Predicting the scholarly impact of Ph.D. candidates over time

TOM JUNKER, MARISE BORN, RENÉ BUTTER (ERASMUS UNIVERSITY ROTTERDAM)

From finishing the Ph.D. to staying in academia and having an impact

Finishing the Ph.D.

- Only 4-8% of doctoral students finish their degree within 4 years in The Netherlands (Berger & de Jonge, 2005)
- Less than 30% stay in academia after obtaining their Ph.D. (similar numbers in US; Seo et al., 2020)

Staying in academia

- Strongly determined by research impact (number of publications, citations etc.)
  - ***Can we predict impact already at the time of the Ph.D. based on candidate's personality?***

Public debate on the measurement of scholarly impact

Knowledge sector takes major step forward in new approach to recognising and rewarding academics

12 November 2019

Academics can excel in many areas, but thus far they have primarily been assessed based on research achievements. From now on, the public knowledge institutions and research funders want to consider academics' knowledge and expertise more broadly in determining career policy and grant requirements.

CAREER NEWS | 25 June 2021

Impact factor abandoned by Dutch university in hiring and promotion decisions

Faculty and staff members at Utrecht University will be evaluated by their commitment to open science.

ScienceGuide

Nieuwe Erkennen en waarderen schaadt Nederlandse wetenschap

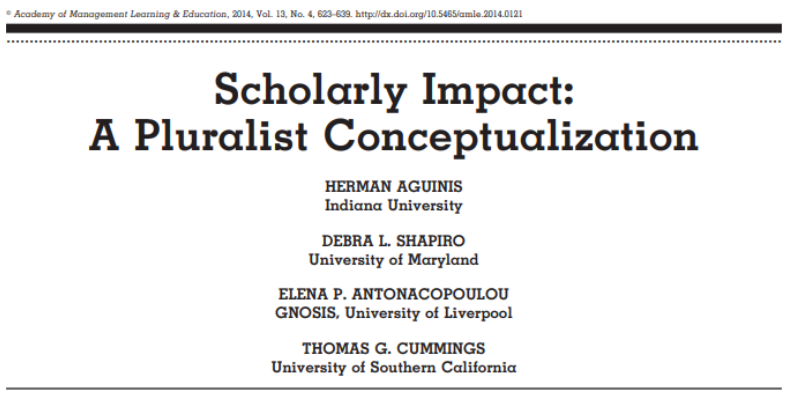
Opinie | door gastauteurs

19 juli 2021 | Een groep van 171 wetenschappers, waaronder 142 hoogleraren, waarschuwt in deze op

Defining and measuring scholarly impact

Recommendations of Aguinis et al. (2014):

- Consider multiple stakeholders
  - **Impact *inside* the field (e.g., publication records)**
  - **Impact *beyond* the field (e.g., practitioner involvement)**
- Use multiple measures to avoid psychometric deficiency


Academy of Management Learning & Education, 2014, Vol. 13, No. 4, 623–639. http://dx.doi.org/10.5465/amle.2014.0121

