

Gender Differences in Diagnosis and Social Characteristics of Children With Autism (ASD) from a US Registry

Biyuan Chen, MD[†], Alison R Marvin, PhD*
and Paul H Lipkin, MD*[‡]

*Medical Informatics, Kennedy Krieger Institute

‡Pediatrics, Johns Hopkins School of Medicine
Baltimore, MD

†3rd Affiliated Hospital of Sun Yat-sen University (SYSU)
Guangzhou, China



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Background

- Male-to-female ratio in ASD ~ 4.5:1 (CDC 2014); consistent over locations and time
- Developmental patterns of ASD development may be different between boys and girls
 - Age of diagnosis
 - Core symptoms
- Few large studies address the different social response and communication characteristics in boys and girls.

Objective

1. Explore trend of gender differences in age of diagnosis;
2. Compare symptom severity by gender.

Design and Methods

- Data from Interactive Autism Network (IAN), web-based family-powered registry for ASD
- Parent- reported data
- Data collected from November 2006 to January 2013 for children under age 18 years
 - Parent-report DSM-4-TR diagnosis (AD, PDD, AspD)
 - Age of first diagnosis
 - Social Responsiveness Scale (SRS)



- Family-centered research network
- Current enrollment ~ 50,000 participants
 - 15,000 children with ASD (~1.4% of the affected US pediatric population)
 - 5,000 adults with ASD
 - Family members
- Research portal (www.IANresearch.org)
- Public website (www.IANcommunity.org)

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- IAN Participant

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Autism spectrum disorders (ASD) are identified in 1 out of every 68 children in the United States. Other countries observe similar rates with an increasing number of children and adults living with the disorder worldwide.

Families and individuals with ASD play a critical role in helping researchers and clinicians better understand the disorder. IAN Research provides a secure online setting where those affected by autism are active participants in ASD research.

By participating in IAN Research, you can help make new discoveries and empower advocates to improve the lives of children and adults with ASD.

Who can participate in IAN Research?

Individuals with ASD and their family members are eligible to participate.

The following ASD diagnoses are included in IAN Research:

- Autism or Autistic Disorder
- Asperger Syndrome
- Childhood Disintegrative Disorder (CDD)
- Pervasive Developmental Disorder - Not otherwise Specified (PDD-NOS)
- Pervasive Developmental Disorder (PDD)
- Autism Spectrum Disorder (ASD)

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Families, researchers and anyone impacted by ASDs can take part in the **IAN Community**, a comprehensive online library and meeting place focused solely on ASD research. Visitors can learn about the latest research, become more informed consumers of research, and join in a worldwide collaboration of people dedicated to finding answers.

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Statistics

- Two-sample t-tests to compare by gender:
 - Age of first diagnosis
 - ASD diagnostic categories
 - SRS Symptom severity
 - Total score
 - Subscales
 - Social awareness
 - Social cognition
 - Social communication
 - Social motivation
 - Autistic mannerisms

Results

- Sample: 15,644 children
 - Male: female = 4.54 to 1
 - Age of first diagnosis: 9,932 children
 - Social Responsiveness Scale (SRS): 5,103 children

Results

Age of Diagnosis (years)

	<i>n</i>	<i>Girls</i>		<i>Boys</i>		<i>t test p</i>	
		<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>1s</i>	<i>2s</i>
<i>Autistic Disorder</i>	4356 <i>F=769; M=3587</i>	3.2	1.88	3.2	1.73	NS	NS
<i>PDD-NOS</i>	1597 <i>F=486; M=2260</i>	4.0	2.47	3.8	2.28	0.03	0.06
<i>Asperger's Disorder</i>	2746 <i>F=244; M=1353</i>	7.6	3.38	7.1	3.02	<0.01	<0.01

Results: Autism Symptoms (SRS) [n= 5103 (4235M:868F)]

SRS Score	Girls		Boys		t-test p (1s)	t-test p (2s)
	Mean	SD	Mean	SD		
Total	106.7	30.3	107.1	29.8	NS	NS
Social Awareness	13.9	4.0	13.9	4.0	NS	NS
Social Cognition	20.7	6.1	20.3	6.2	0.04	0.08
Social Communication	36.2	10.9	36.2	10.8	NS	NS
Social Motivation	16.1	6.4	16.0	6.0	NA	NS
Autistic Mannerisms	19.9	7.0	20.8	6.8	<0.001	<0.001

Conclusions

- This study suggests:
 - Girls with milder forms of ASD (Asperger's, PDD-NOS) are identified later than boys.
 - There is no gender difference in age of identification in those with Autism Disorder.
 - Boys have more difficulties in social mannerisms, and girls in social cognition, which may contribute to the earlier diagnosis in boys and later diagnosis in girls.

Implications

- Many factors may lead to a delay in ASD diagnosis in girls, such as differing natural history, or delayed recognition of symptom differences in young girls.
- Gender-specific risk factors should be further investigated and taken into account for early identification of ASD.
- Continue research on the differences in natural history and symptoms of autism in boys and girls, particularly on affected females.

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