

### What is the issue?

Far more boys than girls are diagnosed with autism spectrum disorder (ASD), but the reasons for this are unclear. This fact sheet aims to:

- Provide some information about the ratios of boys to girls on the spectrum
- Highlight some of the research about the differences between males and females on the spectrum
- Provide some insight into some of the theories that aim to explain the differences in numbers and presentation of boys and girls on the spectrum.

### What does the research say?

#### Facts and figures

Two findings about autism and gender differences have been relatively consistent across a range of research studies: that more boys than girls are diagnosed with ASD, and that girls who receive a diagnosis of ASD are generally more severe than boys on the spectrum. A large scale review of the literature<sup>1</sup> found an average ratio of boys to girls of 3.8:1, but noted that this ratio varied according to whether or not the individuals on the spectrum also had an intellectual disability. An update of this work found ratios that ranged between 1.33:1 and 16:1<sup>2</sup>. Of note was the finding that the average male to female ratio in studies in which the child had an intellectual disability as well as ASD was only 1.9:1 while in studies of children without an intellectual disability the average ratio was 5.75:1. This means that among children on the spectrum with an intellectual disability, there are just two boys for every girl diagnosed, while among those on the spectrum with no intellectual disability, there are almost 6 boys for each girl. An important question, therefore, is: Why are there fewer girls diagnosed on the spectrum with no intellectual disability?

#### Differences in profiles

There is little consensus among researchers about whether the profiles of boys and girls on the spectrum are different, and if so, what these differences may be. Research in this area, therefore, is varied. Some findings are as follows:

- Some studies have indicated that the overall developmental profiles of boys and girls are similar<sup>3,4</sup>
- Several studies have suggested that boys and girls show differences in their autism profiles, with boys showing more features of restricted interests and repetitive behaviours, and girls showing more communication problems<sup>3</sup>
- Other studies suggest associated features described by parents, such as attention and socialisation, along with concerns about depression and anxiety, are more often reported in girls<sup>5,3</sup>
- One small study examined the differences in the functions of disruptive behaviours in children with and without ASD and found that girls were more likely to exhibit behaviours with social functions than boys<sup>6</sup>
- A recent study<sup>7</sup> involving a large number of 10 – 12 year old children has provided more information about the differences in the profiles of boys and girls on the spectrum. This study found that there were similar levels of social and communication difficulties, but that boys displayed more characteristics of repetitive behaviour than girls.

- In addition, teachers reported higher levels of hyperactivity and inattention in boys while parents reported higher levels of emotional symptoms for girls<sup>7</sup>. A recent self-report survey of young adults on the spectrum in Australia found that a higher proportion of females (83 per cent) than males (67 per cent) reported having a mental health condition<sup>8</sup>
- It is also suggested that the interests of girls on the spectrum may be very similar to those of girls without autism, but that the quality and intensity of these interests are unusual<sup>9</sup>

A further complicating factor in describing differences between boys and girls is the age of the children being studied. In many studies, different age groups show different levels of skills and impairments. Another difficulty is that much of the research looks only at children from clinical populations who have already been diagnosed and/or who are accessing intervention<sup>4</sup>. This means that the group being studied might not be representative of children on the spectrum in the wider population, particularly if girls are being under recognised and not receiving a diagnosis. These factors make it difficult to draw firm conclusions about the differences between boys and girls on the spectrum, or to tell whether profile differences might lead to girls being under-diagnosed relative to boys. In the large study mentioned above<sup>7</sup>, parents of girls reported that their daughters had more difficulties (including internalising problems) than were reported by their teachers. The researchers suggest that it is unclear whether this means the symptoms shown by girls on the spectrum are more subtle, or whether girls are better at adapting and coping. Similarly, it has also been found<sup>10</sup> that in the absence of additional intellectual or behavioural problems, girls were less likely than boys to meet diagnostic criteria for ASD at equivalently high levels of autistic-like traits. This might reflect gender bias in diagnosis or genuinely better adaptation/compensation in girls. It is possible that the presence of fewer repetitive behaviours, conventional (though intense) interests and fewer externalising behaviours contributes to the lower recognition of ASD in girls with this profile<sup>11</sup>.

### Proposed theories

There are many theories about why there are different numbers of boys and girls diagnosed with autism spectrum disorder, though no theory has yet provided a full understanding of the differences that exist. Two of these theories are:

