Rates of Autism Spectrum Disorder Diagnosis by Age and Gender

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Agenda

- Prevalence of autism spectrum disorders
- Findings related to age and gender
- Indiana LEND rates of ASD diagnoses by gender
- Clinical and research implications

Prevalence

- Nearly one in 88 children has been identified with an autism spectrum disorder
- Estimated 1,000,000 children with autism
- Boys: 1 in 54; up 82% from 2002 and up 23% from 2006
- Girls: 1 in 252; up 63% from 2002 and up 21% from 2006

(CDC ADDM Network, 2012)

Prevalence

- The estimated prevalence of ASDs identified in the ADDM network surveillance populations continues to increase.
- Reason for the increase is unknown:
  - Increases in awareness and access to services

    OR
  - True increase in prevalence of ASD symptoms

ASD DIAGNOSIS AND AGE

Age at Diagnosis

- ASD can be reliably diagnosed in children under the age of 2
- Median age of diagnosis is between 4.5 and 5.5 years of age (CDC)
  - However, more children are being diagnosed at earlier ages—a growing number (18%) by age 3.
- Median age of diagnosis for children with Autistic Disorder is 4 years of age and 6 years, 3 months for children with Asperger's Disorder

Impairments and Age at Diagnosis

- Children with impairments in nonverbal communication, imaginary play, repetitive motor behaviors, and inflexibility in routines were more likely to be diagnosed at a younger age
- Children with deficits in conversational ability, idiosyncratic speech and relating to peers were more likely to be diagnosed at a later age

(Maenner et al., 2013)

ASD DIAGNOSIS AND GENDER

Gender Findings

- ASDs are almost 5 times more common among boys than girls
- Girls are less likely to be diagnosed with autism than boys, unless they also have intellectual or behavioral problems (Dworzynski et al., 2012).
- Girls are less likely to be identified with ASD even when their symptoms are equally severe (Giarelli et al., 2010; Robinson et al., 2013; Russell et al., 2011).
- Girls with high-functioning ASD tend to be clinically identified later than boys (Giarelli et al. 2010).

Gender Differences

- Gender differences in the ASD phenotype remain poorly understood
- Research findings are often small and inconsistent
- Some studies suggest that there are “subtle yet potentially important differences” between males and females (Hartley & Sikora, 2009, p. 1719)
  - Boys with ASD evidence more stereotyped and repetitive behaviors (Lord et al., 1982; Hartley & Sikora, 2009; Maenner et al., 2013)
  - Toddler girls with ASD had more severe communication impairments than males (Carter et al., 2007; Hartley & Sikora, 2009)
- Due to true biological differences or biases in reporting and diagnosis, or both?

ASD, Gender, and Intellectual Ability

- Some studies have documented a higher incidence of intellectual impairment in girls with autism than in boys.
- Six times as many males as females with autism have normal intellectual ability (Fombonne, 2003).
  - However, this ratio drops significantly, to less than two to one, in children with moderate to severe intellectual impairments
- Sex differences are inconsistent after controlling for IQ

Why is there a gender difference?

- Explanations for gender differences is unclear
- Female Protective Effect (FPE) Model
  - Empirical support for the hypothesis that there is a component of female sex that protects girls from ASD (Robinson, et al. 2013)
  - Girls require a greater etiologic load to manifest autistic behavioral impairment
- Greater susceptibility among boys due to genetic and hormonal factors (e.g., prenatal testosterone exposure)

Possible Explanations for Different Rates

- Girls with ASD are often omitted from research studies
- Girls with ASD are referred less frequently for diagnosis
- Once referred, ASD may be more difficult for clinicians to recognize in girls, especially when they are high functioning
- There may be gender stereotypes at play in the diagnostic process that lead girls to be missed
- Girls may receive alternative diagnoses instead of ASD (e.g., intellectual disability, anxiety) or girls with ASD genuinely have better adaptation and compensatory strategies (Dworzynski et al., 2012)

Riley Child Development Center Diagnoses 2009 – 2012

Total Appointments

	# Total Appts	Males Seen	Females Seen	# ASD Refs	# ASD Dx	# ADHD Refs	#ADHD Dx
2009	524	398	126	188	109	96	95
2010	486	353	133	186	106	94	70
2011	474	352	122	187	113	75	91
2012	562	422	130	259	113	110	89
Total	**2046**	**1525**	**511**	**820**	**441**	**375**	**345**

Males

- 23.6% of referred males received an ASD diagnosis between 2009-2012 (360 of 1525)

	Autistic Disorder + Asperger's Disorder + PDD NOS	ADHD	Language	ID
2009	62 + 15 + 16 = 93	70	193	45
2010	47 + 8 + 25 = 80	52	157	41
2011	60 + 9 + 28 = 97	73	186	37
2012	58 + 12 + 20 = 90	68	153	39
Total	**227 + 44 + 89 = 360**	**263**	**689**	**162**

Females

- 15.9% of referred females received ASD diagnosis between 2009-2012 (81 of 511)

	Autistic Disorder + Asperger's Disorder + PDD NOS	ADHD	Language	ID
2009	10 + 2 + 4 =16	25	57	18
2010	18 +2 + 6 =26	18	64	22
2011	10 + 4 + 2 =16	18	55	21
2012	23 + 0 + 0 =23	21	48	22
Total	**61 + 8 + 12 = 81**	**82**	**224**	**83**

Implications for Research and Practice

- Continued training is needed for professionals and parents on early symptoms of ASDs
  - CDC: Learn the Signs. Act Early.
  - AAP: Recommendations for Developmental Surveillance and Screening
- Make the referral to a diagnostic specialist as soon as deficits or delays are suspected
- Be aware of potential gender bias
- More understanding is needed in terms of how genetic and hormonal factors (in combination with environmental stressors) produce sex differences in autism
- Value of interdisciplinary teams

Questions?

Thank you!

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