Sex Similarities and Differences in Autism Presentation in Adulthood

Elżbieta Jarząbek, Brianna Lewis, Kimberly S. Ellison, Julie M. Wolf,, Max Rolison, Tatiana Winkelman, Talena Day, Kathryn McNaughton, Jennifer Foss-Feig, & James McPartland

McPartland Lab, Yale Child Study Center, New Haven, CT

BACKGROUND

- The scientific inquiry regarding the clinical autism phenotype across males and females reveals mixed findings. While many studies suggest there are more similarities than differences, some report sex distinctness in autism presentation that may lead to a male bias in the ASD prevalence (Grove et al., 2017; Halladay et al., 2015; Lai et al., 2017; Werling & Geschwind, 2013).
- Some studies indicate that females with ASD display more severe social and communication difficulties, but fewer restricted and repetitive behaviors than males with ASD (Van Wijngaarden-Cremers et al., 2014).
- In addition to inconsistent results, research to date has focused on comparison of males and females with ASD. This is problematic given that many aspects of social functioning in typically developing individuals are known to vary as a function of sex.
- There is also limited research that examines self-perception of autistic adults, which may provide important information regarding sex differences and similarities in autism presentation.

Objective:

- This study aimed to provide further clarification of sex-differential cognitive and behavioral presentations to inform diagnostic efforts and clinical practice.

METHODS

Participant Demographics:

	N	Sex		Age (SD)
		F	M	
ASD	43	12	31	24.45 (5.34)
***TD**	45	16	29	26.19 (6.14)

* TD – Typically Developing Participants

Characterization:

- Cognitive ability was measured with the *Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II).*
- Self-perception of social functioning was assessed using the *Social Responsiveness Scale – Second Edition (SRS-2), Adult Self-Report Form* and the *Autism Quotient Form (AQ).*
- Clinician-rated level of social functioning was measured using the *Autism Diagnostic Observation Schedule, Second Edition (ADOS-2), Module 4* administered by research reliable, expert clinicians.

Procedure:

- Data for this study was collected from 2015 to 2017 as part of a larger study conducted at the Yale Child Study Center.
- Statistical analyses were conducted using SPSS statistical software (ver. 24).

Funding Source: NIMH R01 MH100173-02S1 (McPartland), NIMH R01 MH107426 (McPartland, Srihari)

McPartland Lab: **Email:** mcp.lab@yale.edu
Website: http://medicine.yale.edu/lab/mcpartland/

RESULTS

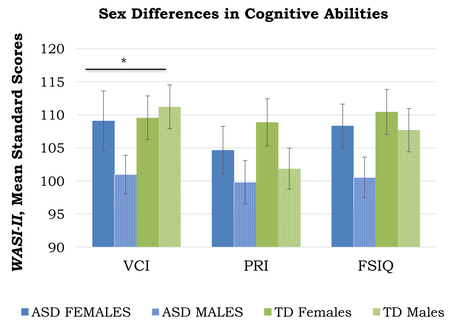

Figure 1. Females and males in both groups showed similar cognitive profiles, but individuals with ASD, as a group, displayed significantly lower verbal skills than their TD counterparts [$F(1,86)=4.54$, $p=.036$].

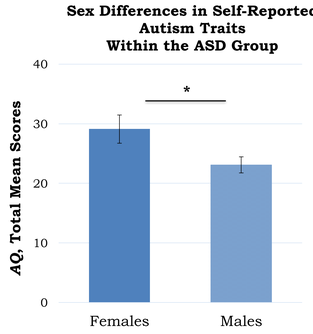

Figure 2. Significant sex differences were observed in self-reported autism traits within the ASD group. Specifically, females with ASD reported more autism traits than males with ASD [$t(41)=2.30$, $p=.026$].

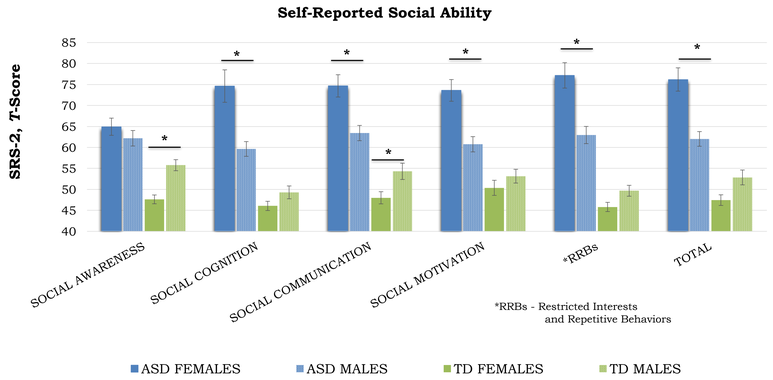

Figure 3. Significant sex differences were observed in self-reported perception of social functioning in both groups. Specifically, females with ASD reported greater impairments in all domains than ASD males, except for Social Awareness, while TD males reported significantly weaker skills in the areas of Social Awareness [$t(41)=-4.26$, $p<.001$] and Social Communication than TD females [$t(41)=-2.30$, $p=.026$].

