Sensory processing sensitivity, stress and anxiety in young high-functioning adults with Autism Spectrum Disorder

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Maarten Wijnants
Anna Bosman
Autism spectrum disorder (ASD)

DSM-5:

1) Limitations social communication/interaction

2) Restricted behaviour/interests/activities
   (subsymptom: sensory over-/underresponsivity)
<table>
<thead>
<tr>
<th>Aesthetic experiences</th>
<th>*</th>
<th>-</th>
<th>-</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low sensory threshold</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ease of excitation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

* Only “attention to details” (= ASD symptom)
SPS in ASD population?

*From empirical research with people with ASD:*

Sensory processing differences in early development (over-/underresponsive)

Too intense $\rightarrow$ (social) withdrawal (Liss et al., 2008)

Brains more active while “resting” (Perez Velazquez & Galan, 2013)

*From self-report of people with ASD:*

Sensory processing $\rightarrow$ autistic symptoms (constraining communication; Robledo et al., 2012)

Common: “stress” and “anxiety” (Donnellan et al., 2012)
But: empathy? Noticing subtleties?
But: empathy? Noticing subtleties?

YES

Recent ASD theories:

1) Empathy imbalance (Smith, 2009):
   - Low cognitive empathy
   - Normal-high emotional empathy

2) Intense world theory
   (Markram & Markram)
But:

ASD: hyper- AND hyporesponsive?

1) Overwhelmed nervous system:
Hyper- and hyporesponsive stress system

2) ASD subgroup..?

Common comorbidities in ASD:
Hyperarousal: (social) anxiety disorder (84%), ADHD (14-78%)
Hypoarousal: depression (43%)
More research needed

SPS / sensory processing in ASD?

↔ subjective and objective stress (heart rate) in ASD?
Participants

**ASD**: 10 women, 10 men (18 - 27 years old)

**No ASD**: 13 women, 10 men (17 - 34 years old)

**All**: university / higher vocational education
Study*

Questionnaires  Stroop

* Heart rate measured during entire study
Questionnaires

Highly Sensitive Person scale (Aron & Aron)

Adolescent/Adult Sensory Profile
  Four quadrants

State-Trait Anxiety Scale
  State anxiety

Visual Analogue Scales
  Anxiety, subjective stress
Self-Regulation Strategies

<table>
<thead>
<tr>
<th>Neurological Threshold Continuum</th>
<th>Self Regulation Behavioral Response Continuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (habituation)</td>
<td>Passive Strategies ← Active Strategies</td>
</tr>
<tr>
<td>Low (sensitization)</td>
<td>Low Registration ← Sensation Seeking</td>
</tr>
<tr>
<td></td>
<td>Sensory Sensitivity ← Sensation Avoiding</td>
</tr>
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</table>

1  2

3  4
Questionnaires

Highly Sensitive Person scale

Adolescent/Adult Sensory Profile
  Four quadrants

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  State anxiety

Visual Analogue Scales
  Anxiety, subjective stress
Visual Analogue Scales
Subjective stress and anxiety

No stress  |  Extreme stress
Study*

* Heart rate measured during entire study
Stroop task (1060 words)

Approximately 30 minute Stroop + unexpected bleeps
Overall sensory processing sensitivity
(possible scores: 27 – 189)
<table>
<thead>
<tr>
<th></th>
<th>ASD (versus no ASD)</th>
<th>ASD women (versus ASD men)</th>
</tr>
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<tbody>
<tr>
<td>AASP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low registration</td>
<td>ASD &gt; no ASD*</td>
<td>n.s.</td>
</tr>
<tr>
<td>Sensory sensitivity</td>
<td>ASD &gt; no ASD*</td>
<td>women &gt; men*</td>
</tr>
<tr>
<td>Sensation seeking</td>
<td>ASD &lt; no ASD*</td>
<td>n.s.</td>
</tr>
<tr>
<td>Sensory avoiding</td>
<td>ASD &gt; no ASD**</td>
<td>n.s.</td>
</tr>
<tr>
<td>SPS (Aron &amp; Aron)</td>
<td>ASD &gt; no ASD**</td>
<td>women &gt; men*</td>
</tr>
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* p < .05; ** p < .001
SPS $\leftrightarrow$ stress

Subjective + objective stress (heart rate)

ASD and no ASD
## Correlations

<table>
<thead>
<tr>
<th></th>
<th>Subjective stress</th>
<th></th>
<th>Objective stress</th>
<th></th>
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<tr>
<td></td>
<td>VAS stress</td>
<td>VAS anxiety</td>
<td>STAI</td>
<td>Heart rate</td>
</tr>
<tr>
<td><strong>SPS (Aron &amp; Aron)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No ASD</td>
<td>.45 *</td>
<td>.51 *</td>
<td>.57 *</td>
<td>.02</td>
</tr>
<tr>
<td>ASD</td>
<td>.41</td>
<td>.27</td>
<td>.41</td>
<td>.62 *</td>
</tr>
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<td><strong>Sensory sensitivity (AASP)</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>No ASD</td>
<td>.32 *</td>
<td>.23</td>
<td>.56 *</td>
<td>-.12</td>
</tr>
<tr>
<td>ASD</td>
<td>.24</td>
<td>.06</td>
<td>.08</td>
<td>.32 #</td>
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# marginally significant
Conclusions:

(High-functioning) ASD strongly related to SPS
Subjective stress not related to SPS in ASD
Objective stress related to SPS in ASD

SPS might explain ASD symptoms

Future research:

Larger study (new study planned)
Replication SPS ↔ stress (reactivity) (in ASD)
Associations SPS ↔ social / daily functioning in ASD


Radboud University Nijmegen
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<td>$p = .016 \rightarrow$ higher</td>
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<td><em>Sensory sensitivity</em></td>
<td>$p = .005 \rightarrow$ higher</td>
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<td><strong>SPS (Aron &amp; Aron)</strong></td>
<td>$p &lt; .001 \rightarrow$ higher</td>
<td>$p = .03 \rightarrow$ higher</td>
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* $p < .05$; ** $p < .001$