Elementary Schoolers’ Development of Self-Regulation: Do Effortful Control and Executive Function Co-Develop?

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Self-Regulation

Executive Function (EF):
- Neurocognitive skills that underlie goal-directed thought and action (Zelazo et al., 2017)
- Working memory, cognitive (attentional) flexibility, inhibitory control
- Directly assessed with novel tasks
- Rapidly developing during infancy, early- and middle- childhood

Effortful Control (EC):
- Temperament theory (Rothbart & Bates, 2006):
  - Attentional Focusing, Inhibitory Control
- Indirectly assessed by adult (or self) report
- Theorized as a (relatively) stable individual trait
Purpose

Understand how behavioral and cognitive aspects of self-regulation co-develop during elementary school.

➢ Whether to expect that teachers will see children’s self-regulatory behaviors normatively improving over time
➢ Whether children’s development of self-regulatory behaviors in the classroom primarily reflect their internal cognitive capacities or if there are other contextual and personal factors at play
➢ Whether the extent to which internal cognition supports externally-observed behavior over time varies for different children
Data

Early Childhood Longitudinal Study, Kindergarten Class of 2010-2011 (ECLS-K)
Analytic Sample: $N = 7,735$

EF: Dimensional Change Card Sort (DCCS)

EC: Temperament in Middle Childhood Questionnaire (TMCQ)

- Teacher reports of *Inhibitory Control* and *Attentional Focusing*
  - Likert-type (1-5)
- Equated to measure growth across time

<table>
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<td>2, S</td>
<td>3, S</td>
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**DCCS:**

Combined score* (1.25 - 10) =

Accuracy (1.25 - 5)

+ 

Reaction time (1 - 5)

*Only for children with Accuracy > .80%
Confirmatory Factor Analysis of EC

CFI = .98
RMSEA = .06

M = 0, Var = 1

\[ \alpha = .95 \quad \omega = 1.0 \]

**Effortful Control**

- **i1**: Easily distracted when listening to story
- **i2**: Can stop when told to stop
- **i3**: Looks around room when doing schoolwork
- **i4**: Can stop doing things too quickly
- **i5**: Working on activity, has hard time keeping mind on it
- **i6**: Has an easy time waiting
- **i7**: Has a hard time paying attention
- **i8**: Has hard time waiting turn to talk when excited
- **i9**: Needs to be told to pay attention
- **i10**: Gets distracted trying to pay attention in class
- **i11**: Likes to plan carefully before doing something
- **i12**: Is good at following directions
- **i13**: Has hard time slowing down when rules say walk

Reverse-coded
Not reverse-coded
Common Content

- **M = 0, Var = 1**
- **.79**
- **.82**
- **.82**
- **.86**
- **.85**
- **.87**
- **.42**
- **.48**
- **.66**
- **.65**
- **.72**
- **.83**
- **.78**
1. To what extent are children’s developmental trajectories of EC related to those of EF, when accounting for individual differences and within-person change?

2. Is there evidence of unobserved systematic heterogeneity (i.e., multiple latent subpopulations) in the co-development of EC and EF?
Analysis Plan

RQ1:
- Parallel-process latent growth curve model with structured residuals (LGC-SR; Curran et al., 2014)

RQ2:
- Multivariate Growth Mixture Model (MGMM; Wickrama et al., 2021)
RQ5: Parallel-Process LGC-SR of EC and EF, 2nd-5th Grade

Within-construct residual correlations and variances omitted

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<th>Parameter</th>
<th>Mean</th>
<th>Variance</th>
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<td>V</td>
<td>0.08</td>
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Free, $p < .001$

Fixed, $p > .05$

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RQ5: Latent Growth Trajectories of EC and EF

Significant association between baseline EF and EC (Cov = .62, r = .34),

Significant but small association between baseline EC and growth in EF (Cov = -.11, r = -.34)

Marginally significant, inconsequentially small association between growth in EF and growth in EC (Cov = .02, p = .09; r = .08, p = .03)

Bivariate LGC-SR of EC and EF: AR(1), no CL
RQ6: Multidimensional Growth Mixture Models

Class 1: 15%
Relatively low EC, curvilinear increases in EF
No significant association between EF and EC

Class 2: 23%
Above average EC, linear increases in EF.
Positive relation between baseline EC and baseline EF (Cov = .03, r = .22).

Class 3: 62%
‘Normative’ trajectories: stable, near-mean EC, linear increases in EF.
Positive relation between baseline EC and baseline EF (Cov = .14, r = .20).
Discussion

- Teacher-reports of EC likely reflect the classroom context.
- Self-regulation in one domain does not appear to support development in the other.
  - These conclusions remain consistent across all means of examining individual variation.
- Self-regulation is complex!
  - Just because children have the capacity to regulate their cognition, doesn’t mean they will regulate their behavior in the classroom setting.


Thank you!