

Multitalker speech perception thresholds in autistic young adults

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BACKGROUND

- Multitalker speech perception, the ability to selectively attend to one talker in the presence of several competing talkers, is an important skill used in everyday life.
- Normal-hearing neurotypical listeners can use spatial cues to selectively attend to the desired talker, while ignoring competing talkers' voices [1,2].
- Many autistic adults report auditory processing differences, such as difficulty listening in noisy environments. [3,4].

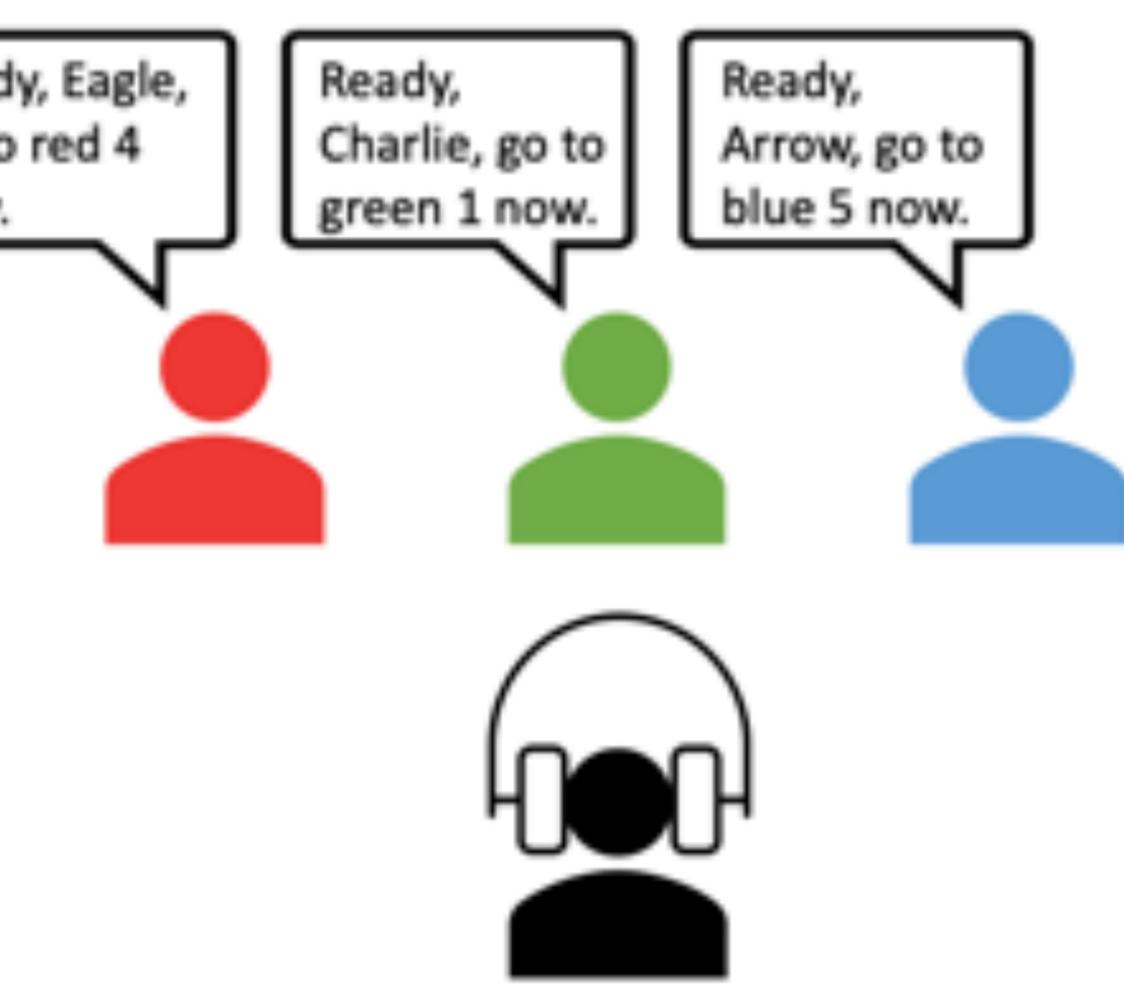
RESEARCH QUESTION: Can autistic young adults use spatial cues to selectively attend to one of three simultaneous sentences?

