

# Adults with autism

Observational study of comorbidity  
in a whole country population

Ewelina Rydzewska, Laura Anne Hughes-McCormack, Christopher Gillberg,  
Angela Henderson, Cecilia MacIntyre, Julie Rintoul, Sally-Ann Cooper

University of Glasgow, Institute of Health and Wellbeing  
[ewelina.rydzewska@glasgow.ac.uk](mailto:ewelina.rydzewska@glasgow.ac.uk)

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

## Prevalence of hearing and vision impairments, physical and intellectual disabilities:

- most research on blindness/sight loss, deafness/hearing loss, and physical disabilities drawn from non-representative and/or small populations, and without general population comparisons;
- North California study found 16 (1.1%) adults with autism to have low vision or blindness (OR=7.85), and 71 (4.7%) with hearing impairment (OR=2.35);<sup>1</sup>
- large study across 25 USA states included 1,002 adults with autism, but was drawn from the population receiving ID and DD services and had no comparison group:<sup>2</sup>
  - only 97 participants (9.7%) did not have ID, so whilst 9.4% had visual impairments, 5.7% had hearing impairments, and 6.0% had physical disability, rates cannot be generalised to the wider population with autism;
- in a study of 92/305 adults aged 23-50 identified to have autism in childhood in the 1980s, 11 of whom were deceased, 73% had ID, 12% had hearing impairment, and 25% visual impairment, but no general population comparison group.<sup>3</sup>

1. Croen LA, Zerbo O, Qian Y, *et al.* The health status of adults on the autism spectrum. *Autism* 2015;19:814–823.

2. Hewitt AS, Stancliffe RJ, Johnson Sirek A, *et al.* Characteristics of adults with autism spectrum disorder who use adult developmental disability services: Results from 25 US states. *Res Autism Spectr Disord* 2012;6:741–751.

3. Jones KB, Kottle K, Bakian A, *et al.* A description of medical conditions in adults with autism spectrum disorder: a follow-up of the 1980s Utah/UCLA Autism Epidemiologic Study. *Autism* 2016;20:551–561.

## Mental health conditions prevalence:

- mental health studied more than physical health;
- systematic reviews reveal wide variation in reported prevalence, as studies based on clinical populations and/or are small in size, and very few include general population comparisons;
- depression,<sup>1</sup> bipolar disorder,<sup>2</sup> suicidal thoughts/behaviour,<sup>3</sup> and non-affective psychosis<sup>4</sup> may be more common in adults with autism;
- North California study<sup>5</sup> identified 1,507/1,578,658 (0.1%) adults with autism age and gender matched with controls without autism:
  - 19.2% of adults with autism also had ID, and 54% had one or more mental health conditions; with rates of individual conditions 3-22 times higher for adults with autism than controls, and higher in women with autism than in men with autism.<sup>5</sup>

1. Stewart ME, Barnard L, Pearson J, *et al.* Presentation of depression in autism and Asperger syndrome. *Autism* 2006;10:103-116.

2. Vannucchi G, Masi G, Toni C, *et al.* Bipolar disorder in adults with Asperger's syndrome: a systematic review. *J Affect Disord* 2014;168:151-160.

3. Segers M, Rawana J. What do we know about suicidality in autism spectrum disorders? A systematic review. *Autism Research* 2014;7:507-521.

4. Padgett FE, Miltsiou E, Tiffin PA. The co-occurrence of nonaffective psychosis and the pervasive developmental disorders: a systematic review. *J Intellect Dev Disabil* 2010;35:187-198.

5. Croen LA, Zerbo O, Qian Y, *et al.* The health status of adults on the autism spectrum. *Autism* 2015;19:814-823.

## 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 27<sup>th</sup> 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
- five age groups of 25-34, 35-44, 45-54, 55-64 and 65+, with 25-34-year olds as the reference group
- gender was a binary variable, with males as the reference group
- SPSS software version 22

