Computerised measure of distractor interference predicts self-reported distraction in the classroom

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The importance of studying attention in educational settings

- Attention skills impact educational outcomes (e.g. Breslau et al., 2009). “Inattention” associated with lower grades (e.g. Merrell et al., 2001; 2016)

- However, most of previous work relied on teacher’s reports

- Very little in way of empirical validation (c.f Unsworth et al., 2012)

- Attention cognitive neuroscience empirical research demonstrates perceptual load increases attention focus (e.g. Lavie, 2005; 2010; Lavie et al 2015 for reviews)

- However predictive validity for adolescents at school not yet established
Research questions:

**Overall**: Can we apply load theory of attention to predict distraction in adolescents in school classroom settings?

**Q1**: Are adolescents more distracted than adults?

**Q2**: Would high perceptual load in the attention task reduce distractor interference in adolescence?

**Q3**: Can we predict adolescent distraction in the classroom from lab attention task measure of distraction? Load work so far established on adults, children and elderly but not adolescents as yet (Maylor & Lavie, 1997; Huang-Pollock, Nigg & Carr, 2002; Lavie et al 2015)
Previous load research: Many demonstrations of high perceptual load => reduced distraction: e.g. Lavie & Cox, 1997; Beck & Lavie, 2005; Forster & Lavie, 2007)
High load reduces interference, even for salient irrelevant distractors (Forster & Lavie, 2008, *JEP:APP*)
‘Entirely irrelevant’ distraction paradigms shown to be a predictor of real world distractibility; (Forster & Lavie, 2016, ‘Establishing the attention distractibility trait’ Psych. Sci)

Irrelevant distractor cost in low load is related to childhood self-reports of ADHD symptoms
Predicting adolescent classroom distraction from a laboratory measure

190 Secondary school students in Ys 7-12 (excl Y11)

N = 32-38 per group (post-exclusions)

65 Adults (18-62, M = 25.8)

Computerised task measure of irrelevant distractor interference, taken on site at school for adolescents

Correlated with self report distraction measure

Hobbiss and Lavie (in prep)
Self-report measure of distraction (using a Distraction Diagnostic Tool (DDT) adapted to the classroom)

Classroom DDT: ‘State’ measure of distraction in previous lesson
Task RT Results

No load effect for adolescents

No significant differences between school year groups in low load effect
Measures of the mean RT may not be suitable for assessing distraction in adolescents

- Adolescents known to be more error prone (e.g. Eigsti et al., 2006; Cohen et al. 2016; Aite, 2018).

- Indeed more error prone ($M_{err} = 11.7\%$) compared with adults ($M_{err} = 5.8\%$) in our sample

- Adolescents have been found to have a greater RT variability and a more skewed RT distribution compared to adults (however so far only in ADHD; Williams et al., 2007; Milne, 2011)
RT distribution skewing comparison between adolescents and adults

Greater RT variability and more skewed RT for adolescents can mask effects using comparisons of the Mean RT.

Adolescents
Tau = 0.16

Adults
Tau = 0.13
Error-weighted RT binning analysis
(Taking full distribution and errors into account)

Bin scores from decile ranked distractor effects on RT

Weighted incorrect responses = (20/Distractor absent Accuracy%) * 100
Distractor effect (bin score) larger in adolescents (vs. adults) across RT distribution

Main effect of age category: $F(1,242) = 8.734, p = .003, \eta^2 = .036$

No interaction with load ($F < 1$)
Interim conclusions

• Q1: Adolescents are more distracted than adults but only when errors and the full RT distribution taken into account

• Q2: Perceptual load effects on focused attention (=reduced distraction) replicated on adults but had no effect on adolescent distraction
Q3: Can we predict adolescent distraction in the classroom from lab attention task measure of distraction?
Bin scores in experiment are strongly correlated to distraction reports on DDT during the previous school lesson

Bin score

$R = 0.249$ ***
Controlling for general motivation, assessed using level of interest in the lesson (in multiple regression)

Bin score a stronger predictor of distraction reports than interest (and both are relatively independent of each other)

<table>
<thead>
<tr>
<th>Summary of hierarchical regression analysis for variables predicting distraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1 - Background variables</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Computer use</td>
</tr>
<tr>
<td>Wellness</td>
</tr>
<tr>
<td>Interest</td>
</tr>
<tr>
<td>Bin score</td>
</tr>
</tbody>
</table>

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<tr>
<th>Model Statistics</th>
<th>Adjusted R²</th>
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<td>0.120</td>
<td>9.999***</td>
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Conclusions

• Adolescents are more distracted than adults but only when errors and the full RT distribution taken into account

• Irrelevant distractor paradigm may be a useful tool in predicting real-world (classroom) distraction...

• ... but requires the measurement and analysis tools to be sensitive to the specific response characteristics of the studied population.

• Perceptual load tasks replicated on adults but had no effect on adolescent distraction
Thank you!

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