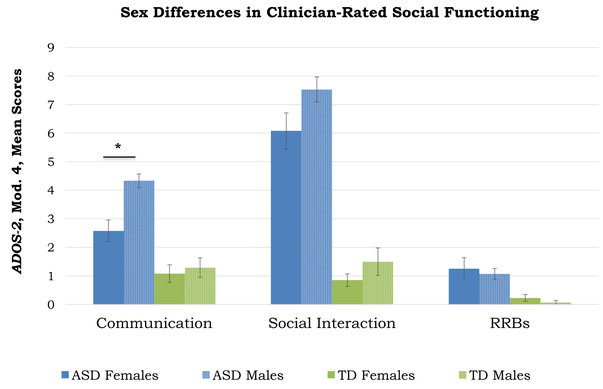

Figure 4. Significant sex differences were observed in the clinician-rated social functioning within the ASD group. Specifically, ASD males scored significantly higher than ASD females in the *Communication* domain [$t(43)=-3.31$, $p=.001$].

RESULTS

- Males and females in both groups showed similar cognitive profiles, with the exception of significantly lower verbal reasoning abilities in the ASD group [$F(1,86)=4.54$, $p=.036$].
- The *AQ* total scores were significantly higher in the ASD group $F(1,85)=39.24$, $p<.001$. Furthermore, there was a significant interaction between Sex and Diagnosis [$F(1,83)=6.68$, $p=.011$], reflecting that sex differences were bigger in the ASD group. A subsequent *t*-test showed that ASD females reported more autism related traits than did ASD males [$t(41)=2.30$, $p=.026$].
- The *SRS-2* Total *t*-score and all subscale *t*-scores were significantly higher in the ASD group compared to TD group [$F(1,80)=27.06$, $p<.001$]. Additionally, in the ASD group, females reported significantly more deficits in *Social Cognition* [$t(40)=2.69$, $p=.011$], *Social Communication* [$t(40)=2.73$, $p=.009$], *Social Motivation* [$t(40)=3.28$, $p=.002$], and *Restricted Interests and Repetitive Behaviors* [$t(40)3.11$, $p=.003$]. In the TD group, an opposite pattern was found with males, who reported significantly weaker skills than females with regard to *Social Awareness* [$t(41)=-4.26$, $p<.001$] and *Social Communication* [$t(41)=-2.30$, $p=.026$].
- The *ADOS-2* results revealed significant sex differences in the ASD group, but not the TD group. Specifically, ASD males scored significantly higher than ASD females in the *Communication* domain [$t(43)=-3.31$, $p=.001$]. There were no significant sex differences in *Social Interaction* or *Stereotyped Behaviors and Restricted Interests Total* scores.

CONCLUSIONS

- While women and men with ASD show many similarities, there also appears to be distinct differences in their clinical presentations.
- Females with ASD reported higher levels of social-communicative difficulties (*SRS-2*) along with significantly higher levels of autism traits (*AQ*) than males with ASD, despite receiving significantly lower ratings of communicative impairment on the *ADOS-2*. This may suggest that females with ASD have greater insight into their social weaknesses. Consequently, this increased insight may affect both the way they present themselves and the manner in which they are perceived by others.

FUTURE DIRECTIONS

- Further analyses are needed with larger data sets to investigate sex differences in ASD presentation.
- Exploration of sex-specific factors at an item level, rather than in mean or total scores, may offer valuable insight.
- Qualitative research and self-perception of individuals with ASD provide additional perspective that may lead to a better understanding of sex similarities and differences in ASD presentation.

References

Grove, R., Hoekstra, R. A., Marlies W., & Begeer, S. (2017). Exploring sex differences in autistic traits: A factor analytic study of adults with autism. *Autism 21*(6), 760-768.

Halladay, A. K., Bishop, S., Constantino, J. N., Daniels, A. M., Koenig, K., Palmer, K., & Szatmari, P. (2015). Sex and gender differences in autism spectrum disorder: summarizing evidence gaps and identifying emerging areas of priority. *Molecular Autism, 6*, 36. http://doi.org/10.1186/s13229-015-0019-y

Lai, M.-C., Lombardo, M. V., Ruigrok, A. N., Chakrabarti, B., Auyeung, B., Szatmari, P., … MRC AIMS Consortium. (2017). Quantifying and exploring camouflaging in men and women with autism. *Autism, 21*(6), 690–702 http://doi.org/10.1177/1362361316671012

Van Wijngaarden-Cremers, P. J. M., van Eeten, E., Groen, W. B., Van Deurzen, A. A., Oosterling, i. J., & Van der Gaag, R. J. (2014). *Journal of Autism and Developmental Disorder, 44*(3), 627-635. https://doi.org/10.1007/s10803-013-1913-9

Werling, D. M., & Geschwind, D. H. (2013). Sex differences in autism spectrum disorders. *Current Opinion in Neurology, 26*(2), 146–153. http://doi.org/10.1097/WCO.0b013e32835ee548