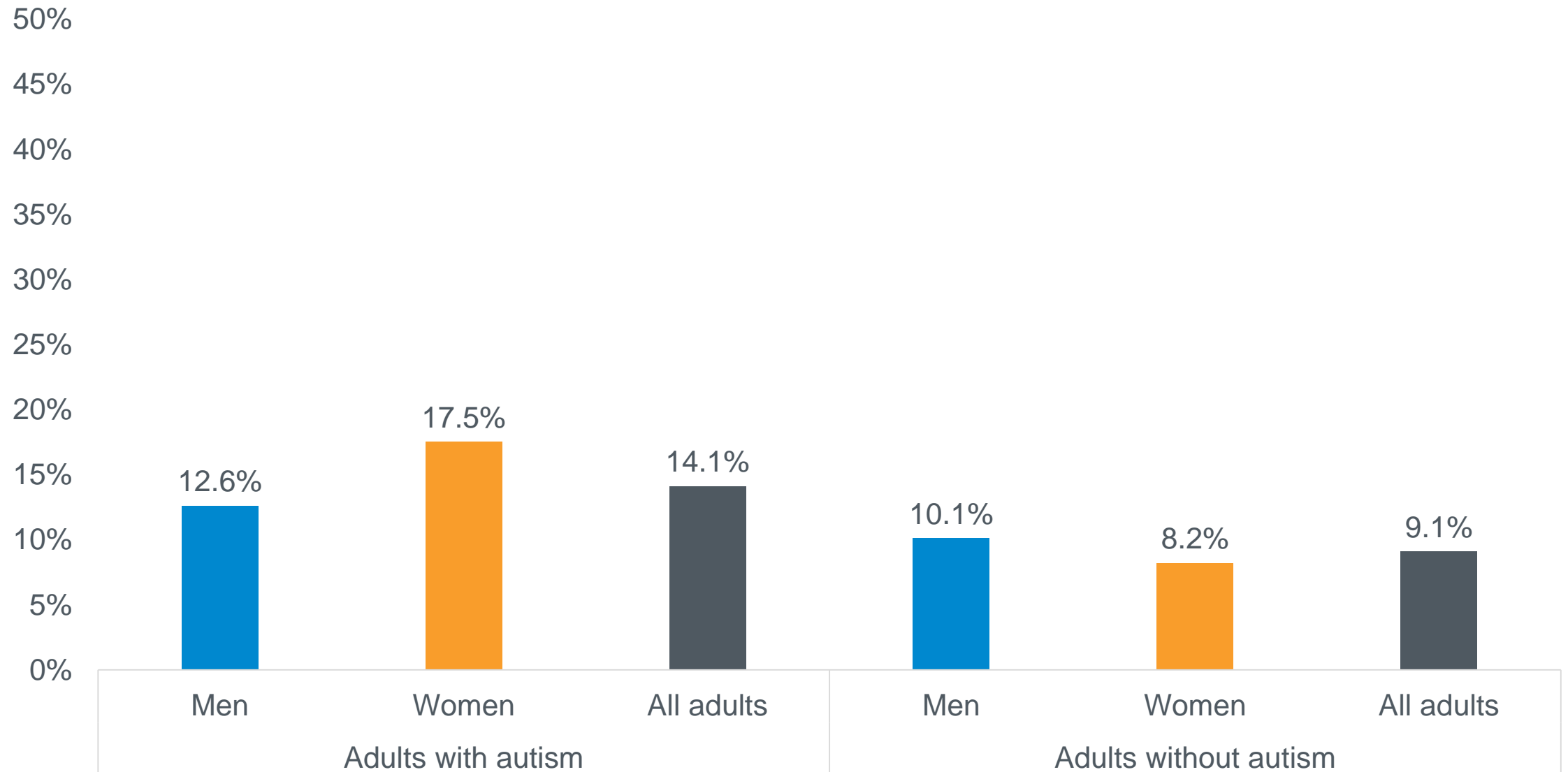
Do you have any of the following conditions which have lasted, or are expected to last, at least 12 months? Tick all that apply.

- 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:

