

## Girls with ASD behave differently during brief natural conversations

Sunghye Cho, Mark Y. Liberman, Christopher Cieri, Neville Ryant, Meredith Cola, Victoria Petrulla, Lisa Yankowitz, Juhi Pandey, Robert T. Schultz, & Julia Parish-Morris

### 1. Background

- Autism spectrum disorder (ASD) is primarily diagnosed in boys (4:1; [1]).
- ASD girls have been underdiagnosed and excluded from many studies, rendering it urgent to understand this subgroup.
- Few studies have included sufficient numbers of girls to assess sex differences, and even fewer have compared ASD girls to typically-developing (TD) girls.
- This study begins to fill that gap by analyzing speech/pause duration in a large sample of boys and girls with and without ASD.

### 2. Objective

- Measure effects of sex and diagnosis on quantitatively derived speech/pause patterns in girls and boys with and without ASD during natural conversations

### 3. Participants

	ASD (n=45)	TD (n=47)	p-value
Age	11.5 (2.8)	10.1 (2.8)	0.02
Sex	16 F & 29 M	24 F & 23 M	0.13
IQ	105.8 (12.1)	108.6 (12.3)	0.27
ADOS-2 overall	6.4 (2)	1.2 (0.4)	< 0.001

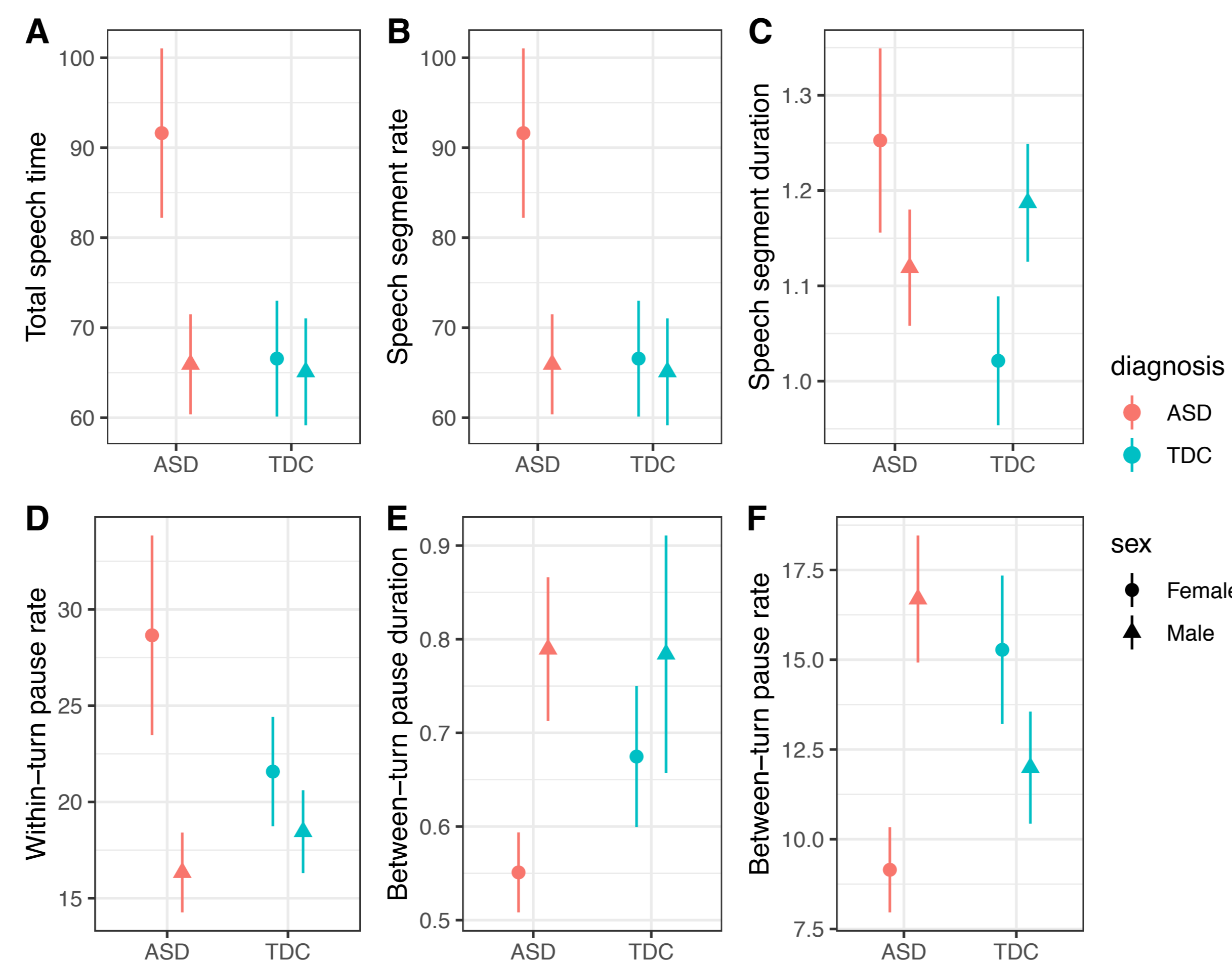
### 4. Methods

- 5-min "get-to-know-you" conversations with a young adult confederate
- A speech activity detector time-segmented recordings into speech and silence segments.
- Speaker diarization with time-stamped transcripts
- Silence: coded as within-or between-turn silence
- Between-turn silences: coded as Confederate-to-Participant or Participant-to-Confederate

### 5. Measurements and analysis

- Total duration of speech time
- Mean speech segment duration
- Speech segment rate (segment per minute)
- Mean within-turn or between-turn pause duration
- Within- or between-turn pause rate (per minute)
- Group comparison
- Regression analysis with clinical measurements

### 6. Results



	Clinical test	ASD girls	ASD boys
