SYMPOSIUM

Enjoying cognitive effort: **outcomes and development of Need for Cognition** in youth

Paper 1: Need for Cognition Predicts Academic Achievement Beyond Cognitive Ability, Openness and Persistence

Paper 2: Need for Cognition Predicts Changes in Academic Interest but not the Other Way Round

Paper 3: Need for Cognition as a Resource for Coping with Everyday Challenges in School

Paper 4: The Development of Need for Cognition: Longitudinal Differences across Secondary School Tracks

Discussion: Astrid Poorthuis (Utrecht University)

Seeking, mastering, and enjoying cognitive effort: scrutinizing the role of Need for Cognition in academic achievement

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Need for Cognition and achievement

- Need for Cognition reflects individual differences in "the tendency to seek, engage in, and enjoy effortful cognitive activities"
- NFC expected to relate to academic performance (e.g. Colling et al., 2022; Liu & Nesbit, 2023)

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- But NFC is also related to other student characteristics which we know to (strongly) predict school achievement
- Best-known example: **cognitive ability**
  - Bidirectional relation: success ➔ appreciation and/or appreciation ➔ improvement
  - Empirically: weak to moderate correlation
  - Conceptual distinction: maximal performance vs. typical investment

Other constructs related to NFC

NFC: "seek, engage in, and enjoy effortful cognitive activity"

	Overlap with NFC	Distinction from NFC
Openness		
Persistence		
Intrinsic school motivation		

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Intrinsic school motivation	Liking to invest in cognitive activity	IM: highly dependent on *school* environment vs. NFC: broad and more stable trait

➔ This study

- **Relations** between NFC and cognitive ability, openness, persistence, and intrinsic motivation for studying

- **Predictive validity** of NFC for academic performance **beyond** these characteristics

In addition: interaction effect?

- In addition, **interactive effects** have been suggested - in particular **between cognitive ability and NFC**

- Arguments for either positive or negative interaction:
    - "Having both the potential ánd the willingness to fully exploit this potential" ➔ positive IA?
    - "Drive to invest in cognitive activities might compensate for lower ability" ➔ negative IA?