Scholarly Impact:
A Pluralist Conceptualization

HERMAN AGUINIS
Indiana University

DEBRA L. SHAPIRO
University of Maryland

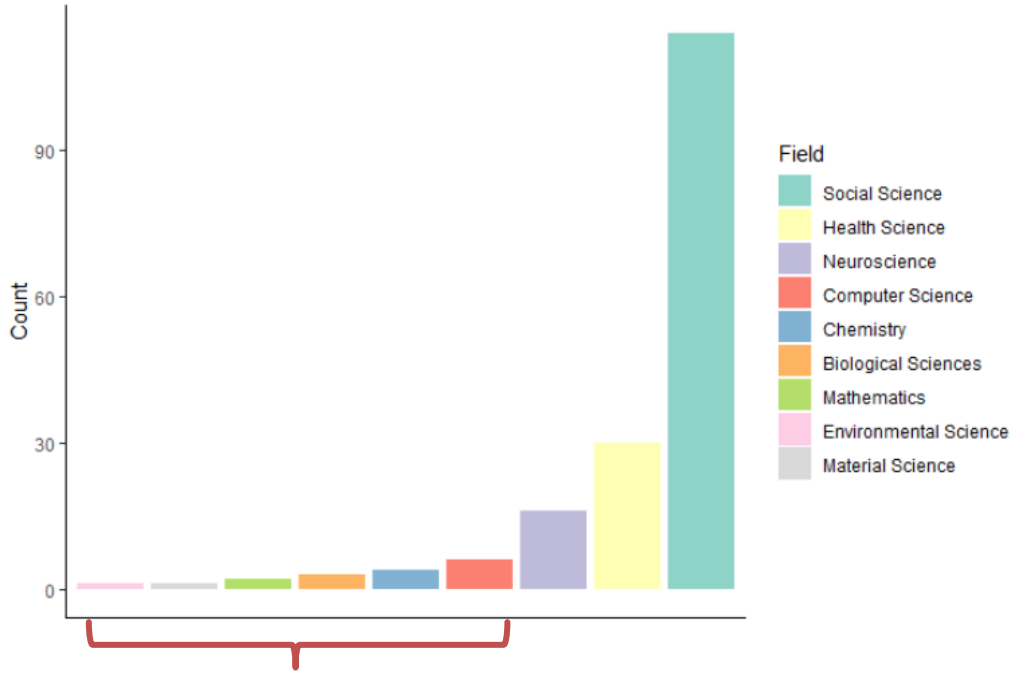
ELENA P. ANTONACOPOULOU
GNOSIS, University of Liverpool

THOMAS G. CUMMINGS
University of Southern California

Aguinis, H., Shapiro, D. L., Antonacopoulou, E. P., & Cummings, T. G. (2014). Scholarly impact: A pluralist conceptualization. *Academy of Management Learning & Education, 13*(4), 623-639.

Overview of the present research – sample

- Total sample composed of **329 (former) Ph.D. candidates** as in Butter & Born (2012)
- Predictor data (personality measures) recorded in between 2007 and 2010
  - Participants were on average in the 3rd year of their Ph.D.
  - Mostly female (57%) and on average 29 years old



Coded as "STEM" fields

Butter, R., & Born, M. P. (2012). Enhancing criterion-related validity through bottom-up contextualization of personality inventories: The construction of an ecological conscientiousness scale for Ph. D. candidates. *Human Performance*, *25*(4), 303-317.

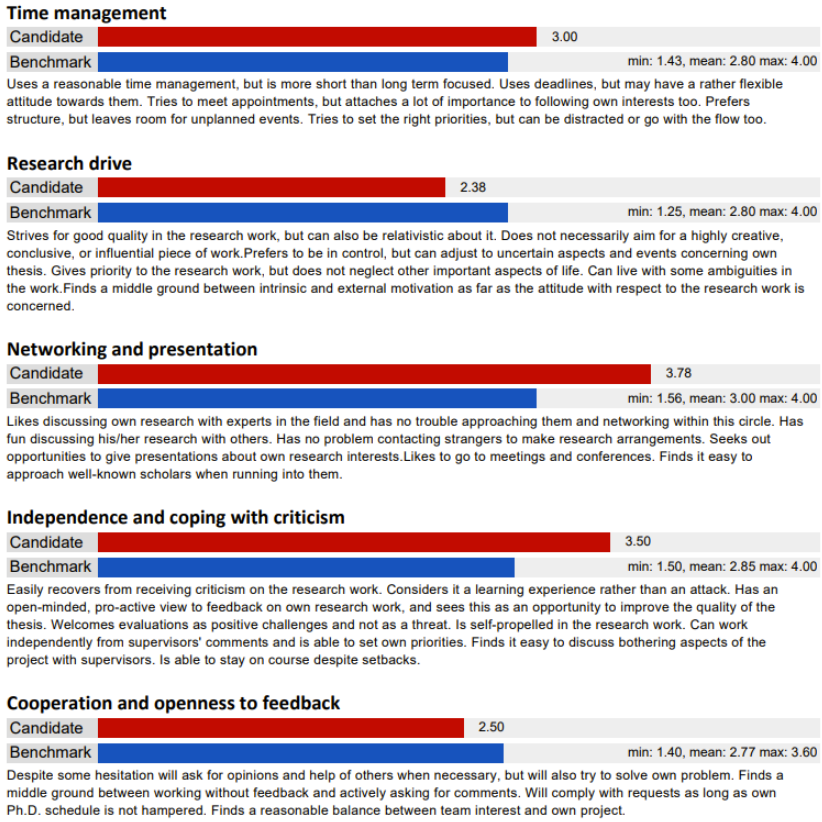
Predictors assessed in 2007-2010

The Ph.D. Personality Questionnaire (PPQ)