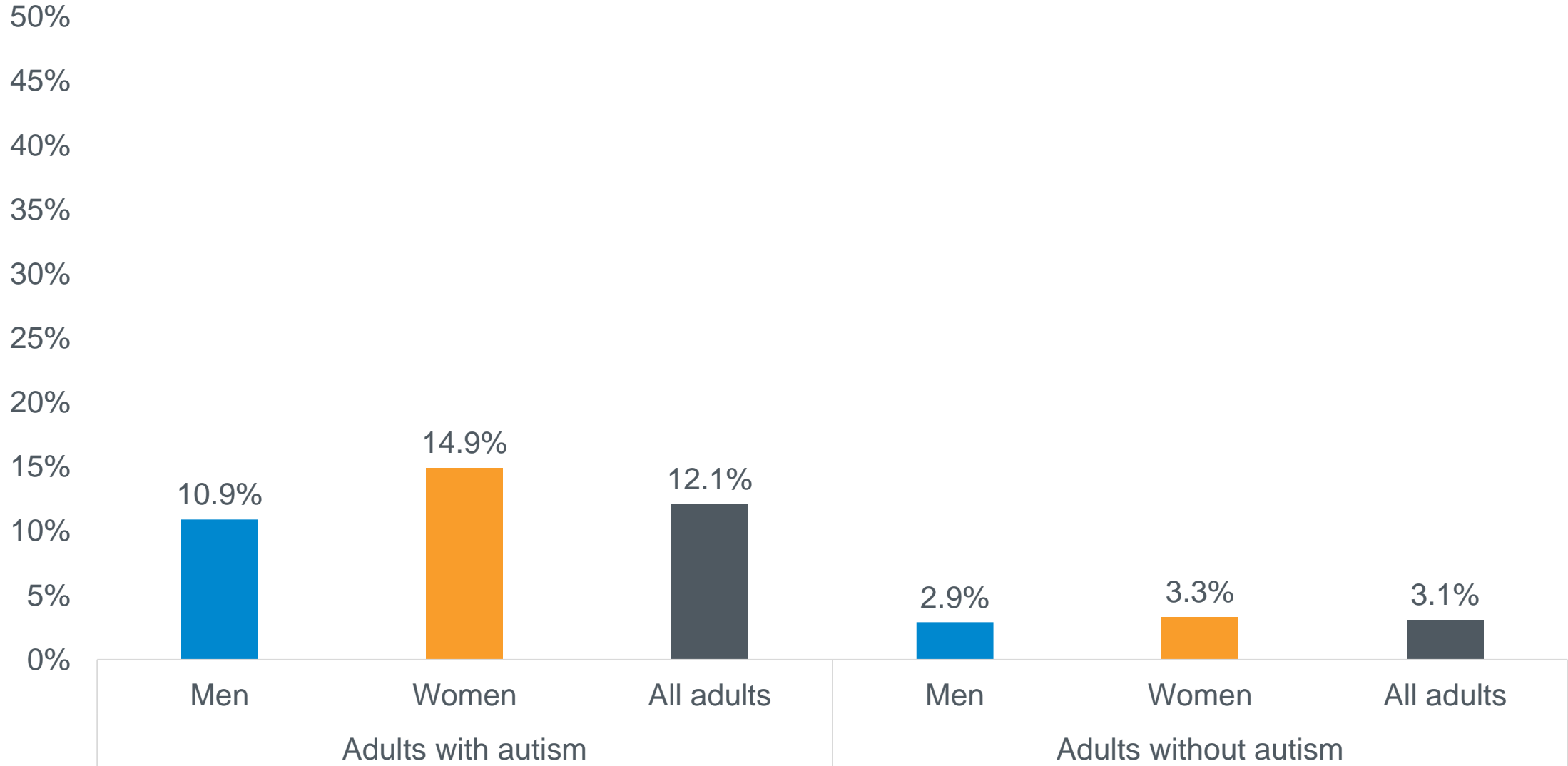
- 5,295,403 people;
- 3,746,584 adults aged 25+:
  - 6,649 (0.2%) with autism;
- 1,776,845 (47.5%) males and 1,963,090 (52.5%) females without autism;
- 4,610 (69.3%) males and 2,039 (30.7%) females with autism.