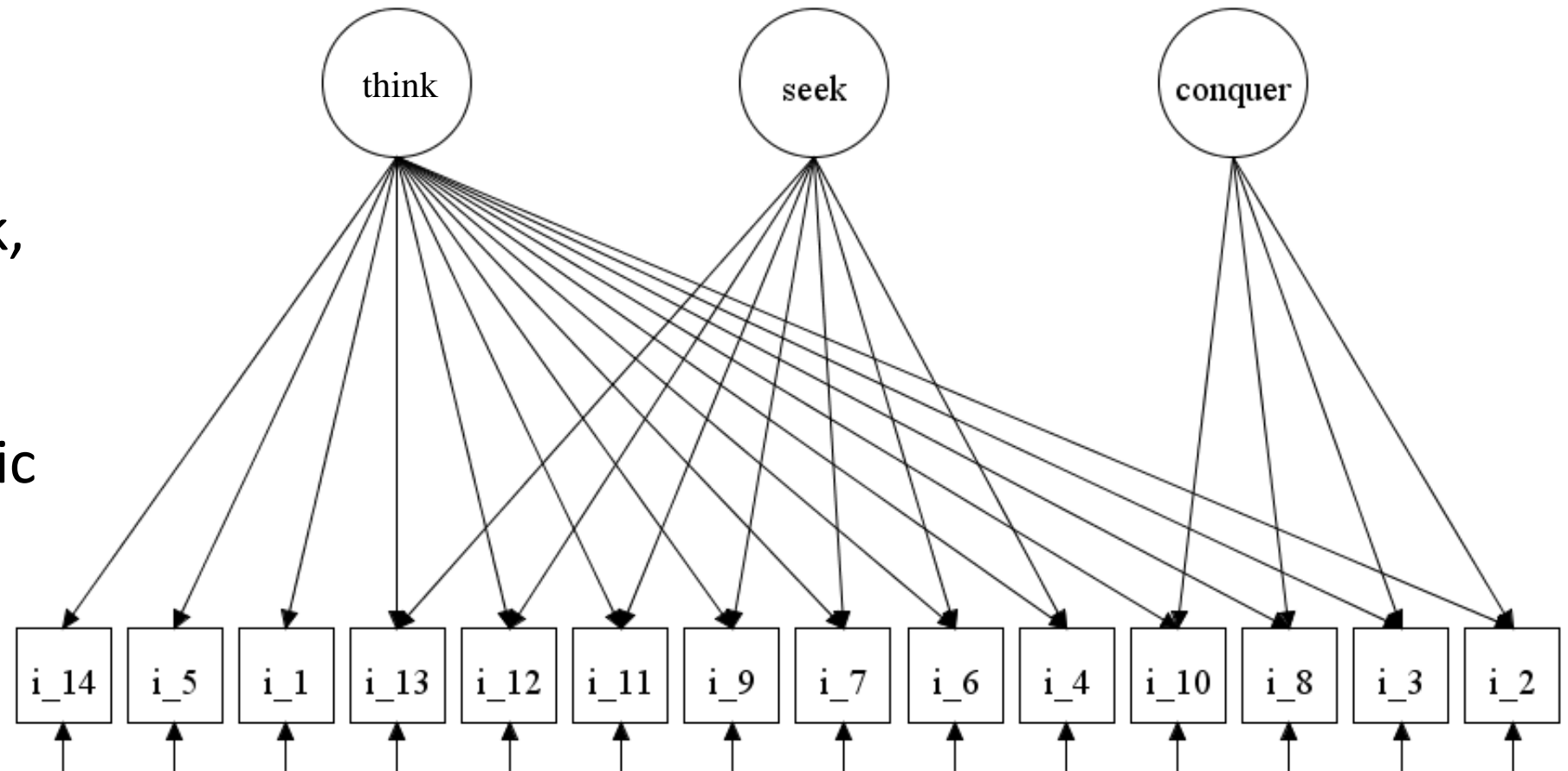- Empirical studies mostly lacking

Beyond unidimensional NFC: the "bi-factor" model of NFC (Keller et al., 2016)

