Auditory Sensitivity and Safety in Children with ASD

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54,000 participants

- 15,000 children with ASD
- 5,000 adults with ASD
- 14,000 siblings
- 20,000 parents/guardians
Background: IAN Elopement Study 2011

- Concern about elopement and child safety
- Possible link between elopement and auditory hypersensitivity

Question 10: If you are able, please tell us what you believe causes your child’s elopement behavior. **Check all that apply.** (n=725)

- **53%** Enjoys running and/or exploring
- **36%** Trying to reach a place he/she enjoys
- **33%** Trying to escape an anxious situation (like demands at school)
- **30%** Trying to escape uncomfortable sensory stimuli (like loud noise)
- **30%** Pursuing his/her special topic
- **23%** Completely at random/can’t predict
- **22%** Is bored or understimulated
- **22%** Has too much energy or is hyper
- **20%** Times of transition or commotion
- **17%** Leaves because of confusion, disorientation or unfamiliar setting
- **17%** Leaves when attention shifts away (waiting to get away)
- **15%** Leaves to get attention (loves being chased)
- **14%** Trying to reach or find a certain person
- **14%** Fleeing something frightening
- **14%** Trying to find food/favorite food
- **9%** Other
- **9%** None of these apply

- **1%** None of these apply

Anderson et al, Pediatrics 2012
Auditory Sensitivity

- Abnormal sensory experiences common in ASD (40% - 100%)
- Auditory hyper sensitivity affects 30-50% children with ASD
- Not related to auditory acuity
- Parent concerns about hyper sensitivity
  - Child in distress and/or pain
  - Increased unsafe behaviors
  - Difficult to manage

- Safety concerns also related to hypo sensitivity
Auditory Sensitivity and Child Safety Study

• Funded by National Autism Association
• Team included parents, ASD experts, audiologists, researchers
• Launched Spring 2014
• Aims:
  – Characterize auditory hyper- and hypo-sensitivity in children with ASD
  – Determine relationship between auditory hypersensitivity and potentially unsafe behaviors
  – Assess use and satisfaction of interventions for auditory hypersensitivity
Who participated?

- Survey of parents of children with ASD (n=814)
- Child Characteristics
  - 82.4% male
  - 87.5% non-Hispanic; 84.8% white
  - Median age: 10.3 years
- ASD Diagnosis
  - ASD 28.1%
  - Autism 34.4%
  - PDD-NOS 21.0%
  - Asperger’s Syndrome 13.9%
  - PDD 2.6%
Hyper-sensitivity: Preliminary Results

• Reported Rates
  - 13.4% Never
  - 9.0% Resolved
  - 77.6% Current

• Median age
  - Onset: 2.0 years
  - Resolution: 7.5 years
  - Worst symptoms: 4.5 years

• Child’s Emotional State
  (n=631 responses)
  - Stressed: 77.7%
  - Irritable: 61.3%
  - Scared: 55.2%
  - Nervous: 54.4%
  - Frustrated: 43.9%
  - Annoyed: 40.9%

• Child’s Physical Response
  (n=631 responses)
  - Covers ears: 85.9%
  - Yells or screams: 52.2%
  - Tries to run away: 42.3%
  - Cries: 36.3%
  - Tries to stop sound/noise: 33.8%
  - Tries to hide: 25.2%
Hyper\textit{sensitivity: Preliminary Results}

- More Severe ASD symptoms
  - SRS raw score
    - $111.6$ vs. $99.3$ ($p<0.0004$)

- More likely to have Epilepsy/Seizure Disorders
  - $11.3\%$ vs. $7.3\%$ ($\chi^2<0.001$ FET)

- $18/60$ ($30\%$) seizure related to auditory triggers
Hypersensitivity: Preliminary Results

- **Impact:** Always or frequently limits participation
  - 31.1% Family activities
  - 29.8% School activities
  - 38.5% Community activities

- **Burden**
  - 63.4% episodes weekly (26% daily)
  - 49.5% mod or extreme difficulty managing

n=631 responses
Hypersensitivity: Preliminary Results

• Safety Concerns
  – 43.2% in an unsafe situation
    • 11.0% very unsafe
    • 10.7% moderately unsafe
    • 21.5% somewhat unsafe
  – 18.2% Child physically injured or hurt
  – 28.1% Others physically injured or hurt

n=631 responses
### Hypersensitivity: Preliminary Results

- **Common Interventions**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Used By</th>
<th>Very Satisfied</th>
<th>Somewhat Satisfied</th>
<th>Somewhat Unsatisfied</th>
<th>Very Unsatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning/preparing child for trigger sounds</td>
<td>90.9%</td>
<td>13.5%</td>
<td>39.5%</td>
<td>9.3%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Avoiding trigger sounds</td>
<td>89.8%</td>
<td>23.9%</td>
<td>34.1%</td>
<td>6.4%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Taking quiet breaks</td>
<td>85.6%</td>
<td>31.0%</td>
<td>40.4%</td>
<td>4.1%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Ear buds/standard headphones with music</td>
<td>57.6%</td>
<td>23.3%</td>
<td>31.1%</td>
<td>11.1%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Ear muffs</td>
<td>50.3%</td>
<td>24.0%</td>
<td>27.4%</td>
<td>11.0%</td>
<td>19.2%</td>
</tr>
<tr>
<td>Ear plugs</td>
<td>44.8%</td>
<td>7.1%</td>
<td>17.4%</td>
<td>16.7%</td>
<td>45.0%</td>
</tr>
</tbody>
</table>

n=631 responses
Hypo\text{sensitivity: Preliminary Results}

- Reported Rates
  - Never: 55.3% (n=449)
  - Current: 29.9% (n=243)
  - Resolved: 14.8% (n=120)

- Median age
  - Onset: 1.5 years
  - Resolution: 4.5 years
  - Worst symptoms: 3.0 years

- Safety Concerns (n=243 responses)
  - 52.5% in unsafe situation
    - 16.1% very unsafe
    - 15.7% moderately unsafe
    - 20.7% somewhat unsafe
  - 15.6% Child physically injured or hurt
  - 10.0% Others physically injured or hurt
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