## Deafness/partial hearing loss

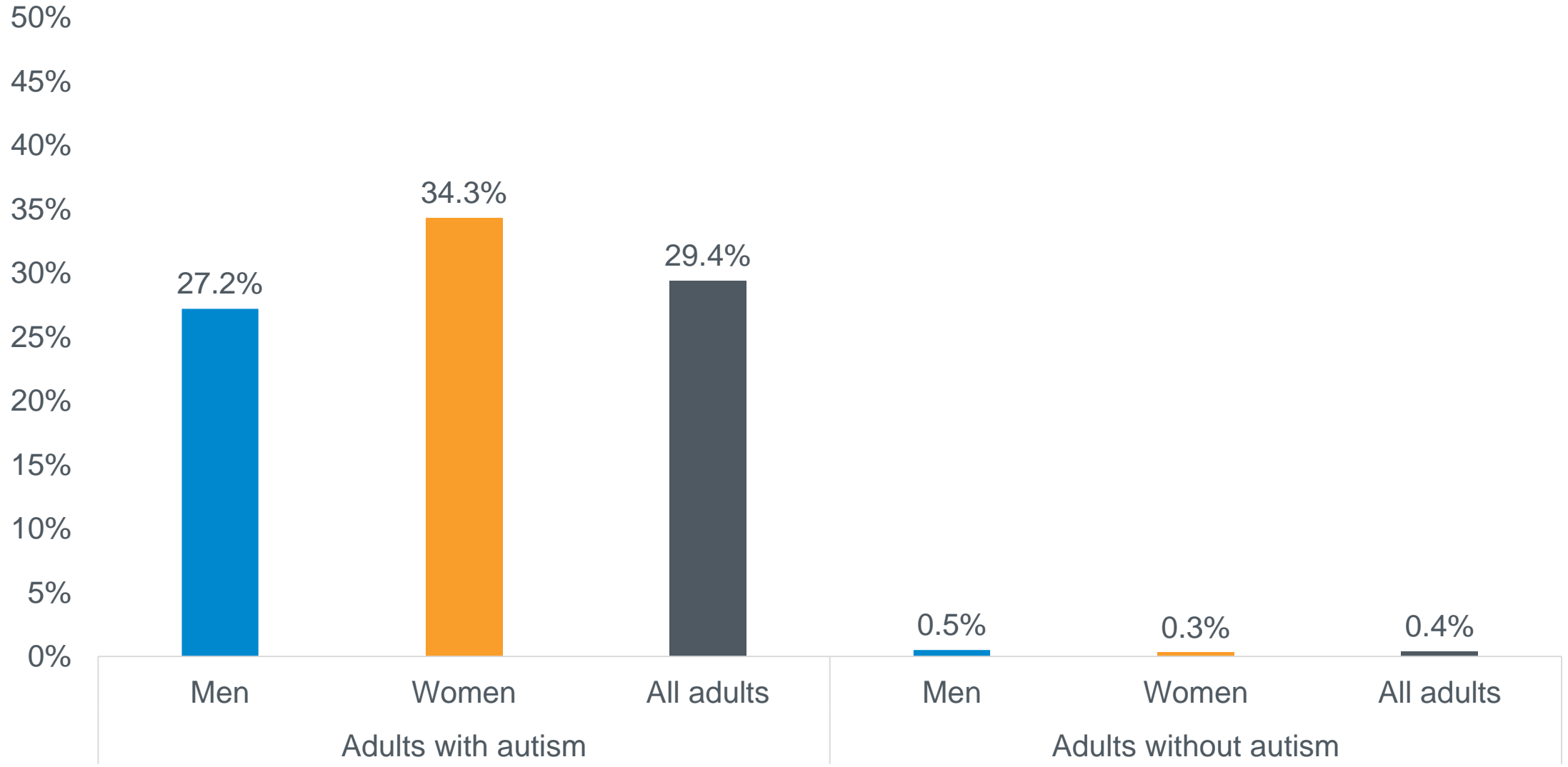




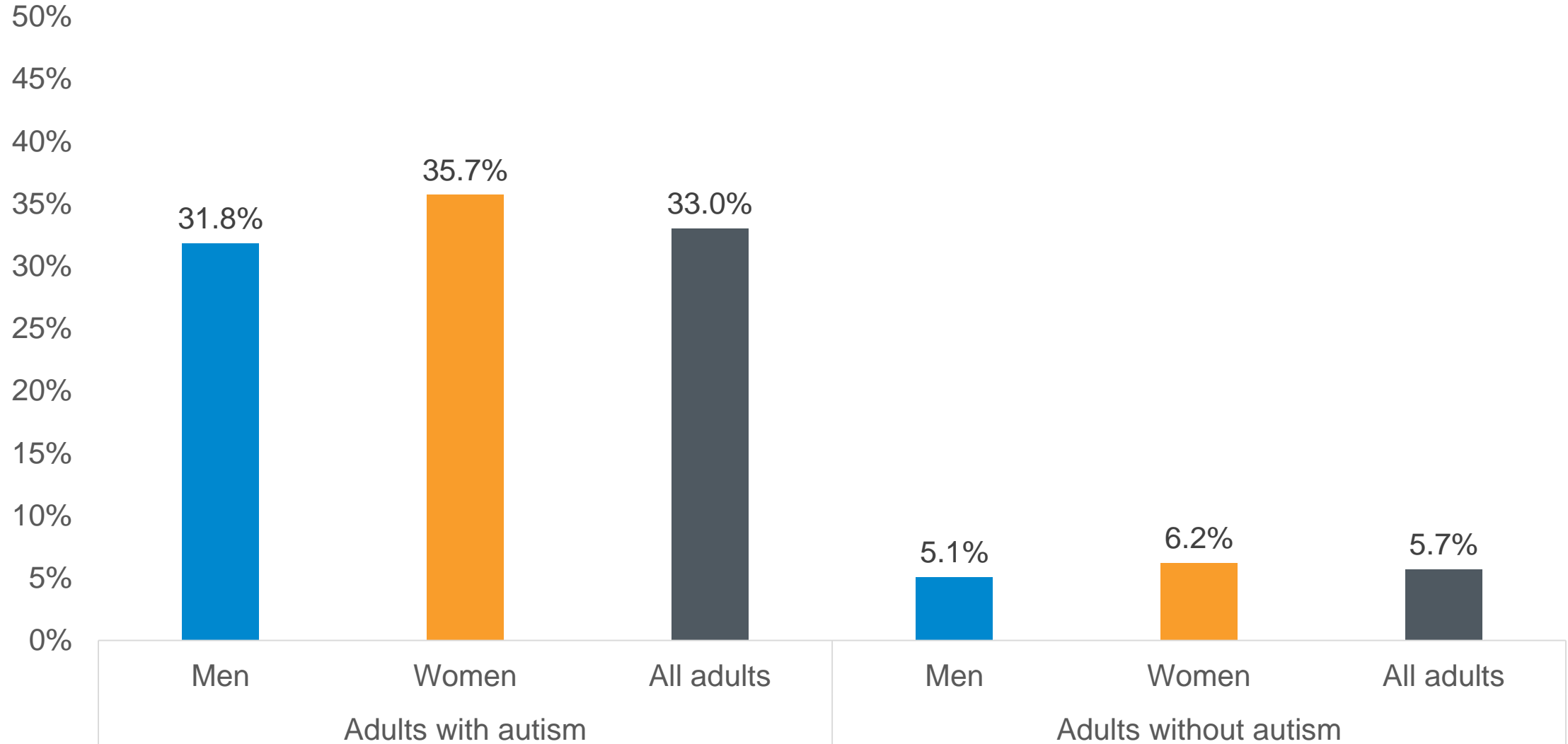
# Blindness/partial sight loss



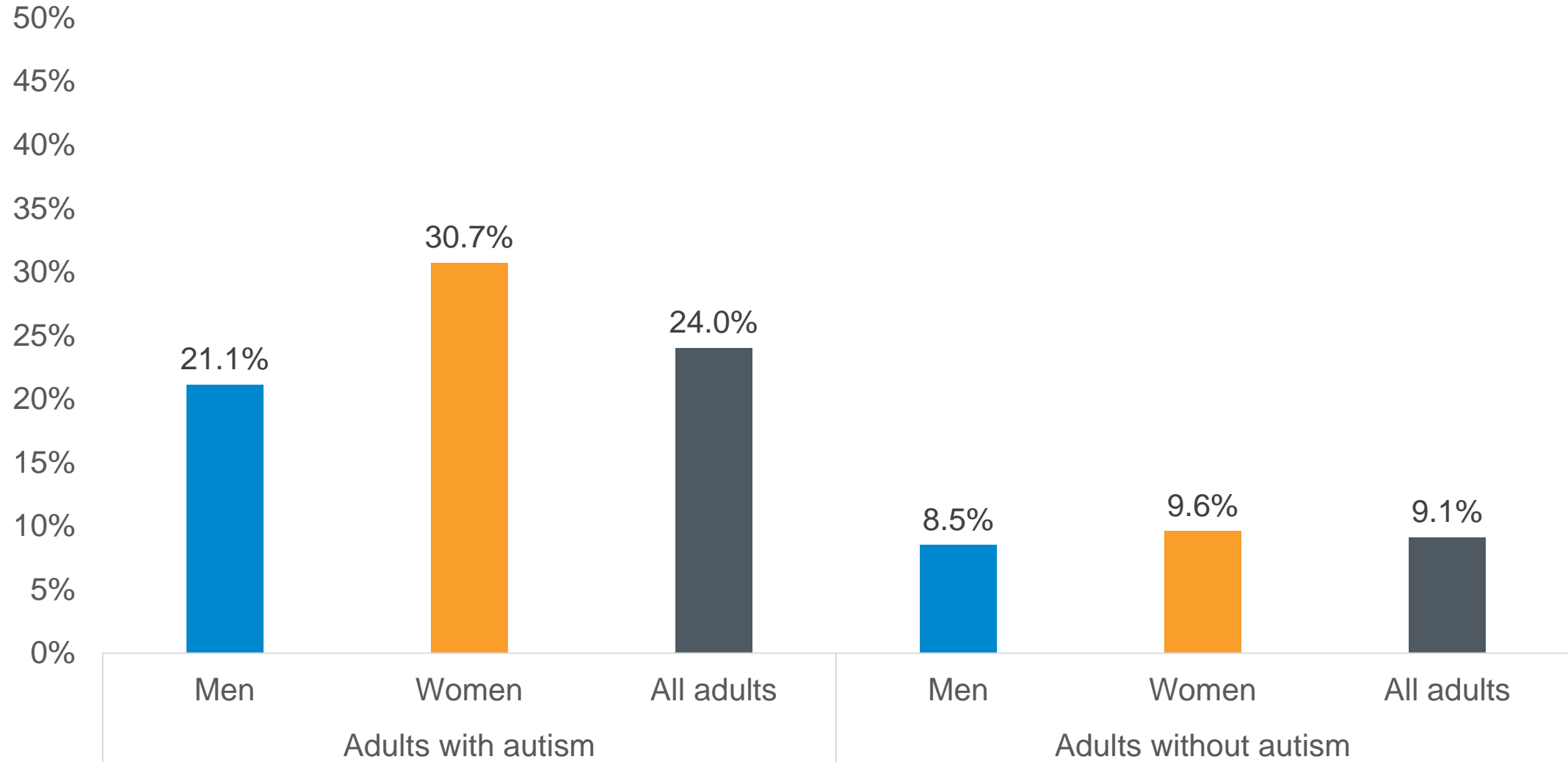
# Intellectual disabilities



## Mental health condition



## Physical disability



Odds ratios of autism, age, and gender in predicting comorbid conditions  
in the whole population of adults (part 1)

Condition	Variable	OR	95% CI
Deafness or partial hearing loss	Autism	<b>3.320</b>	3.075-3.585
	35-44	1.768	1.721-1.817
