

SENSORY CONSIDERATIONS FOR SOCIAL COMMUNICATION IN AUTISM

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DISCLOSURES

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Non-Financial Disclosures: Certified Autism Specialist (IBCCES), Special Education Advocacy trained (COPAA)

Personal Disclosure: I am a parent of an autistic child, am active in my local autism community and am neurodivergent, myself (ADHD).

OUTLINE

Neurodiversity-Affirming Approach
in Supporting Social Communication

- Literature Review (**what**)
- Service Delivery (**how**)
- Reconciling Intervention with Disability Rights (**why**)

AUDITORY FEATURES COMMON IN AUTISM SPECTRUM CONDITION (ASC)

- **Auditory Processing Deficits**
 - Difficulties understanding spoken language in the presence of normal peripheral hearing
- **Sound Tolerance Issues**
 - Overt and disabling inability to tolerate every-day sounds



WHAT IS CURRENTLY PROVIDED?⁵ (TYPICAL SERVICES)



ABA

Most commonly recommended following Dx (and best covered by insurance)



OT

Supports with sensory processing & TDL's



DEV PED MD

Oversees services/plan of care & medical management



SLP

Supports speech and language development & social communication



EI & IEPS

Educational Services including specialized instruction & supports

EVIDENCE-BASED PRACTICE (EBP) REVIEWS/SUMMARIES

- *Interagency Autism Coordinating Committee (IACC) Summary of Advances 2020*
<https://iacc.hhs.gov/publications/summary-of-advances/2020/>
- *The Agency for Healthcare Research and Quality (AHRQ)- Comprehensive evidence review to assess the effectiveness and safety of interventions targeting sensory challenges for children with autism.*
<https://effectivehealthcare.ahrq.gov/products/asd-interventions/research-2017>
- *The National Clearinghouse on Autism Evidence and Practice (NCAEP)- Systematic review of current intervention literature targeting individuals on the autism spectrum.*
<https://ncaep.fpg.unc.edu/>
- *What Works Clearinghouse (WWC)- Institute of Education Sciences detailed reports on EBP in schools*
<https://ies.ed.gov/ncee/wwc/FWW>



INFO DUMP

Evidence from Current Literature

NEUROPHYSIOLOGIC IMPACTS ON SOCIAL COMMUNICATION

- Autism- difficulty filtering, prioritizing and integrating sensory input (Sensory Gating).
- Both over- and under-responsivity → excitation/inhibition imbalance (over- and under-connectivity across brain regions, synaptic pruning abnormalities, neural transmission dys-synchrony).
- Delayed maturation of neural pathways between lower and higher brainstem levels.
- Differences in central gain control- the brain's non-linear way of processing information relative to the stimuli- excessive gain found in the brain's resting state may contribute to autistics' withdrawal into their own inner world. (Perez Velazquez 2013)

AUDITORY & VISUAL MISALIGNMENT

- Temporal Binding Window (TBW) is wider in autism- greater difficulty in synthesizing sensory input into a cohesive percept.
- Demonstrated to be particularly evident in the mismatch between auditory and visual processing (reduced McGurk effect)- caused by poor neural synchronization & brainstem abnormalities.
- Impacts joint attention, speech and language development, receptive and expressive social cueing, salience & reward systems.
- Autistics found to exhibit enlarged TBW **specifically for speech**, and this process is **malleable**. (Stevenson 2014)
- Watching an interlocuter's mouth/face less likely to improve speech-in-noise understanding.

DECREASED SOUND TOLERANCE

- Relates to abnormal gain control- reduced habituation to redundant auditory stimuli
- Efferent inhibition strength correlated with hyperacusis in ASC (Wilson 2017)
- 50-70% of the autistic population exhibits DST- source of significant distress and impairment. (Williams 2021)
- Among the most recognizable features in autism → over-protecting the ears
- Helps with keeping the stress response down HOWEVER this may makes DST worse (in addition to creating a functional hearing loss in school/social environments).
- Tinnitus Retraining Therapy (TRT) found to be effective in treating DST- protocols include breaking negative associations with sound (habituation/auditory toughening) and avoiding silence/over-protecting the ears.