- **Contextualized "ecological" measure** of personality enactment in the Ph.D. context (Butter & Born, 2012)
- **Bipolar forced choice** rating (1-5) to reduce socially desirable responding

(1)
"I approach deadlines in a rather loose manner"

(5)
"As far as deadlines in my Ph.D. project are concerned, I am a reliable person"



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Convergent validity of the PPQ with standard measures of personality

Conscientiousness – dependability	*Neuroticism*	*Agreeableness*	*Conscientiousness – achievement striving*	*Extraversion*
Time management	Independence	Cooperativeness	Research drive	Networking

Correlations with IPIP personality scales (N = 190)

	Time management	Independence	Cooperativeness	Research drive	Networking
Extraversion	-.098	.119	.303**	.014	**.545****
Conscientiousness	**.593****	.323**	-.017	**.224****	.104
Agreeableness	.113	.094	**.231****	.028	.201**
Emotional stability	.210**	**.531****	-.107	.016	.239**
Openness	-.065	.321**	-.057	.127	.316**

**. Correlation is significant at the 0.01 level (2-tailed).

Objective criteria recorded by the end of 2019

Proximal criteria (*N* = 201):

- **Degree status**: For 170 participants it was verified based on NARICS whether they obtained their degree, for 31 participants it was concluded that they did not obtain their Ph.D.

NARCIS - National Academic Research and Collaborations Information System

LinkedIn

Distal criteria (*N* =181):

- *Impact inside the field*
  - **H-index** (i.e., a cumulative measure)
  - **Top journal publications** (i.e., a non-cumulative measure)
- *Impact beyond the field*
  - **Number of subject areas published** (i.e., interdisciplinarity)
  - **Academic-corporate collaboration** (i.e., practitioner perspective)

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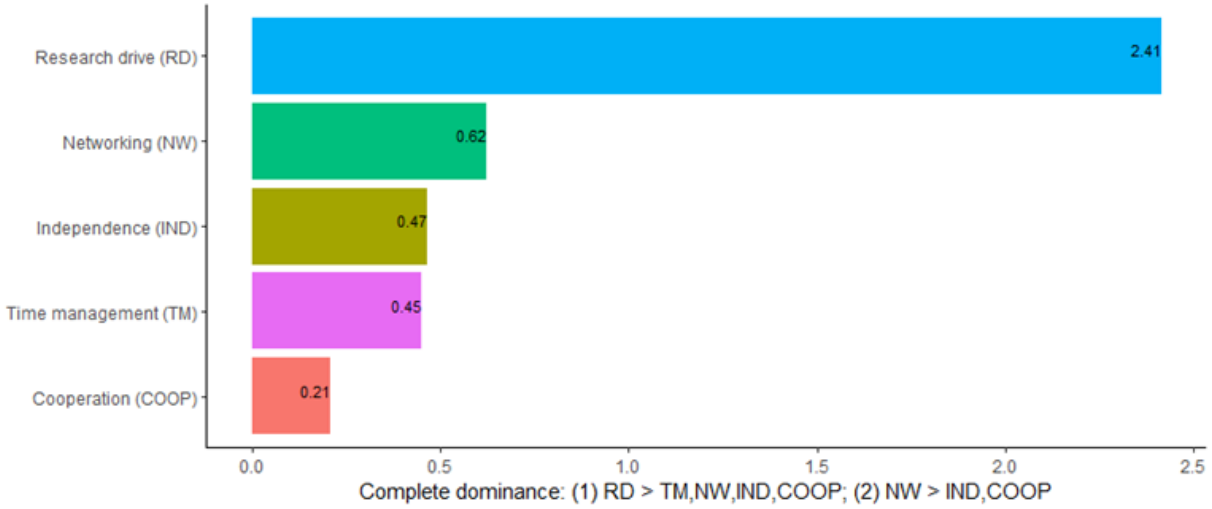
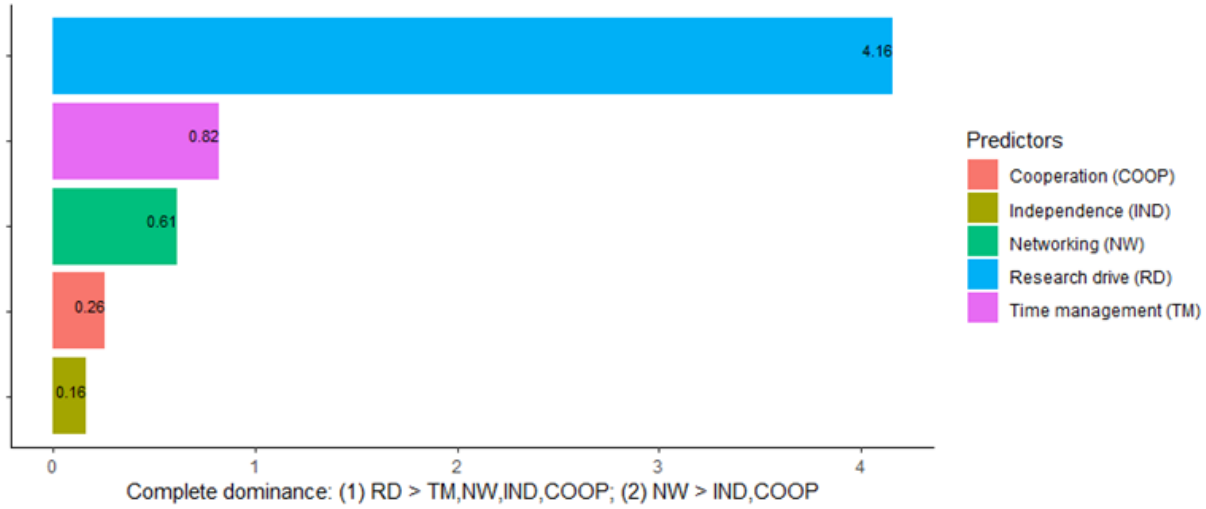
Impact *inside* the field is best predicted by research drive