	45-54	<b>3.550</b>	3.464-3.638
	55-64	<b>7.742</b>	7.563-7.926
	65+	<b>28.621</b>	27.987-29.269
	Female	.683	.678-.688
Blindness or partial sight loss	Autism	<b>8.514</b>	7.861-9.220
	35-44	1.360	1.308-1.414
	45-54	<b>2.335</b>	2.254-2.419
	55-64	<b>3.882</b>	3.752-4.016
	65+	<b>15.769</b>	15.287-16.267
	Female	1.018	1.006-1.030
Intellectual disabilities	Autism	<b>94.571</b>	89.409-100.032
	35-44	1.101	1.050-1.154
	45-54	1.187	1.134-1.243
	55-64*	.958	.910-1.008
	65+	.631	.598-.665
	Female	.812	.788-.838

CI: confidence intervals; OR: odds ratio

Odds ratios of autism, age, and gender in predicting comorbid conditions in the whole population of adults (part 2)

Condition	Variable	OR	95% CI
Mental health condition	Autism	<b>8.595</b>	8.163-9.050
	35-44	1.404	1.384-1.424
	45-54	1.383	1.364-1.403
	55-64	1.076	1.060-1.093
	65+	.913	.899-.926
	Female	1.247	1.236-1.258
Physical disability	Autism	<b>6.210</b>	5.841-6.603
	35-44	<b>2.138</b>	2.091-2.186
	45-54	<b>3.786</b>	3.708-3.866
	55-64	<b>7.311</b>	7.164-7.460
	65+	<b>15.288</b>	14.994-15.587
	Female	1.064	1.056-1.072

