Auditory discrimination and auditory sensory behaviours in autism spectrum disorders

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Background

- Autism Spectrum Disorder (ASD)
  - Complex neurodevelopmental disorder
    - Genetic factors
    - Environmental factors
  - Characterized by:
    - Social impairments
    - Communicative impairments
    - Restricted interests
    - Repetitive behaviors
  - Characterized on a spectrum (DSM-5)
  - Previous research has suggested that ASD shows enhanced auditory perception

Current Study Aims

- Aim 1: Characterize auditory discrimination profile in a large ASD sample
  - Perhaps enhanced sound perception is part of the ASD profile
- Aim 2: Examine the association between auditory discrimination sensitivity and self-reported sensory behaviors in ASD sample
  - Perhaps due to fundamental differences in processing of auditory information

Method

- Participants
  - 72 adolescents with ASD
  - 48 adolescents without ASD

Table 1
Mean age (years; months), verbal IQ, performance IQ and full scale IQ (SD in brackets) for the non-ASD and ASD groups.

	Non-ASD	ASD
n	48	72
Male:Female	46:2	66:6
Age	15;6 (5.9)	15;6 (5.7)
Verbal IQ	87.25 (19.70)	84.31 (17.41)
Performance IQ	92.83 (21.15)	93.36 (17.44)
Full scale IQ	89.33 (21.53)	87.79 (17.32)

Method

- Design and Procedure
  - Hearing screening
    - Pure tone audiometry
    - Otoacoustic emissions
    - Tympoanometry
  - Auditory discrimination tasks
    - Frequency discrimination
    - Intensity discrimination
    - Duration discrimination

Auditory Discrimination Tasks

Method

- Design and Procedure
  - Hearing screening
    - Pure tone audiometry
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    - Tympoanometry
  - Auditory discrimination tasks
    - Frequency discrimination
    - Intensity discrimination
    - Duration discrimination
  - Self report of auditory sensory behaviors
    - AASP
      - Low registration
      - Sensation seeking
      - Sensory sensitivity
      - Sensation avoidance

Results: Auditory Discrimination Thresholds

- No significant group differences for any of the tasks
- 19.7% of ASD participants had exceptional performance on frequency discrimination task
- 4.3% of ASD participant had exceptional performance on intensity discrimination task
- 14.1% of ASD participants had exceptional performance on duration discrimination task
- Overlap between skills was limited

Results: Auditory Discrimination Tasks

- Characteristics of the subgroup with exceptional frequency discrimination and ASD

Table 4
Characteristics of the 14 individuals with ASD and exceptional frequency discrimination: diagnosis, verbal IQ (VIQ), performance IQ (PIQ), full scale IQ (FSIQ), onset of first words in months (1st words).

	Diagnosis	VIQ	PIQ	FSIQ	1st words
1	Autism	77	110	92	44*
2	Autism	80	119	98	40*
3	Autism	86	115	100	48*
4	Autism	112	107	111	18
5	Autism	100	106	104	48*
6	Autism	97	109	103	14
7	Autism	109	114	113	15
8	Autism	99	110	106	40*
9	Other ASD	60	55	54	24
10	Other ASD	77	119	97	15
11	Other ASD	120	106	115	10
12	Other ASD	99	96	99	30*
13	Other ASD	103	115	109	30*
14	Other ASD	88	93	88	30*
Mean (SD)		94.3 (15.6)	105.3 (15.7)	99.2 (14.6)	29.0 (13.3)

*Delayed first words (>24 months), according to ADI criteria.

