Individual differences in children’s self-regulation in response to classroom activities and interactions

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• A person’s attempts to voluntarily regulate cognition, behavior, and emotion to promote effective functioning and positive adaptation

Self-regulation

• “occurs when a person ... attempts to change the way he or she would otherwise think, feel, or behave”

• “involves having the person override ... simple responses and effortful implement a different response”
THE ARCHITECTURE OF SELF-REGULATION
(BLAIR & URSACHE, 2011)

- Genes
  - Neuromodulator receptor function
- Stress Physiology
  - Sympathetic, Parasympathetic, HPA
- Emotional Reactivity and Regulation
  - Positive and Negative emotion
- Attention
  - Alerting, Orienting, Executive
- Executive Functions
  - Working Memory, Inhibitory Control, Attention Flexibility

CONTEXT
SELF-REGULATION PROCESSES

- **Lower order processes**: Regulation of the stress response system
  - components: parasympathetic, sympathetic, and HPA axis
- **Higher order processes**: Executive functions
  - attention, working memory, and inhibitory control
  - considered as cognitive foundation of the ability to apply attention, working memory, and inhibitory control to behavior
SELF-REGULATION PROCESSES

- Alteration of stress response physiology influences neural activity in the prefrontal cortex that underlies executive function (Blair & Raver, 2012)

- HPA dysregulation (very high or very low levels of stress response) are associated with deficits in executive functioning (Blair & Ursache, 2011)
THE ARCHITECTURE OF SELF-REGULATION

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CONTEXT

Automatic Controlled
• Adults play a critical role in supporting the development of self-regulation skills

• Importance of high-quality classroom environment
  – Teacher-child interactions as primary mechanisms through which children learn in classrooms

Teacher-Child Interactions (Hamre et al., 2014)

- Emotional Support
- Classroom Organization
- Instructional Support
THE PRESENT STUDY

- Explore individual differences in relations between lower and higher order self-regulation processes
- Investigate whether or not teacher-child interactions differentially affect lower and higher order processes of self-regulation
• 141 children (45% girls); $M_{age} = 63$ months ($SD = 4.9$)
• International Sample from the UAE:
  – Arab (58%), American (17%), Indian (9%), Asian (7%), European (6%), African (2%), and Australian (1%)
• Family SES: primarily middle-class background
• From 27 kindergarten classrooms
  – Predominately teachers from the UK and the U.S.
  – All female teachers; $M_{age} = 36$ years ($SD = 9.2$); on average, 10 years of teaching experience in ECE ($SD = 8.0$)
MEASURES

- Stress response physiology
  - Saliva and hair cortisol
- Executive function battery
  - Pencil Tapping, DCCS, Number recall
- Quality of teacher-child interactions
  - Classroom Assessment Scoring System CLASS Pre-K

**Rating:** 10 items. Time sampling with cycles of 20-min observation and 10-min scoring.

**Scale:** 1 – 7 (1,2 = low, 3,4,5 = mid, 6,7 = high)
RESULTS: RELATIONS BETWEEN LOWER AND HIGHER ORDER SELF-REGULATION PROCESSES

Table 1. Associations between lower and higher order self-regulation processes

<table>
<thead>
<tr>
<th>Lower order self-regulation processes (Stress response regulation)</th>
<th>1. Saliva Cortisol&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2. Hair Cortisol&lt;sup&gt;a&lt;/sup&gt;</th>
<th>3. Working Memory</th>
<th>4. Attention</th>
<th>5. Inhibitory Control</th>
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</thead>
<tbody>
<tr>
<td>1. Saliva Cortisol&lt;sup&gt;a&lt;/sup&gt;</td>
<td>--</td>
<td>.45*</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Hair Cortisol&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>3. Working Memory</td>
<td>.04</td>
<td>-.34*</td>
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<td></td>
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<tr>
<td>4. Attention</td>
<td>-.00</td>
<td>-.03</td>
<td>.91**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Inhibitory Control</td>
<td>-.01</td>
<td>-.31*</td>
<td>.86**</td>
<td>.89**</td>
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</tbody>
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Note. * p < .05. ** p < .01.

<sup>a</sup> Overall cortisol output (higher scores reflect higher cortisol levels).
RESULTS: DESCRIBING THE QUALITY OF TEACHER-CHILD INTERACTIONS

Figure 1. Average ratings of interactions. Colored area: UAE data. The area under the dashed lines represents USA data for comparison (Hamre, Hatfield, Pianta, & Jamil, 2014).
RESULTS: RELATIONS BETWEEN TEACHER-CHILD INTERACTIONS AND SELF-REGULATION PROCESSES

Table 2. Multilevel models of domains of teacher-child interactions on lower and higher order self-regulation processes

<table>
<thead>
<tr>
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<th>Lower order self-regulation processes (Stress response regulation)</th>
<th>Higher order self-regulation processes (Executive functions)</th>
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<tr>
<td></td>
<td>Saliva Cortisol&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Hair Cortisol&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Emotional Support</td>
<td>-.19&lt;sup&gt;+&lt;/sup&gt;</td>
<td>-.34&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Instructional Support</td>
<td>-.24&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-.31&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Classroom Organization</td>
<td>-.08</td>
<td>-.01</td>
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</table>

Note. Controlling for child age and gender. <sup>+</sup> p < .10. <sup>*</sup> p < .05. <sup>**</sup> p < .01.

<sup>a</sup> Overall cortisol output (higher scores reflect higher cortisol levels).
DISCUSSION

• High correlations among higher order self-regulation measures support the assumption of a single latent executive function construct in early childhood (Hughes et al., 2010; Wiebe et al., 2008, 2011)

• Moderate interrelations between lower and higher order self-regulation processes might be due to the age of the children

• Teacher-child interactions provide an important context for children’s self-regulation, in particular higher order self-regulation processes
CONCLUSION

• Investigate the relation of lower order self-regulation processes to the developmental trajectories of higher order self-regulation processes

• Enhancing the quality of the learning environment to promote children’s self-regulation skills
  – Important to make high-quality classrooms accessible to all children
  – Determine which types of educational experiences lead to optimal levels of arousal and engagement
THANK YOU!

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