## Odds ratios of age and gender in predicting comorbid conditions in the population of adults with autism (part 1)

Condition	Variable	OR	95% CI
Deafness or partial hearing loss	35-44	1.189	.934-1.514
	45-54	<b>2.178</b>	1.738-2.731
	55-64	<b>3.920</b>	3.088-4.975
	65+	<b>11.179</b>	8.972-13.929
	Female	1.169	1.001-1.365
Blindness or partial sight loss	35-44	1.179	.936-1.485
	45-54	<b>1.750</b>	1.397-2.192
	55-64	<b>2.378</b>	1.851-3.056
	65+	<b>5.148</b>	4.117-6.438
	Female	1.232	1.051-1.443
Intellectual disability	35-44	1.163	1.008-1.343
	45-54	1.363	1.172-1.584
	55-64	1.656	1.384-1.981
	65+	1.505	1.254-1.807
	Female	1.354	1.209-1.516

## Odds ratios of age and gender in predicting comorbid conditions in the population of adults with autism (part 2)

Condition	Variable	OR	95% CI
Mental health condition	35-44	1.455	1.269-1.668
	45-54	1.485	1.284-1.719
	55-64	<b>1.548</b>	1.297-1.849
	65+	<b>1.531</b>	1.280-1.832
	Female	1.155	1.034-1.291
Physical disability	35-44	1.220	1.038-1.434
	45-54	1.487	1.258-1.758
	55-64	<b>2.312</b>	1.913-2.795
	65+	<b>3.634</b>	3.022-4.370
	Female	1.504	1.333-1.697



## Conclusions

- mental health conditions in 33% of all adults with autism (range 23-37% depending on age group; 27-37% for men and 30-40% for women);
  - lower than a previous report of 54%, but their sample may have been biased;<sup>1</sup>
- 14% had hearing impairment (range 7-46% depending on age group; 5-44% for men and 11-47% for women);
- 12% had visual impairment (range 7-30% depending on age group; 7-27% for men and 10-35% for women)
  - higher than the rates in the North California study (4.7% and 1.1% respectively, though ORs were not dissimilar);<sup>1</sup>
  - lower than in the study of 92 adults with autism (12% and 25% respectively), but the study was smaller and of limited age range (23-50 y);<sup>2</sup>
- ID in 29% of all adults with autism (range 25-32% depending on age group; 22-35% for men and 31-42% for women);
- physical disability in 24% of all adults with autism (range 15-45% depending on age group; 14-42% for men and 24-45% for women);
  - few studies with which we can draw comparisons for ID and none for physical disability.

1. Croen LA, Zerbo O, Qian Y, *et al.* The health status of adults on the autism spectrum. *Autism* 2015;19:814–823.

2. Jones KB, Kottle K, Bakian A, *et al.* A description of medical conditions in adults with autism spectrum disorder: a follow-up of the 1980s Utah/UCLA Autism Epidemiologic Study. *Autism* 2016;20:551–561.

## Conclusions

- ID 95 times more prevalent in adults with autism, 9 times for mental health conditions and deafness/partial hearing loss, 6 times for physical disability, and 3 times for blindness or partial sight loss;
- findings on hearing and visual impairments particularly important, given the impact of these impairments on reciprocal communication;
- autism possibly underdiagnosed in more intellectually-able females compared with males<sup>1</sup> and many conditions are related to intellectual level, with a gradient across the whole spread of intelligence (not just ID);<sup>2</sup>
  - 34% of women compared with only 27% of men with autism reported accompanying ID;
  - at the same time, rates of all 5 comorbidities higher in women with autism;
  - OR of female gender predicting each of the 5 comorbidities greater for all conditions (except mental health) in the population with autism compared with the whole population, and reversed for deafness and ID which were more common in men in the whole population.

1. Dworzynski K, Ronald A, Bolton P, *et al.* How different are girls and boys above and below the diagnostic threshold for autism spectrum disorders? *J Am Acad Child Adolesc Psychiatry* 2012;51:788–797.

2. Wraw C, Deary IJ, Gale CR, *et al.* Intelligence in youth and health at age 50. *Intelligence* 2015;53:23-32.

**Thank  
You.**



If you would like to find out more, please email  
[ewelina.rydzewska@glasgow.ac.uk](mailto:ewelina.rydzewska@glasgow.ac.uk)

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