➔ **Strong general factor, but additional subdimensions - seeking** challenges - **conquering** them
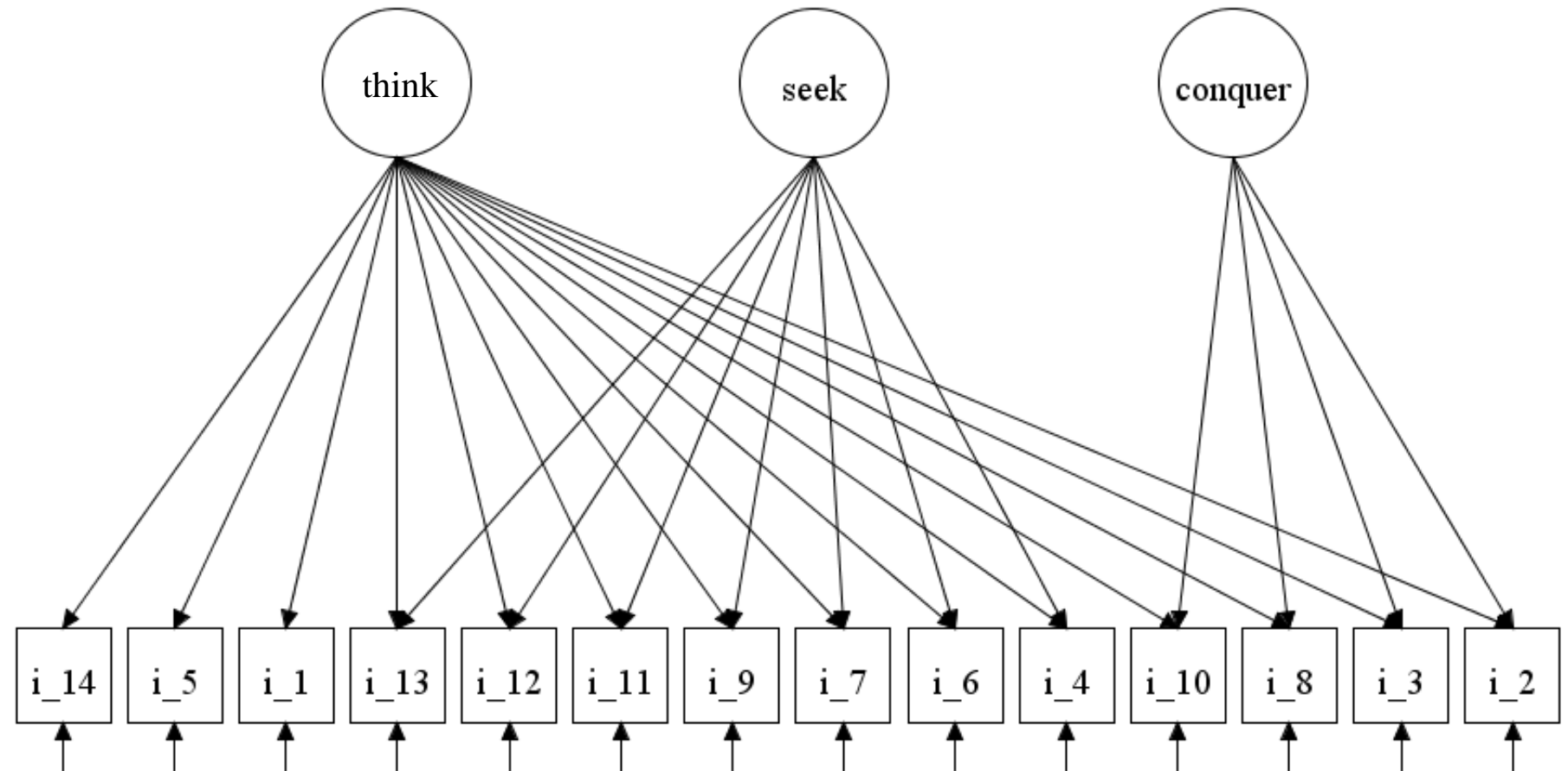
Beyond unidimensional NFC: the "bi-factor" model of NFC (Keller et al., 2016)

➔ Do these subfactors (seek, conquer) **incrementally predict** academic performance?

Method

- **Sample**: 3,409 students in Grade 7 from Flanders (166 classes; M_{age} 12.4 years)

- **Predictors**
    - Need for Cognition: 14 items from Preckel and Strobel (2017) (α = .92)
    - Cognitive ability: CoVaT-CHC (Magez et al., 2015)
    - Openness to experience: 6 items from Quick Big Five (Vermulst & Gerris, 2005) (α = .68)
    - Persistence: 6 items from Children's Perceived use of Self-Regulated Learning Inventory (Vandevelde et al., 2013) (α = .82)
    - Intrinsic academic motivation: 4 items from Academic Self-Regulation Questionnaire (Ryan & Connell, 1989) (α = .87)

- **Outcomes**
    - Academic achievement: GPA at the end of the school year

- **Structural model**, corrected for nesting in classes; standardized estimates

Factor analysis

CFA supported bi-factor model (alternative factor models, such as unidimensional model, also had reasonable fit)

	χ^2 (df)	Scaling Corr.	Diff.	AIC	RMSEA	CFI	TLI	SRMR
SF	1735.12 (77)	1.35	-	116971.747	.08	.91	.89	.05
CF	944.32 (74)	1.33	589.38 (3) $p < .001$	115891.322	.06	.95	.94	.04
BF	627.91 (66)	1.28	261.36 (8) $p < .001$	115456.501	.05	.97	.96	.03

Note. SF: single-factor model; CF: factor model with three correlated factors; BF: a bi-factor model with three uncorrelated factors. Diff.: Sattora-Bentler Scaled Chi-Squa Difference. $n = 3,337$. Fit of CF model compared to SF model; fit of BF model compared to CF model. Corrected for nesting in classes.

