

## Background/Purpose

- Effortful control (EC) has been characterized as reflecting the capacity to inhibit a dominant response in favor of a subdominant response<sup>1</sup>.
- Previous literature has indicated that EC is crucial for the effective regulation of behavior and emotion<sup>2</sup>.
- EC has been associated with numerous children's outcomes (e.g. externalizing problems, academic competence) .
- Compared to the literature linking EC to externalizing problems, fewer studies have examined the association between EC and children's internalizing (INT) difficulties.
- Furthermore, although some existing work suggests a negative association between INT and EC<sup>3,4,5</sup>, some studies have not identified such effects<sup>6,7</sup>.
- Quantitatively summarizing the existing work on associations between EC and INT may identify methodological differences between studies that account for disparate findings and provide directions for future research in this area.
- The goal of the current investigation is to conduct a meta-analysis on the association between children's EC and INT problems.

## Hypotheses

- It was anticipated that the overall effects between EC and INT would be negative.
- Given findings in existing literature, gender and method used to measure EC were expected to be potential moderators.
- Alternative potential moderators examined included: high vs. low risk samples, clinical vs. non-clinical samples, and mean age of the sample.

## Method

- As part of a larger meta-analysis of EC and children's outcomes, PsycInfo and MedLine databases were searched using 14 terms for EC (e.g., temperament, and self-regulation) and 53 terms for children's outcomes, including INT related search terms (e.g., Depression and Anxiety).

## Method- Continued

- 210 studies meeting inclusion criteria, based on the review of abstracts identified from the database searches, were retrieved for further review.
  - An additional 7 studies meeting inclusion criteria were identified and retrieved based on reference list searches.
  - A total of 40 studies contained relevant data for this investigation.
- After multiple reports using the same sample, and multiple effect sizes (ES) within single studies were accounted for:
  - Retrieved studies rendered 284 total ES, yielding 33 single ES for analysis.
  - The total sample size across studies was 9,606.
- Potential Moderator Variables:
  - EC measurement: Behavioral, Parent Report, Other Report (e.g. self-report, teacher, etc.), and Cross Informant (e.g., parent reported EC and teacher reported INT)
  - Age: 0-5 (early childhood), 6-12 (school aged), and 13-17 years (adolescence)
  - Clinical sample: Sample with INT diagnosis was compared to a non-clinical control sample
  - High Risk: Greater than 66% of the sample was determined to be demographically at risk (e.g. low SES, low maternal education, etc.)
  - Gender
- Effect Size Coding:
  - Correlation coefficients were used as the ES in the current study.
  - When group differences were reported, the standardized mean difference ES was calculated and transformed to a correlation coefficient.
- The meta-analysis was conducted using the random effects model<sup>8</sup>.
- Homogeneity tests were utilized to determine absence or presence of moderators; if a test was significant, follow-up analyses were performed<sup>8</sup>.
- The fail-safe N<sup>9</sup> and sufficiency<sup>10</sup> indices were used to determine the potential effects of publication bias on findings.

## Results

Unit of Analysis	EC Source	k	Mean ES	Std. Error	95% CI	Fail Safe N	Sufficiency	Homogeneity
<b>All Studies</b>	<b>Multiple ES<sup>1</sup></b>	<b>64</b>	<b>-0.21*</b>	<b>0.018</b>	<b>-0.17 to -0.24</b>	<b>11,852</b>	<b>237.05</b>	<b>57.87</b>
Method	Behavioral	17	-0.13*	0.021				
	Parent Report	14	-0.25*	0.013				
	Other Report	16	-0.28*	0.015				
	Cross Informant	17	-0.14*	0.011				
<b>All Studies</b>	<b>Single ES<sup>2</sup></b>	<b>33</b>	<b>-0.21*</b>	<b>0.029</b>	<b>-0.15 to -0.26</b>	<b>2,649</b>	<b>55.99</b>	<b>21.30</b>
Age	Early Childhood	8	-0.08*	0.023				
	School Age	22	-0.24*	0.012				
	Adolescence	3	-0.19*	0.057				
	Clinical	Clinical Sample	4	-0.14*	0.080			
	Non-Clinical Sample	29	-0.21*	0.010				
Demographic Risk	Low	15	-0.16*	0.015				
	High	3	-0.18*	0.056				
	Mixed	4	-0.13*	0.049				
	Cannot Determine	11	-0.27*	0.015				

\* =  $p < .05$  1) Studies contributed more than one ES if EC was measured with multiple methods 2) Each study contributed one ES

## Results

- When studies were permitted to contribute more than one ES to the distribution (i.e. All studies, Multiple ES) the expected moderation effect was not observed.
- In line with meta-analytic practice, in a subsequent analysis each study only contributed one ES.
- The overall ES ( $r = -0.21$ ) fell between a small and medium effect based on Cohen's criteria<sup>11</sup>.
- EC accounts for 4.4% of the variance in children's INT outcomes.
- The homogeneity test was not significant, suggesting that no moderators of the effect were present.
- Qualitative examination (see table) of each level of each moderator suggests minimal differences between levels, which also suggests the absence of specific moderating variables.

## Discussion

- This meta-analysis synthesized the growing literature examining the association between EC and INT. Although not as strong as effects typically observed for other outcomes (e.g., externalizing), results were consistent with a modest small to medium effect size.
- Findings indicated that methodological differences do not appear to account for the sometimes variable findings between studies.
- Studies separating effects by gender, using adolescent samples, or examining clinical samples were not frequently identified.
- Future studies should address the limitations noted above.

## Author Contact, Copies, & References

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- To download a copy of this poster, including references cited in the poster as well as studies contributing effect sizes to the analyses reported in this presentation, please visit the Emotion Regulation & Temperament Lab website at: [www.niu.edu/emotionreg](http://www.niu.edu/emotionreg)

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