PARTICIPANTS

- 24 adults age 21-23 years ($n = 12$ ASD group; $n = 12$ comparison group).
- 12 ASD group participants were recruited from a larger longitudinal study conducted at the UW Autism Center; initial research diagnoses of ASD established at age 3 years using DSM-IV criteria [5].
- 12 comparison group participants were newly recruited for the current study; reported no history of cognitive, developmental, or other health concerns.
- All subjects passed an audiometric screen (≤ 20 dB hearing level at octave frequencies between 250 and 8000 Hz) for inclusion in the current study.
- ADOS-2 [6] and WASI-II [7] administered to all participants.
- Age (years): ASD group $M = 21.7$, $SD = 0.6$; comparison group $M = 21.6$, $SD = 0.7$; independent samples t-test; $t(22) = 0.38$, $p = .71$.
- WASI-II FSIQ: ASD group $M = 100.5$, $SD = 15.1$; comparison group $M = 118.3$, $SD = 6.4$; independent samples t-test; $t(22) = -3.75$, $p = .001$.

MULTITALKER LISTENING TASK

- Participants listened to three people talking at once.
- All three people said sentences with a keyword, a color, and a number (e.g., "Ready, Charlie, go to green one now.")
- Goal: listen for the person who says "Charlie" (target talker) and report back the color and number that person said, while ignoring the two competing talkers.
- All sentences were from the Coordinate Response Measure (CRM) Corpus [8].
- Multitalker speech perception thresholds, measured in terms of target-to-masker ratios (TMRs), were estimated as the level difference (dB) between the target and two competing talkers.



MULTITALKER LISTENING TASK



Fig 1. Response panel. After hearing the three simultaneous sentences, participants indicated the color and number said by the target talker. For example, if the target talker said, "Ready Charlie, go to green one now" the participant would click the button in the bottom left-hand corner of the response panel shown above. The target talker was always identified by the keyword "Charlie." The target talker was always male, and his voice always came from directly in front of the participant. There were eight possible keywords (Arrow, Baron, Charlie, Eagle, Hopper, Laker, Ringo, Tiger), four colors (blue, red, white, green) and the numbers 1-8.