- **Do gender norms and expectations play a role?** Researchers<sup>5</sup> have found that when higher functioning males and females performed similarly on clinical tests (such as the ADOS), females were rated by their parents as having worse social problems. They questioned whether the parents in the study had different expectations of boys and girls around social relationships and rated the girls worse (even though the girls and boys were similar when tested) because the girls' behaviours were further from what they expected the behaviour should be. It is possible, however, that as seen in a more recent study, parents may be more sensitive to the internalising problems seen in girls<sup>7</sup>. It has also been suggested<sup>12</sup> that researchers and diagnosticians may not be paying enough attention to gender specific norms, meaning that girls on the spectrum may be compared with standards for boys' behaviour and socialisation, rather than behaviours that are typical for girls of the same age.
- **Do girls have protective factors?** A study of the IQ, social and communication skills of typically developing children was conducted<sup>13</sup> in order to look at mild social deficits across a large group of children. It was found that there were continuous mild social deficits across the IQ range but that

girls with high verbal IQ were less likely to have social communication problems. There was, however, no such protective factor found for boys, suggesting that higher verbal IQ somehow gave girls a protective factor against social communication problems of the type seen in ASD. This theory might help explain why there are fewer girls with high IQ and diagnosed ASD. Two recent studies<sup>7, 10</sup> also suggest that girls may display more coping skills than boys at a similar level of intelligence and autism severity.

### In summary

There are far more boys than girls diagnosed with autism spectrum disorder. Despite the research to date it is unclear exactly what the differences are between boys and girls on the spectrum, why the differences occur and why there are fewer girls diagnosed with ASD. Recent research suggests that boys may display greater levels of repetitive behaviours and that girls may show more internalising difficulties such as anxiety. This may mean that boys are easier to identify and may be more likely to be referred for a diagnostic assessment than girls. Further research is needed in this area.

### References

- 
- <sup>1</sup> Fombonne, E. (1999). The epidemiology of autism: a review. *Psychological Medicine*, 29, 769 – 786.
- <sup>2</sup> Fombonne, E. (2003). Epidemiological surveys of autism and other pervasive developmental disorders: An update. *Journal of Autism and Developmental Disorders*, 33(4), 365 – 382.
- <sup>3</sup> Hartley, S.L. & Sikora, D.M. (2009). Sex differences in autism spectrum disorder: An examination of developmental functioning, autistic symptoms, and coexisting behaviour problems in toddlers. *Journal of Autism and Developmental Disorders*, 39(12), 1715-1722. doi: 10.1007/s10803-009-0810-8
- <sup>4</sup> Carter, A.S., Black, D.O., Tewani, S., Connolly, C.E., Kadlec, M.B. & Tager-Flusberg, H. (2007). Sex differences in toddlers with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(1), 86 – 97.
- <sup>5</sup> Holtmann, M. Bölte, S. & Poustkaet, F. (2007). Autism spectrum disorders: Sex differences in autistic behaviour domains and coexisting psychopathology. *Developmental Medicine & Child Neurology*, 49, 361–366.
- <sup>6</sup> Reese, R.M. Richman, D.M., Belmont, J.M. & Mors, P. (2005). Functional characteristics of disruptive behaviour in developmentally disabled children with and without autism. *Journal of Autism and Developmental Disorders*, 35(4), 419 – 428.
- <sup>7</sup> Mandy, W., Chilvers, R., Chowdhury, U., Salter, G., Seigal, A. & Skuse, D. (2012). Sex differences in autism spectrum disorder: Evidence from a large sample of children and adolescents. *Journal of Autism and other Developmental Disorders*, 42, 1304 – 1313.

- 
- <sup>8</sup> Autism Spectrum Australia. (2013). *We Belong: The experiences, aspirations and needs of adults with Asperger's disorder and high functioning autism*. Autism Spectrum Australia. Retrieved June 2014 from: [www.autismspectrum.org.au/sites/default/files/Autism\\_Spectrum\\_WE\\_BELONG\\_Research\\_Report-FINAL\\_LR\\_R.pdf](http://www.autismspectrum.org.au/sites/default/files/Autism_Spectrum_WE_BELONG_Research_Report-FINAL_LR_R.pdf) )
- <sup>9</sup> Gould, J. & Ashton-Smith, J. (2011). Missed diagnosis or misdiagnosis? Girls and women on the autism spectrum. *Good Autism Practice (GAP)*, 12(1), 34-41.
- <sup>10</sup> Dworzynski, K. Ronald, A., Bolton, P. & Happé, F. (2012). How different are girls and boys above and below the diagnostic threshold for autism spectrum disorders? *Journal of the American Academy of Child & Adolescent Psychiatry*, 51(8), 788–797.
- <sup>11</sup> Werling, D.M. & Geschwind, D.H. (2013) Sex differences in autism spectrum disorders. *Current Opinion in Neurology*, 26(2), 146-153.
- <sup>12</sup> Rutter, M., Caspi, A. & Moffitt, T.E. (2003). Using sex differences in psychopathology to study causal mechanisms: Unifying issues and research strategies. *Journal of Child Psychology and Psychiatry*, 44(8), 1092–1115.
- <sup>13</sup> Skuse, D.H., Mandy, W., Steer, C., Miller, L.L., Goodman, R., Lawrence, K., Emond, A. & Golding, J. (2009). Social communication competence and functional adaptation in a general population of children: Preliminary evidence for sex-by-verbal IQ differential risk. *Journal of the American Academy of Child and Adolescent Psychiatry*, 48(2), 128 – 137.

Reviewed September 2015