Explained variance h-index



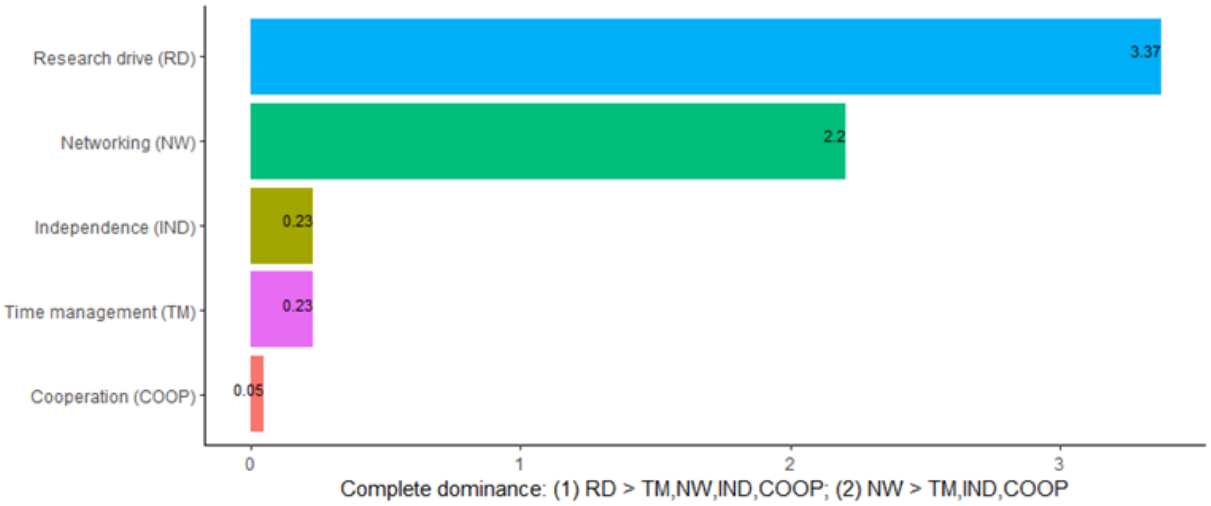
Explained variance top journal publications