MORE AUDITORY FEATURES IN AUTISM

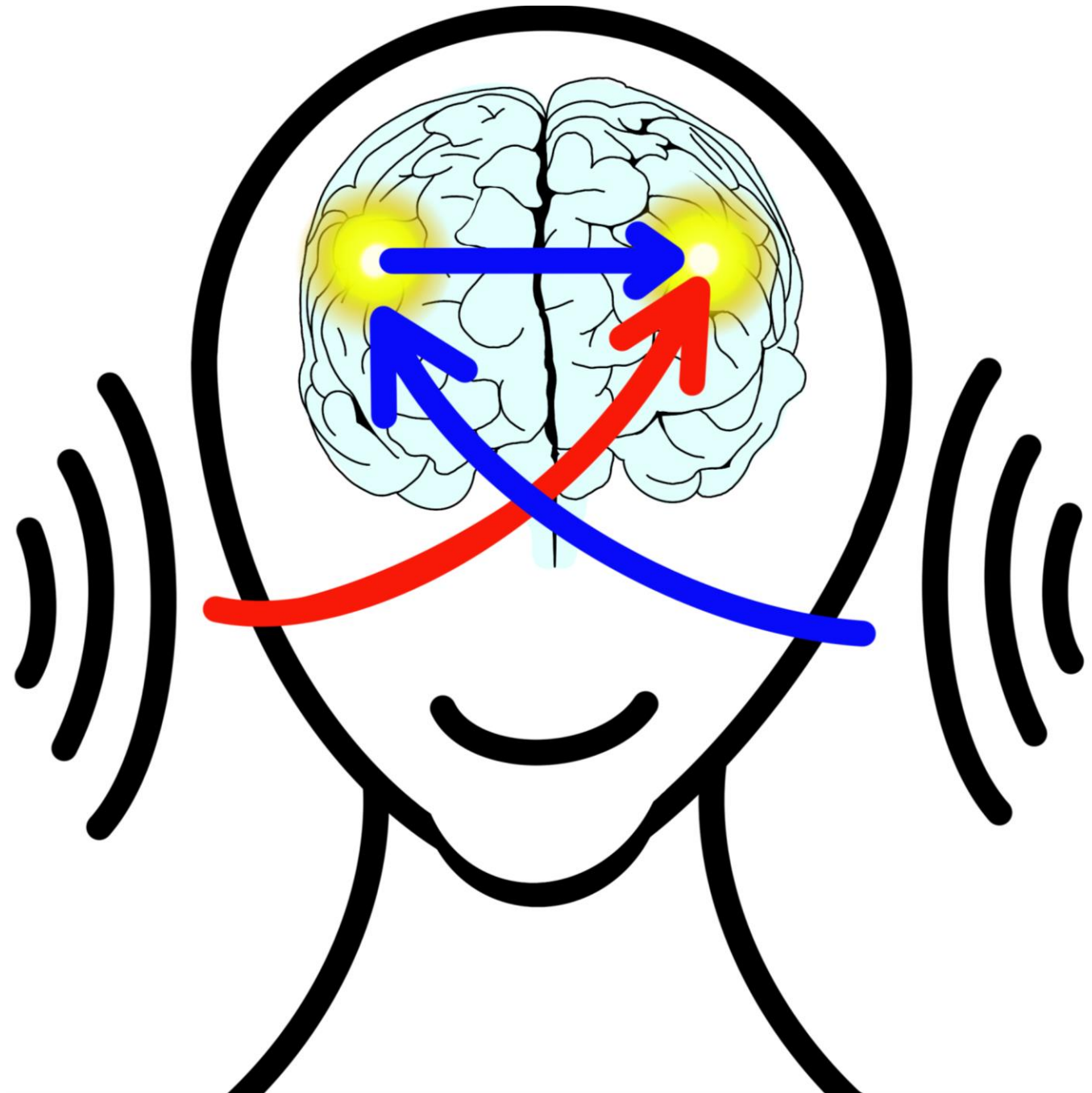
- Enhanced pitch perception, poor auditory stream segregation/localization abilities, poor speech-in-noise understanding and poor prosody perception. (Jones 2009, O’Conner 2012, Pillion 2018, Thye 2018)
- Autistic children are often insensitive to voices. The degree of under-connectivity between the voice-selective cortex and reward pathways predicts symptom severity. (Abrams 2019)
- Relationship between auditory processing and Restrictive/Repetitive behaviors. These (self-soothing) behaviors are influenced by the degree to which sounds are missed/detected in the environment. (Kargas 2015)
- Children and adults with ASC exhibit clinically significant auditory processing difficulties, requiring appropriate school and work accommodations. (Schafer 2020)

