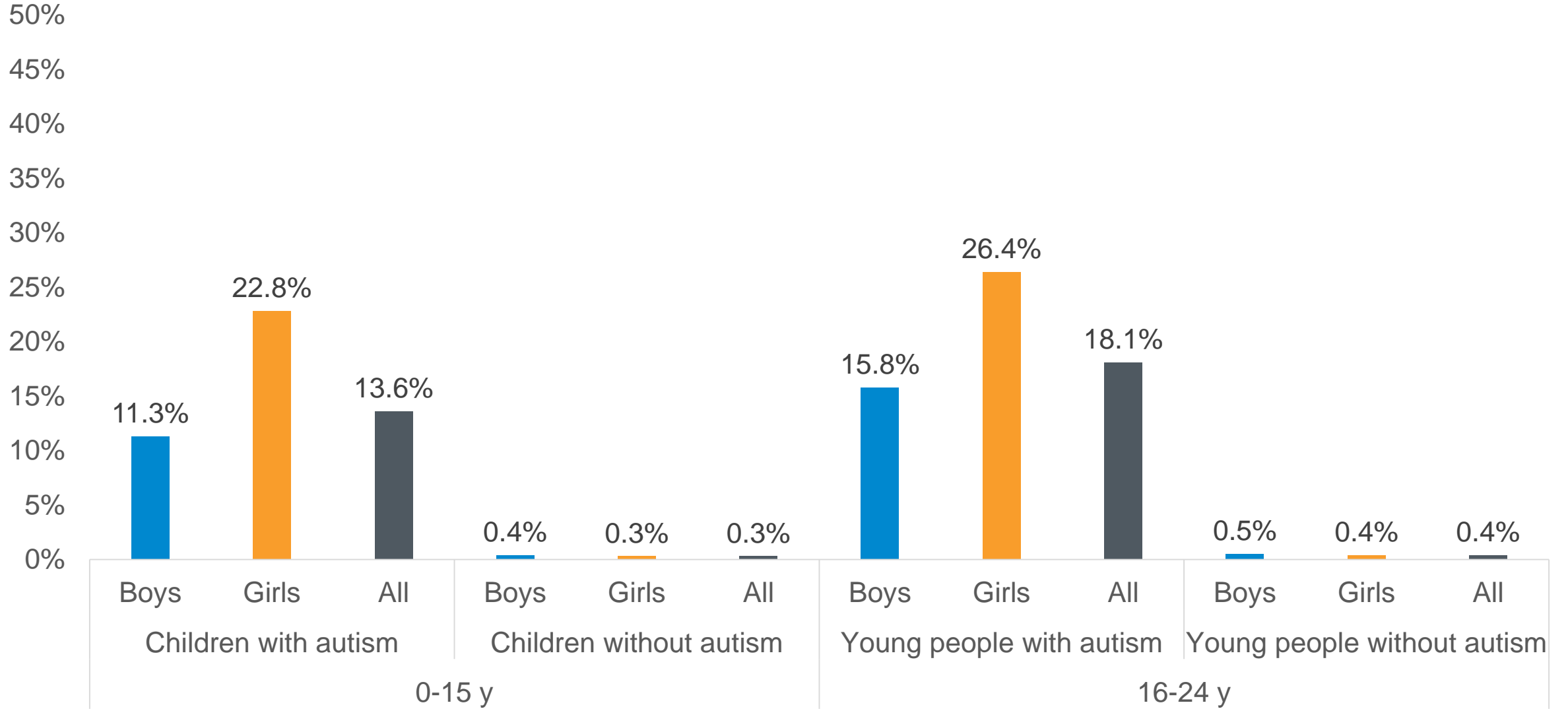
Deafness/partial hearing loss



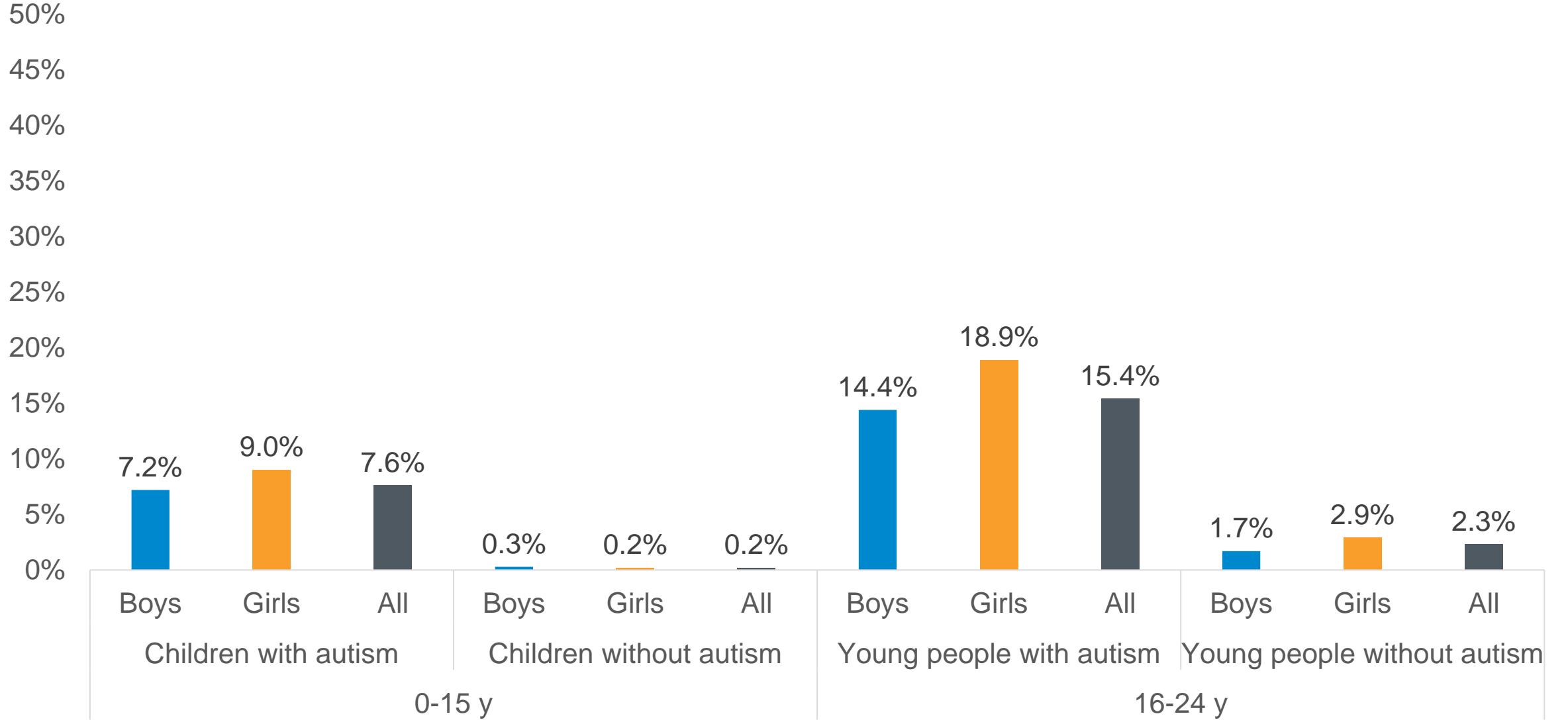
Blindness/partial sight loss



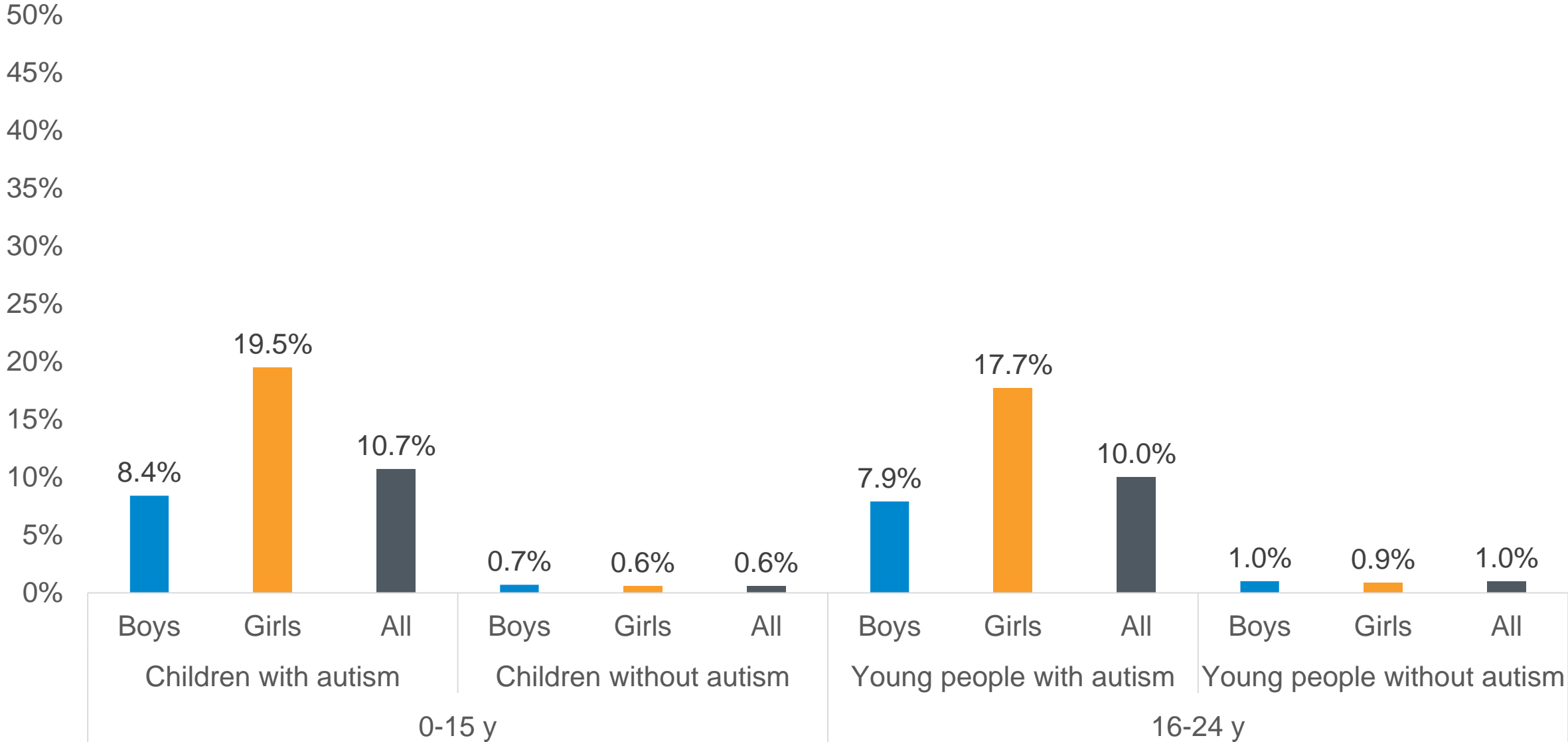
Intellectual disabilities



Mental health condition



Physical disability



Odds ratios of autism, age, and gender in predicting comorbid conditions in the whole population of children and young people

Condition	Variable	OR	95% CI
Deafness or partial hearing loss	Autism	5.36	5.11-5.61
	Aged 16-24	1.53	1.47-1.60
	Female gender	0.94	0.79-1.13
Blindness or partial sight loss	Autism	8.88	8.10-9.74
	Aged 16-24	1.55	1.33-1.81
	Female gender	0.90	0.61-1.34
Intellectual disabilities	Autism	49.73	38.13-64.85
	Aged 16-24	1.39	1.39-1.40
	Female gender	1.03	0.42-2.54
Mental health condition	Autism	15.72	13.35-18.52
	Aged 16-24	7.60	2.96-19.53
	Female gender	1.51	1.44-1.59
Physical disability	Autism	15.84	14.09-17.80
	Aged 16-24	1.43	1.11-1.85
	Female gender	1.02	0.61-1.71

Odds ratios of age and gender in predicting comorbid conditions in children and young people with autism

Condition	Variable	OR	95% CI
Deafness or partial hearing loss	Aged 16-24	1.32	1.32-1.32
	Female gender	2.07	2.04-2.10