Latent correlations between NFC and other constructs

	Think	Seek	Conquer
Cognitive ability	.26* [.22, .30]	.08 [-.02, .17]	-.13* [-.18, -.08]
Openness	.20* [.16, .25]	-.10* [-.16, -.04]	.03 [-.02, .09]
Persistence	.36* [.32, .40]	-.04 [-.11, .02]	.49* [.44, .54]
Intrinsic Motivation	.60* [.56, .64]	.05 [-.04, .13]	.31* [.24, .37]

Note. 95%-confidence intervals between brackets. n = 3,337. Corrected for nesting in classes.

- Think (general NFC-factor) **correlated moderately to strongly** to all four other student characteristics
- Additionally, the Conquer subfactor of NFC was incrementally related to persistence and intrinsic motivation
- Seek was not or weakly incrementally related to other characteristics

Predicting academic achievement

Predictor	Model 1				Model 2			
	β	SE	β/SE	p	β	SE	β/SE	p
Need for Cognition - Think	0.24	0.02	11.64	<.001	0.11	0.03	4.30	<.001
Need for Cognition - Seek	0.11	0.03	3.98	<.001	0.09	0.02	4.11	<.001
Need for Cognition - Conquer	0.12	0.03	4.49	<.001	0.09	0.03	3.11	.002
Gender					0.19	0.02	11.25	<.001
Cognitive ability					0.48	0.02	31.00	<.001
Openness					-0.07	0.02	-3.85	<.001
Persistence					0.15	0.03	5.81	<.001
Intrinsic motivation					-0.02	0.03	-0.72	.469
Number of individuals	3,337				3,337			
Number of classes	166				166			
Fit statistics								
χ^2 (df)	700.402 (77)				3263.53 (461)			
AIC	124386.99				274647.00			
RMSEA	0.05				0.04			
CFI	0.97				0.93			
TLI	0.95				0.92			
SRMR	0.03				0.05			
R^2	8.1%				35.8%			

The general and subfactors of NFC each uniquely predicted achievement (together: R^2 = 8.1%)

Also **after controlling** for cognitive ability, openness, persistence, and intrinsic motivation for studying

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Among those other characteristics
- In particular cognitive ability predicted AP
- Smaller associations for persistence and (negative) for openness
- Null association for intrinsic motivation

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Persistence	0.15	0.03	5.61	<.001
Intrinsic motivation	-0.02	0.03	-0.72	.499
Need for Cognition–Think *Cognitive ability	0.00	0.02	0.00	.972
Number of individuals	3,337			
Number of classes	166			
Fit statistics				
χ^2 (df)				
AIC	267356.350			
RMSEA	-			
CFI	-			
TLI	-			
SRMR	-			
R²	35.8%			

No interaction between NFC and cognitive ability

Conclusion

- Need for Cognition **uniquely predicted** school achievement over and beyond four other student characteristics conceptually and empirically related to Need for Cognition

- **Subdimensions** of Need for Cognition (Seek, Conquer) predicted academic performance beyond the general factor

- Benefits of Need for Cognition observed **independently** of ability

➔ Findings underscore importance of Need for Cognition for academic functioning of students

➔ Important to find ways to improve Need for Cognition in youth!

https://www.projecttalent.be/

Lavrijsen J., Preckel F. & Verschueren, K. (2023). Seeking, mastering, and enjoying cognitive effort: scrutinizing the role of Need for Cognition in academic achievement. Accepted for publication in *Learning and Individual Differences*.

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