The Scale "Openness for Information" (SOFI) – A new assessment tool for research on information behavior

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Information Behavior

“information behavior”: *“activities a person may engage in when identifying their own need for information, searching for information and using or transferring that information.”* (Wilson, 1999, p. 249)

→ Important for learning and achievement, particularly in self-regulated learning activities

Prediction of Information Behaviors

- ***Context-oriented approach:*** situational demands, available information resources, scholarly discipline, stage of the research process etc. (e.g. Wilson, 1981)
- ***Competence-oriented approach:*** information literacy (knowledge / skills relevant for effective/efficient information behavior; e.g. Kwong & Son, 2011), prior knowledge/level of expertise, general cognitive abilities (e.g. Ingwersen, 1996)
- ***Personality-oriented approach:*** personal dispositions (personality dimensions, self-efficacy, personal interests, cognitive styles, learning styles etc., e.g. Halder, Roy, & Chakraborty, 2010; Heinström, 2003, 2005; Kim, Sin & Tsai, 2014; Kwon & Song, 2011)

Openness for Information (OI)

- situational trait influencing behaviors in the context of information searching; dispositional “need for information”

- individual preference for broad and comprehensive, as well as deep and differentiated, well-reflected information behaviors → individuals with high “openness for information” are generally inclined to:
  - approach information searching in an intellectually curious, open-minded manner,
  - invest much time and effort in information searching
  - try to identify multiple perspectives on a topic,
  - strive to test assumptions by consulting multiple information sources,
  - apply well-founded evaluation criteria

Research Questions and Hypotheses (1)

(1) **Scale construction**: structure, psychometrics (reliability, item-total correlations), and **stability**

(2) Associations with **information behaviors:**

- metacognitive activities (planning, monitoring, reflecting) ↗
- number/variety of information sources used ↗
- application of sophisticated (scientific) evaluation criteria ↗

(3) Associations with **personality measures:**

- Need for Cognitive Closure ↘
- "Big 5": Openness for Experiences ↗, Conscientiousness ↗
- Epistemic curiosity ↗

Research Questions and Hypotheses (2)

(4) Associations with **cognitive abilities and competence measures:**

- Verbal intelligence **?**
- Nonverbal intelligence **?**
- Scholarly information literacy (knowledge about searching and accessing information) **?**

(5) **Relevance for learning:** Prediction of information literacy acquisition

Scale „Openness for Information“ (SOFI)

- **Pilot version:** *k* = 17 items referring to information search and evaluation, e.g.,
  - *„I try to find out whether contradictory information on my search topic/my question exists.“*
  - *„I invest a lot of time to find the best source of information.“*
  - *I use a variety of information sources to get an impression of the spectrum of opinions on the topic / possible answers on my question“*

- **Instruction:** „Please indicate how you *usually* behave when searching and evaluating information.“

- **Ratings:** 5-point Likert scales *(„very atypical for me” – „very typical for me”)*

Empirical Studies

- ***Study 1: Construction and first validation***
  - *N* = 112 law students (all semesters)
  - 18 - 33 years (*M* = 21.88, *SD* = 2.80), 60.7 % female
- ***Study 2: Stability and validity***
  - *N* = 116 (Study **2a**)/*N* = 115 (Study **2b**) psychology students (2nd year BSc; 3rd and 4th wave of a longitudinal study; *N* = 137 at t1),
  - 18 to 31 years (*M* = 20.33, *SD* = 2.29), 81.8 % female
- ***Study 3: Associations with cognitive abilities***
  - *N* = 99 students of educational sciences (all semesters)
  - 17 to 32 years (*M* = 21.96, *SD* = 2.87), 82.0 % female
- ***Study 4: Applicability in non-student samples***
  - *N* = 86 adults (opportunity sample; online study)
  - 18-74 years (*M* = 44.35, *SD* = 13.22), 52.3 % female

Construction: EFA / CFA

- **Exploratory Factor Analysis**
  - Study 1 (*N* = 112 law students) → Principal Components Analysis
  - Scree-Test / parallel analysis (Horn, 1965): 1 factor (29.32 percent of variance) → Final version: *k* = 9 items

- **Confirmatory Factor Analysis**
  - Study 1, 2a, 3, 4 (*N* = 413) → CFA with Mplus-Version 7.2 (Muthén & Muthén, 2014), ML-estimations
  - 1-factor-model: χ^2 = 78.56, *df* 27, *p* <.001; CFI = 0.939, TLI = 0.919, RMSEA = .068 [90%-CI = .051-.086], SRMR = .040

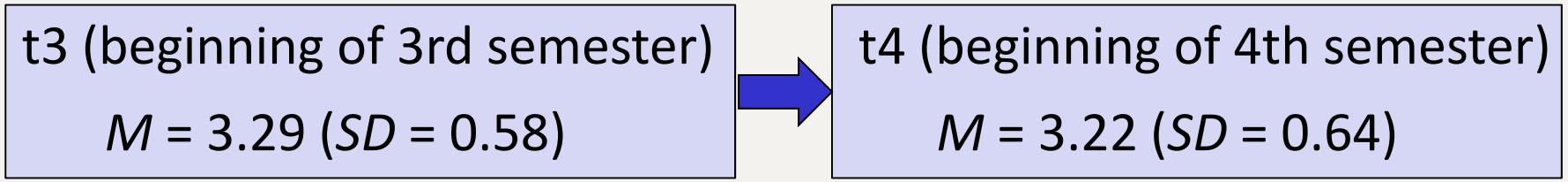
Descriptive Statistics and Reliability

Study	*N*	*M*[a]	*SD*	Cronbach's Alpha	$r_{it\text{-}i}$ (min-max)
1 (Law - all yrs.)	112	3.51	0.68	.80	.42 - .65
2a (Psych. – 2nd yr.)	116	3.29	0.58	.81	.30 - .61
2b (Psych. – 2nd yr.)	115	3.22	0.64	.83	.33 - .69
3 (Educ. Sc. - all yrs.)	99	3.51	0.59	.75	.28 - .60
4 (Adults)	86	3.68	0.68	.86	.39 - .68