Blindness or partial sight loss	Aged 16-24	1.08	1.07-1.08
	Female gender	2.51	2.12-2.97
Intellectual disabilities	Aged 16-24	1.39	1.39-1.39
	Female gender	2.17	1.82-2.57
Mental health condition	Aged 16-24	2.21	2.21-2.21
	Female gender	1.32	1.22-1.43
Physical disability	Aged 16-24	0.92	0.92-0.92
	Female gender	2.60	2.50-2.71

Conclusions

- deafness/partial hearing loss, blindness/partial sight loss, and physical disability respectively, 5, 9, and 16 times more prevalent;
- prevalence for deafness/partial hearing loss of 2.9% in 0-15 year olds and 3.9% in 16-24 year olds higher than previously reported in all studies¹⁻⁶ except one;⁷
- findings for blindness/partial sight loss of 3.5% in 0-15 year olds and 3.8% in 16-24 year olds higher than previously reported rates of 1.0%⁶ and 1.3%;⁵
- 10.7% of 0-15 year olds and 10.0% of 16-24 year olds reported to have a physical disability;
- ID 50 times more prevalent:
 - 13.6-18.1% of children/young people with autism compared with 0.3-0.4% without autism;
 - much lower than previously reported, in view of the broader criteria for autism in recent years.