Results: Auditory Sensory Behaviors

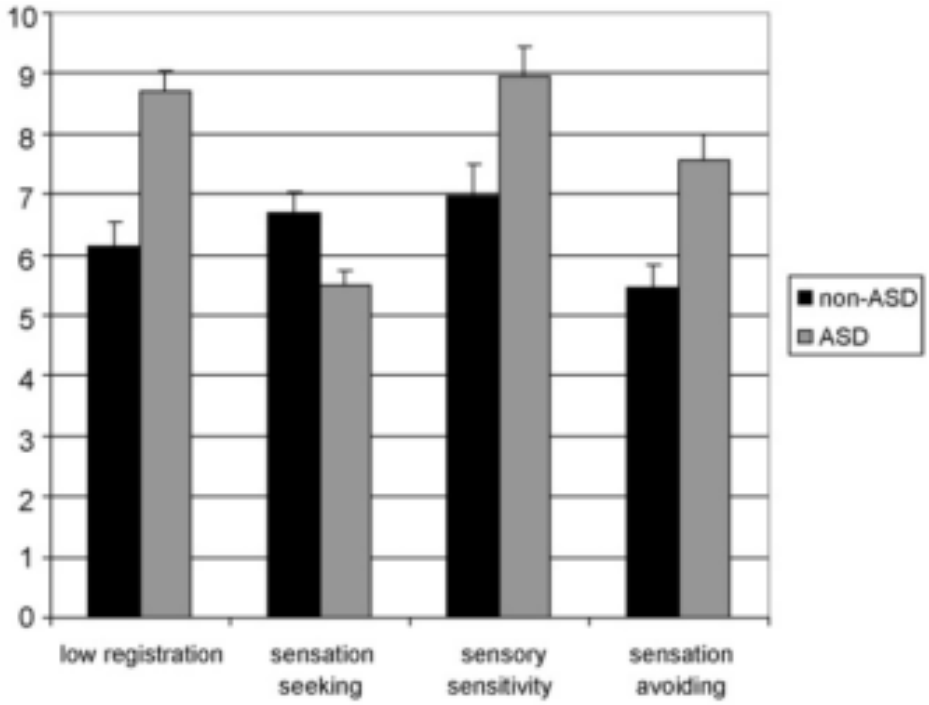
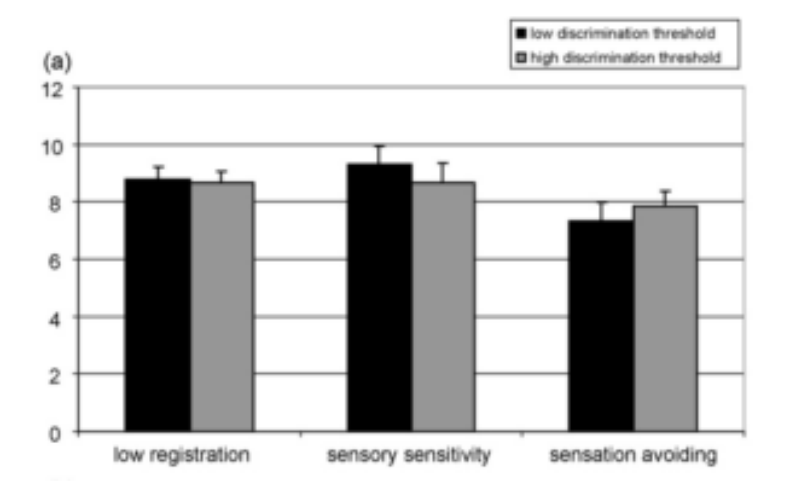
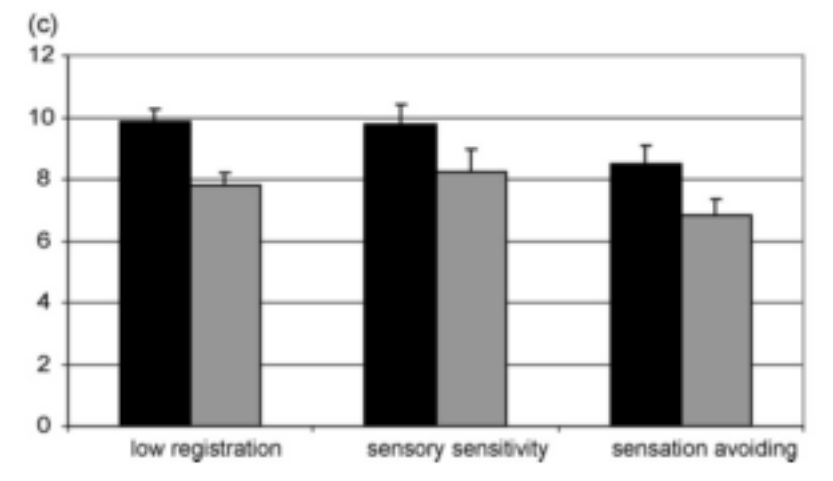
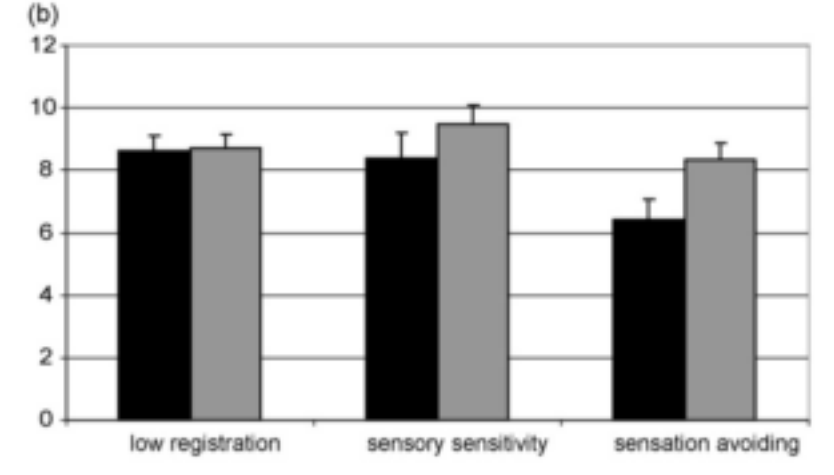


Fig. 1. ASD group: mean scores (and standard error) for auditory items on the Adolescent/Adult Sensory profile, grouped into quadrants. A higher score indicates more self-reported auditory sensory behaviours. The maximum score on sensation seeking is 10; the maximum score on the other three items is 15.

Results: Auditory Sensory Behaviors







Discussion

- No differences at the group level, however ASD subgroup differences
- Consider the possibility of ASD subgroups given the heterogeneity of the disorder
  - Results suggests ~1 in 5 individuals with ASD may exhibit exceptional frequency discrimination skills
  - Why is frequency processing unique in the ASD group?
- Greater degree of self-reported auditory sensory behaviors in ASD
  - Further exploration of the link between auditory perceptual processing and auditory sensory behaviors

Thank you!