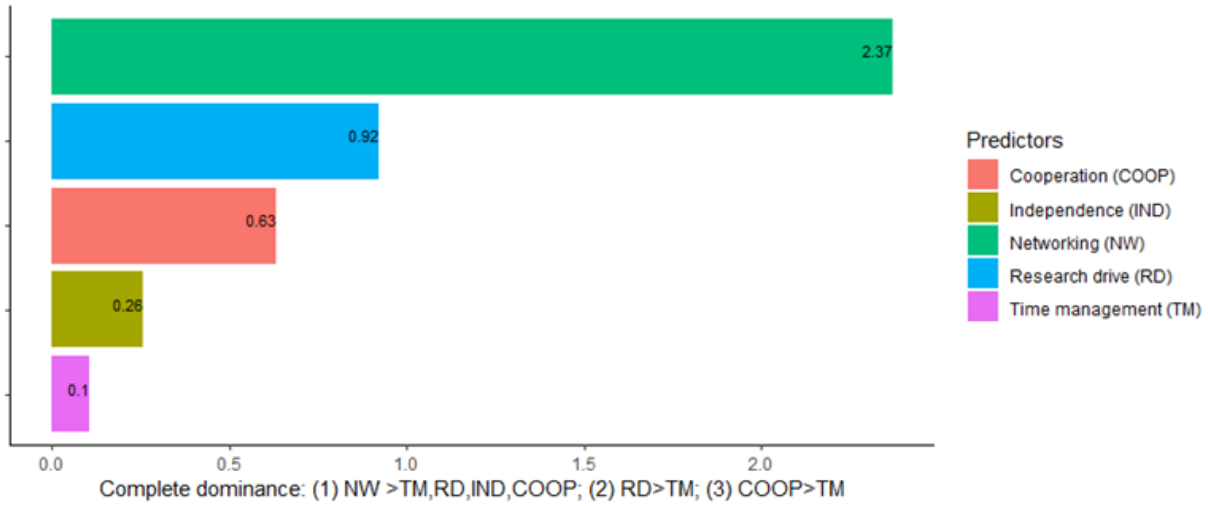
Research drive assessed during the Ph.D. uniquely predicted the **h-index** (***ß* = .15,** 95% bootstrap CI [.292; 4.315]) and the **percentage of publications in top journals** (***ß* = .23**, 95% bootstrap CI [5.030; 23.678])

Impact *beyond* the field is best predicted by networking

Explained variance subject areas



Explained variance academic-corporate collaboration



Networking uniquely predicted **academic-corporate collaboration** (***ß* = .17,** 95% bootstrap CI [.859; 4.196]) and the **subject areas count** (***ß* = .17**, 95% bootstrap CI [.124; 1.920])