RESULTS

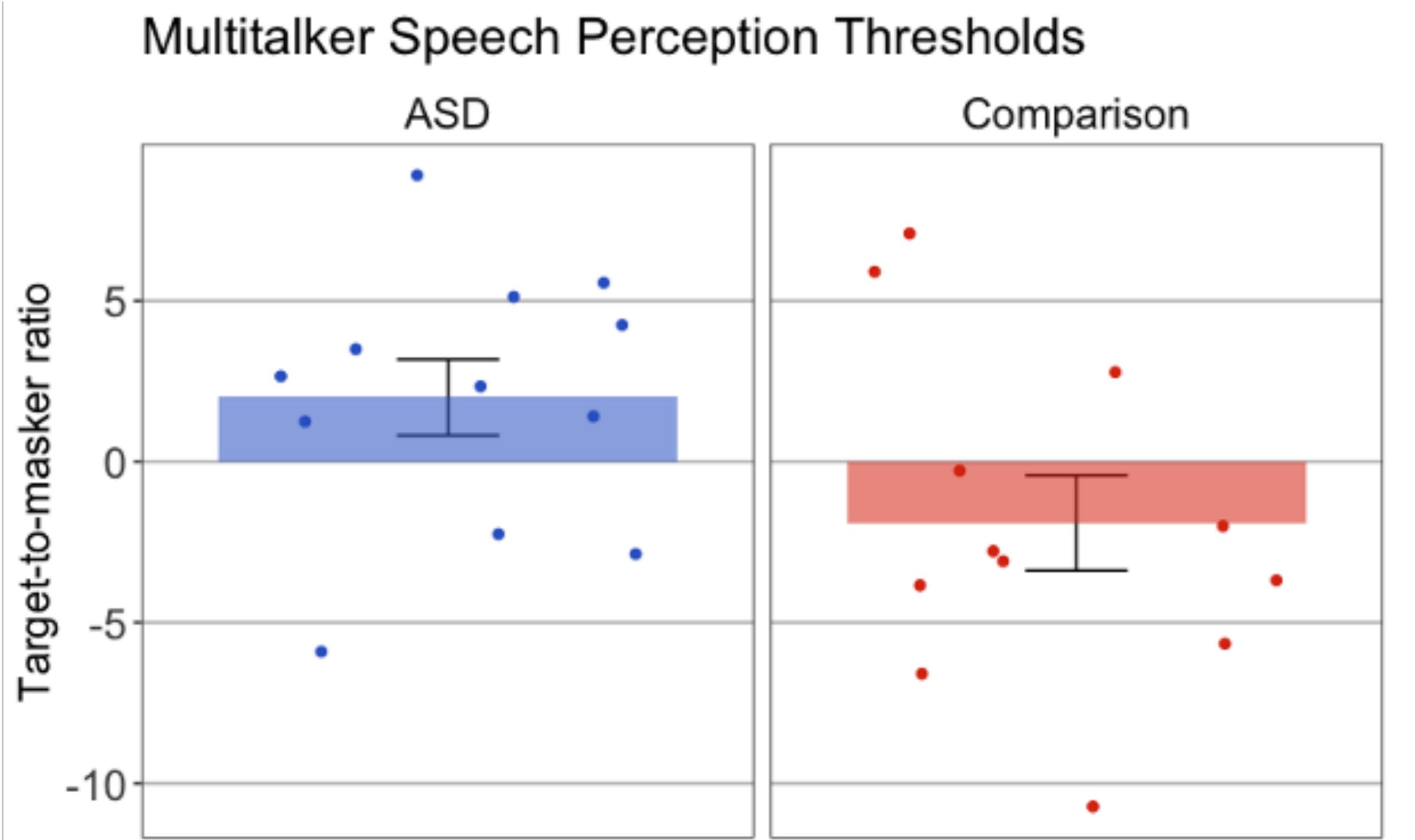


Fig 2. Multitalker speech perception thresholds in ASD and comparison groups. Mean \pm SE shown with bars. Individual data points shown with solid points. Overall, ASD group participants required the target talker to be louder than competing talkers (i.e., positive TMRs) (ASD group $M = 2.00$, $SE = 1.18$; comparison group $M = -1.91$, $SE = 1.48$).

