Tactile Processing Across Early Childhood to Adulthood

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BACKGROUND

• In early childhood, the sense of touch is a learning mechanism that influences the development of motor, social and communication skills2.

• Little is known about childhood maturation of somatosensory function3,4.

• Puts et al observed that tactile discrimination thresholds in adolescents aged 8-12 are similar to adults5,6.

METHODS

SAMPLE:

Ages 3-6; N=41 (13F/28M)
Ages 7-12; N=25 (12F/13M)
Ages 13-17; N=22 (12F/10M)
Ages 18-23; N=39 (18F/21M)

OBJECTIVE

• To examine sensory tactile discrimination changes with age from early childhood to adulthood.

• Hypothesis: Tactile discrimination thresholds will decrease during early childhood and reach a plateau near the age of 85.

RESULTS

Table 1. Percentage of participants that completed each vibrotactile task in each age group.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>TOJ</th>
<th>DD</th>
<th>SQAD</th>
<th>SMAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 3-6</td>
<td>93%</td>
<td>86%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Ages 7-12</td>
<td>96%</td>
<td>96%</td>
<td>92%</td>
<td>84%</td>
</tr>
<tr>
<td>Ages 13-17</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Ages 18-23</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 1. A Scatterplot of reaction time/age (ms/years) as a function of age (years). B Scatterplot of amplitude/age (μm/years) as a function of age (years) for both SQAD and SMAD tasks. C Scatterplot of time/age (ms/years) as a function of age (years) for both TOJ and DD tasks. D Beta coefficient matrix. Color bar represents the beta values (slope/regression coefficients) of task performance vs. age in each age group.

DISCUSSION

• To our knowledge, our study is the first to assess sensory discrimination in a young age range (ages 3-6) quantitatively.

• The most rapid period of sensory development is observed between ages 3-6.

  ➢ Discrimination thresholds decrease (= higher sensitivity) and approach a plateau between ages 7-12; specifically near age 8, as hypothesized.

  ➢ Reaction time displays the lengthiest period of development, as it approaches a plateau closer to age 12.

• TOJ is shown to be the task that young children find the most difficult and unable to complete.

CONCLUSION

• Our work suggests important development of the tactile sensory system is ongoing across early childhood.

• Understanding how somatosensory function develops during early childhood can be a reference point for atypical sensory experiences in childhood-onset neurodevelopmental disorders (e.g. autism).

• This study can be extended by acquiring longitudinal data.

REFERENCES


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