Notes. [a] Range of values: 1-5. *N*: sample size, *M*: arithmetic mean, *SD*: standard deviation, *rit-i(min-max)*: Range of part-whole corrected item-total correlations

Stability

- Study 2a/b: *N* = 115 Psychology students (BSc, 2nd year)



[*t* = 1.81, *df* 113, *n.s.*]

- test-retest correlation (6 months): *r* = .64***

Correlations with Information Behaviors (Self Reports)

„Information Behavior Questionnaire“ (IBQ; Mayer, in prep.):
Self-reports about the typicality of behaviors during an information search on a health-related topic based on an information problem solving model (Brand-Gruwel, Wopereis, Vermetten, 2005; Brand-Gruwel, Wopereis, & Walraven, 2009).

	Planning the search (k = 6)	**Monitoring** the search process (k = 3)	**Documenting** & organizing search results (k = 4)	**Reflecting** the search process and its results (k = 3)
Study 1	.32**	.12	.33**	.17+
Study 2a (t3) – IBQ(t4)	.28**	.23*	.18+	.26**
Study 2b (t4) – IBQ(t4)	.18+	.17	.09	.23*
Study 3	.25**	.08	.24**	.33**
Study 4	.41**	.24**	.36**	.32**

Correlations with Information Sources and Evaluation Criteria (Self Reports)

„Information Behavior Questionnaire“ (IBQ; Mayer, in prep.): Self-reports about the typicality of a) using specific types of information sources

b) applying specific types of criteria to evaluate information

Study	Information Sources				Evaluation Criteria	
	Books	Press	Social Partners	Science	Scientific / formal quality	Clarity
Study 1	.26**	.21*	-.07	.33**	.44**	-.05
Study 2a (t3) – IBQ(t4)	.08	.11	-.06	.19*	.37**	-.06
Study 2b (t4) – IBQ(t4)	.18+	.06	-.07	.19*	.26*	.03
Study 3	.49**	.25**	-.08	.35**	.43**	-.05
Study 4	.33**	.14	.06	.48**	.52**	.17

Correlations with NCC and „Big Five“

- Need for Cognitive Closure Scale NCC – German short form (*k* = 16; Schlink & Walther, 2007)
- NEO-FFI – German short form (*k* = 30; Koerner et al., 2008)
- Epistemic Curiosity Scale EC (Litman & Mussel, 2013) – Interest-type vs. Deprivation-type EC

Study	NCC	NEO-N	NEO-E	NEO-O	NEO-A	NEO-C	EC-I	EC-D
Study 1	-.32**	-.15	.17	.24**	-.16	.19*	.50**	.39**
Study 4	-.21*	-.03	.08	.20*	.10	.17+	--	--
	NCC (t1)	NEO-N (t2)	NEO-E (t2)	NEO-O (t2)	NEO-A (t2)	NEO-C (t2)	EC-I (t1)	EC-D (t1)
Study 2a (SOFI-t3)	-.31**	-.25**	.16	.25**	.28**	.18*	.29**	.08
Study 2b (SOFI-t4)	-.23**	-.12	.07	.24**	.31**	.24**	.14	.13

Correlations With Cognitive Abilities and Scholarly Information Literacy

- Intelligence:
  - Nonverbal intelligence: Raven Advanced Progressive Matrices (Raven, 1962)
  - Verbal intelligence: Verbal Analogies (IST 2000R; Amthauer, Brocke, Liepmann, & Beauducel, 2001)

- Scholarly Information Literacy:
  - Procedural Information-Seeking Knowledge Test (PIKE; Rosman, Mayer & Krampen, 2015)

	Raven (t1)	Verbal Analogies(t1)	PIKE (t3)	PIKE (t4)
Study 2a (t3)	.11	.07	.09	.22*
Study 2b (t4)	.07	.18*	.10	.17*

Relevance: Openness for Information and the Acquisition of Scholarly Information Literacy

Study 2a/b: Prediction of changes in Information literacy by Openness for Information → Stepwise Multiple Regression

criterion = PIKE t4;

predictors : Step 1: PIKE t3
Step 2: verbal analogies t1
Step 3: SOFI t3

final model: R^2 = .427, F = 27.34, df 3/110, p <.01;
R^2_{change} (SOFI) = .025, p < .05

	b	SE(*b*)	β	*t*	*p*
Constant	6.905	5.520		1.251	.214
PIKE (t3)	.639	.089	.534	7.170	.000
Verbal Analogies (t1)	.575	.203	.211	2.833	.005
SOFI (t3)	2.041	.938	.158	2.175	.032

Conclusions

- The Openness for Information Scale SOFI is a
  - economic,
  - reliable, and
  - stable measure of openness for information during information search and evaluation

  - **Validity & relevance:** first hints, but more evidence needed, e.g. associations with
    - observations of information behaviors (planning searches, formulating and realizing search strategies, evaluating information, aggregating information)
    - additional constructs related to learning and achievement (e.g., styles of learning, goal orientations; epistemological beliefs)
    - quality of search results / decisions based on searches → situational variability in the „optimal level“ of openness (e.g., simple vs. complex tasks)?

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Thank you!

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