Mean duration of within-turn pause	VABS (Vineland adaptive behavior responsiveness scale) communication	n.s.	$\beta=-0.01$ , $p=0.03$
	SRS (Social responsiveness scale) total	$\beta=-0.21$ , $p=0.004$	$\beta=0.23$ , $p=0.034$
Within-turn pause rate	SRS communication	$\beta=-0.32$ , $p=0.003$	$\beta=0.33$ , $p=0.005$
	SRS social motivation	$\beta=-0.22$ , $p=0.005$	n.s.
	SRS social communication	$\beta=-0.23$ , $p=0.005$	$\beta=0.24$ , $p=0.041$
	VABS communication	n.s.	$\beta=-0.16$ , $p=0.05$
	VABS socialization	$\beta=0.15$ , $p=0.025$	$\beta=-0.16$ , $p=0.06$
	VABS total	$\beta=0.15$ , $p=0.043$	$\beta=-0.21$ , $p=0.031$

### 7. Summary

(\* p < 0.05, \*\*\* p < 0.001)

- Total speech time: ASD girls > all others\*
- Mean speech segment duration: ASD girls > TD girls\*
- Speech segment rate: ASD girls > all others\*
- Within-turn pause rate: ASD girls > ASD boys\* & TD boys\*
- Between-turn pause duration: ASD girls < ASD boys\*
- Between-turn pause rate: ASD girls < ASD boys\*\*\*, TD girls\*
- Frequent within-turn pauses: higher adaptive behavior scores and social responsiveness scores for ASD girls.

### 8. Conclusion

- ASD girls speak differently from ASD boys, but may also differ from TD girls and boys. Their conversational behaviors that conflict with a male-referenced conceptualization of ASD may interact with clinical biases, thus reducing access to ASD-specific supports.

**Acknowledgement:** We thank the children and families that participated in our research, as well as clinicians and staff at the Center for Autism Research. This study was supported by an Autism Science Foundation Postdoctoral Fellowship to JPM; the Eagles Charitable Trust, McMorris Family Foundation, and Allerton Foundation to RTS; and NICHD 5U54HD086984-03 to Michael B Robinson & RTS.  
**References:** [1] Baio et al. (2018). Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. *MMWR Surveill Summ.* 67(6):1–23.