1. Gravel J, Dunn M, Lee W, et al. (2006) Peripheral audition of children on the autistic spectrum. *Ear and Hearing* 27(3): 299–312.

2. Tharpe A, Bess F, Sladen D, et al. (2006) Auditory characteristics of children with autism. *Ear and Hearing* 27(4): 430–441.

3. Jure R, Rapin I and Tuchman R (1991) Hearing-impaired autistic children. *Developmental Medicine & Child Neurology* 33(12): 1062–1072.

4. Tas A, Yagiz R, Tas M, et al. (2007) Evaluation of hearing in children with autism by using TEOAE A.B.R., *Autism: the International Journal of Research and Practice* 11(1): 73–79.

5. Fombonne E (2003) Epidemiological Surveys of Autism and Other Pervasive Developmental Disorders: An Update. *Journal of Autism and Developmental Disorders* 33(4): 365-382.

6. Van Naarden Braun K, Christensen D, Doernberg N, et al. (2015) Trends in the Prevalence of Autism Spectrum Disorder, Cerebral Palsy, Hearing Loss, Intellectual Disability, and Vision Impairment, Metropolitan Atlanta, 1991–2010. *PLoS One* 10(4): e0124120.

7. Rosenhall U, Nordin V, Sandström M, et al. (1999) Autism and hearing loss. *Journal of Autism and Developmental Disorders* 29(5): 349–357.

Thank
You.



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