RESULTS

Worse task performance
↓
Better task performance

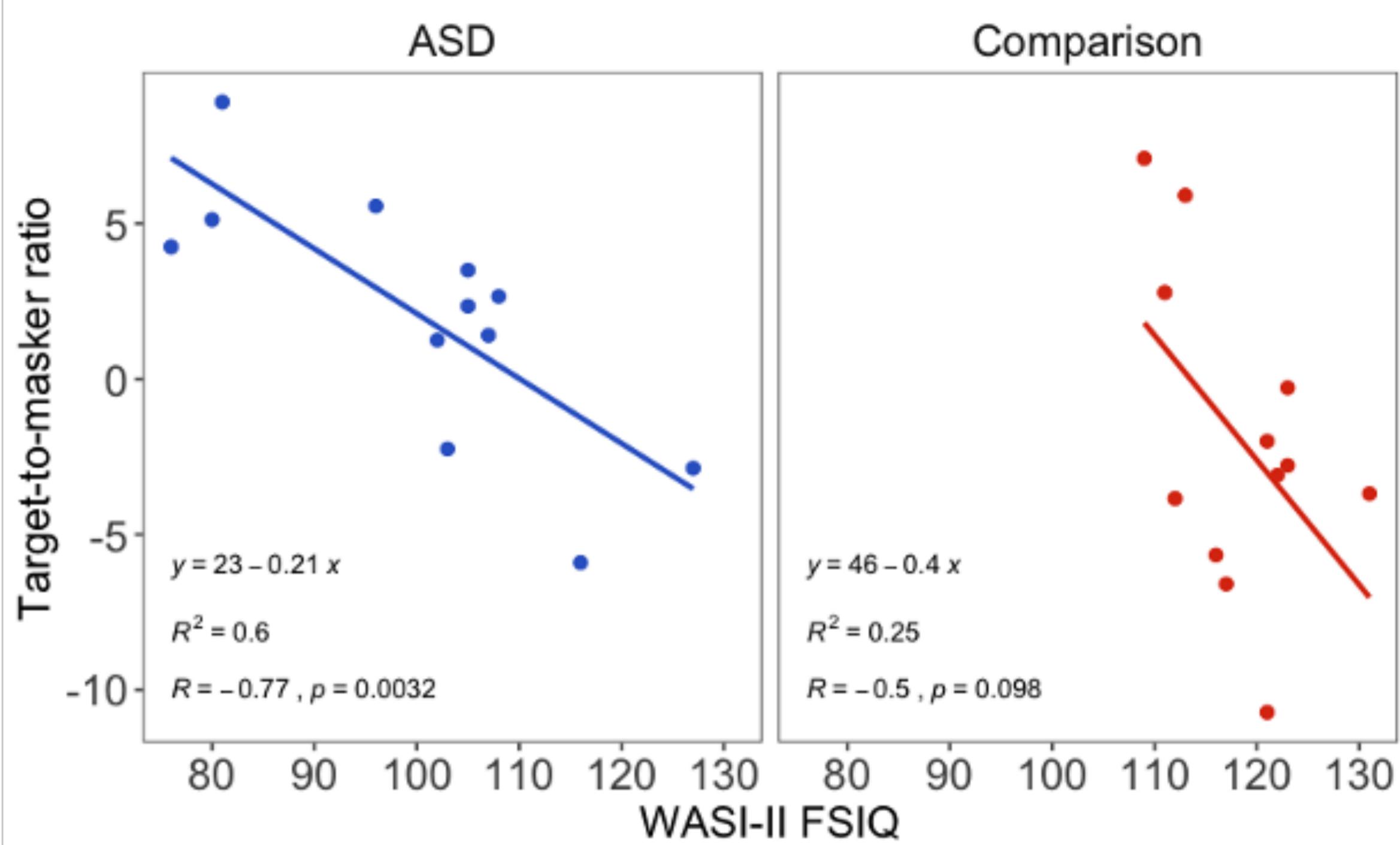


Fig 3. Multitalker speech perception thresholds as a function of WASI-II Full-Scale IQ (FSIQ) in ASD and comparison groups. WASI-II FSIQ was a significant predictor of TMR in the ASD group ($\beta = -0.77$, $t = -3.85$, $p = 0.003$, $r^2 = 0.60$); but not in the comparison group ($\beta = -0.50$, $t = -1.82$, $p = 0.098$, $r^2 = 0.25$).

CONCLUSIONS

- ASD group participants were able to complete the multitalker listening task, though they required higher (i.e., positive) target-to-masker ratios compared to comparison group participants.
- Most participants in the ASD group required the target talker to be louder than the two competing talkers, as reflected by overall positive target-to-masker ratios.

DISCUSSION

- ASD group task performance suggests difficulty using spatial cues to separate simultaneous auditory streams.
- Results are consistent with prior research indicating differences in auditory stream segregation in autistic adults [3,4].
- Autistic adults may benefit from having their communication partner step away from competing talkers in multitalker situations, so that their communication partners voice becomes louder than other competing voices in the room.

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