IMPACTS ON COMMUNICATION

- Auditory deficits that interfere with decoding stimuli found to exacerbate social deficits. (Hitoglou 2010)
- Poorer functional connectivity between the ears was found to be correlated with language ability. Atypical auditory processing directly relates to social, cognitive, and communicative impairments in ASC. (Linke 2018)
- Language impairments in autism are found to relate to abnormal lateralization of the functional language network (more right-hemisphere activity). (Herringshaw 2016)
- Abnormal right laterality for speech processing and poor auditory discrimination can be measured via magnetoencephalography mismatch field recordings (MEG), serving as an objective marker for language/communication skills in low/non-speaking autistic children. (Matsuzaki 2019)
- Right-sided language processing crowds out the ability to understand prosody!

Neurophysiologic underpinnings

- Brainstem timing differences between vision & audition
- Corpus collosum differences- most common feature in the literature
- Over-connectivity between proximal brain regions
- Under-connectivity for distal brain regions
- Dichotic listening deficit → hyper-activation of REA



EFFICACIOUS TREATMENT

- **Hearing Technology-** remote mic & low-gain hearing aids
- **Binaural Interaction/Dichotic Listening Training-** improves auditory attention, balances binaural processing asymmetries AND benefits untrained auditory skills.
- **Phonemic Entrainment/Synthesis, Words in Noise training, Auditory (Working) Memory-** perceptual learning evidence, building up the auditory skills hierarchy
- **Auditory-Motor Synchronization & Temporal Processing Remediation-** keeping time with a beat relates to phonological skills
- **Spatial Listening Training-** ability to localize sound source relates to improved speech-in-noise understanding (auditory stream segregation)

WHAT DO WE CURRENTLY DO? (AUDIOLOGISTS)



RULE OUT HL

Confirm normal peripheral hearing prior to Dx



DX & TX APD

Targeted auditory processing deficit remediation



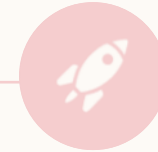
SUPPORT DST

Sound therapy/
Counseling



FIT DEVICES

Low-gain hearing aids and/or remote-mic fittings



EDUCATIONAL SUPPORTS

Deliver device support and/or provide accommodation recommendations

WHAT CAN WE *REALLY* DO

**BINAURAL
BALANCE**

**TARGET
BOTTOM-UP**

**AUDITORY-
MOTOR**

**WORKING
MEMORY**

ACCOMMODATE

ILD & ITD- spatial &
dichotic listening
training

Phonemic &
suprasegmental cue
training

Rhythm training-
synchronizing input
with output

WM training improves
aud processing AND
inhibitory control

Accept aspects of
Disability as natural
(support vs. “fixing”)

AFFIRMING NEURODIVERSITY

- Important and progressive paradigm shift toward the Social Model of Disability
- Disability Rights and Universal Design concepts improve access for EVERYBODY
- Empowering autistic children and adults can have a cumulative impact on quality of life
- Patient-Centered Care: holistic, validating, effective (improved treatment volition and outcomes)
- Social skills training for Neurotypicals: Double-Empathy Problem

CLINICAL CONSIDERATIONS

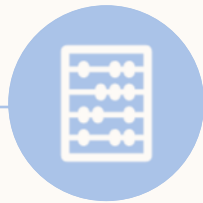
PROMPTING EYE CONTACT?

- Impact on expressive language- impedes verb generation (Kajimura 2016)
- Reported to provoke stress response & burden cognitive load
- Autistic advocates advise against it!
- Can facial cues/lip-reading be leveraged in this population?

KEEP MENTAL HEALTH PARAMOUNT

- No real learning can occur during fight or flight response
- Autism- brains primed to perceive ambiguous stimulus as a threat
- Avoid power-plays, escalating tension- reduced compliance with treatment/volition
- Be mindful of negative messaging & the patient internalizing ableism.

WHAT IS NEEDED



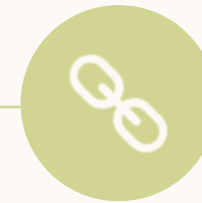
ACADEMIA

- More rigorous research on underlying mechanisms & efficacious supports
- Inclusion of ND voices
- Community partnerships with clinics- IRB & liability



CLINICAL CONSENSUS

- APD as clinical entity?
- Refine best practices & incorporate with what already works
- Disability Rights Paradigm



SYSTEMIC SUPPORTS

- Health insurance coverage for this Dx- normal hearing but “abnormal auditory perception”
- Addition to IEP/504 documentation RE: SDI & accommodations

“

**SENSORY PROCESSING ABNORMALITIES
CREATE A MALADAPTIVE DEVELOPMENTAL
TRAJECTORY OF CASCADING DELAYS AND
DEFICITS.**

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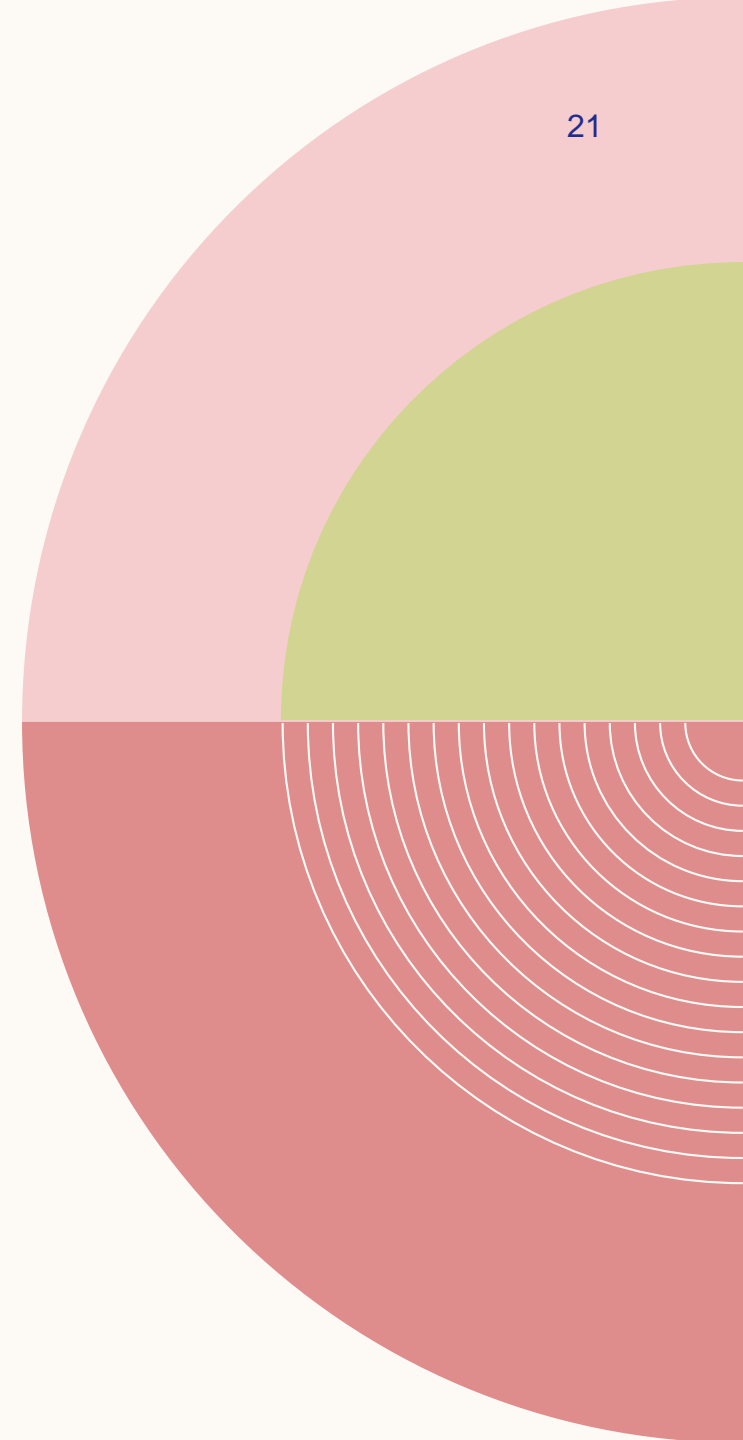
Thye 2018

CONCLUSIONS

Best practice dictates that individuals with peripheral/sensory loss (i.e. hearing loss) receive devices and therapeutic supports to habilitate or restore functioning.

Sensory differences common in autism clearly impact social communication, among other composite skills important for learning, connecting, mental health and overall sense of agency.

We can provide sensory supports effectively, while respecting an individual's neurotype.





THANK YOU!

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