FURTHER DEVELOPMENT OF THIS WORK

NO EQUIDISTANT MEASUREMENT

Person A

PPQ 2007 PhD 2009

13 years prediction interval

Person B

PPQ 2010 PhD 2011

10 years prediction interval

Criteria recorded end of 2019

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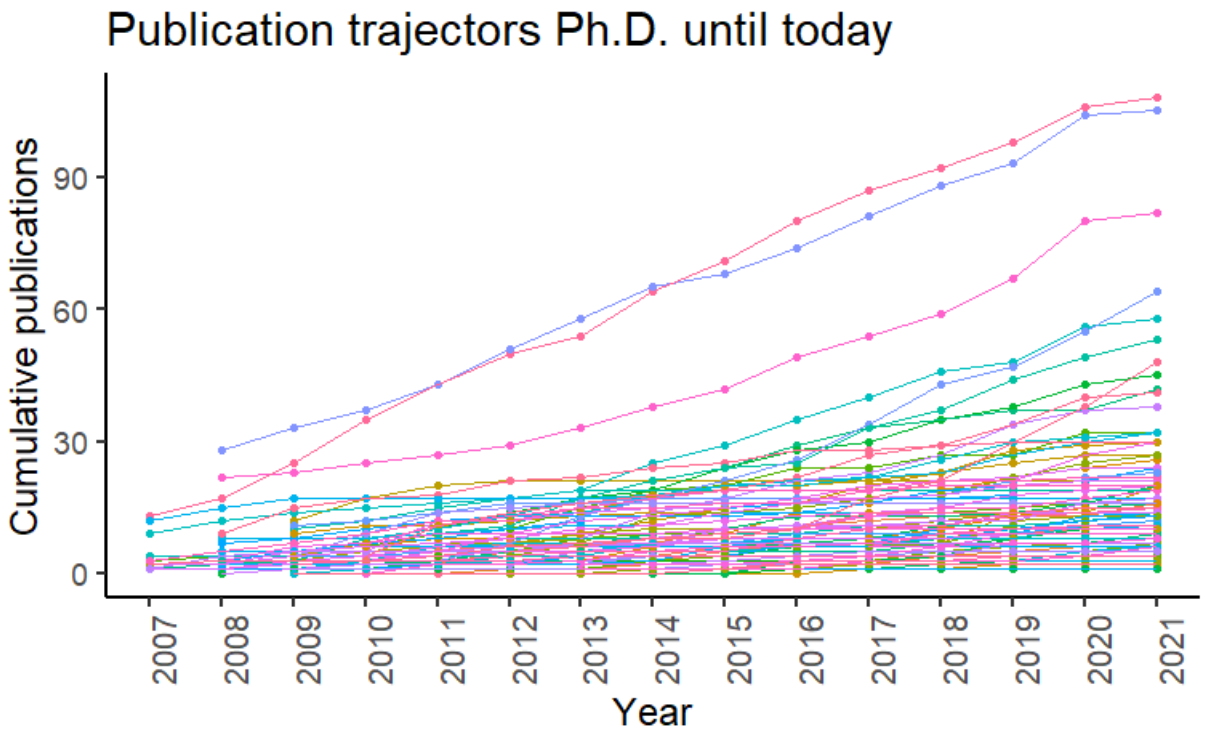
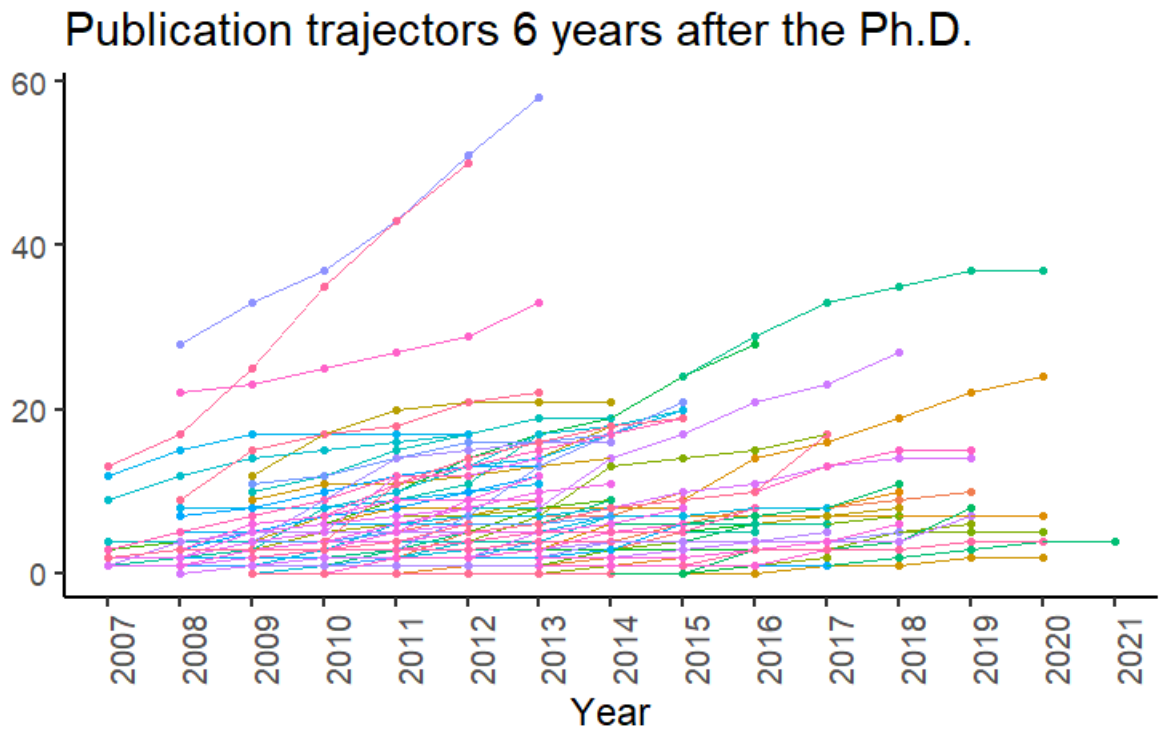
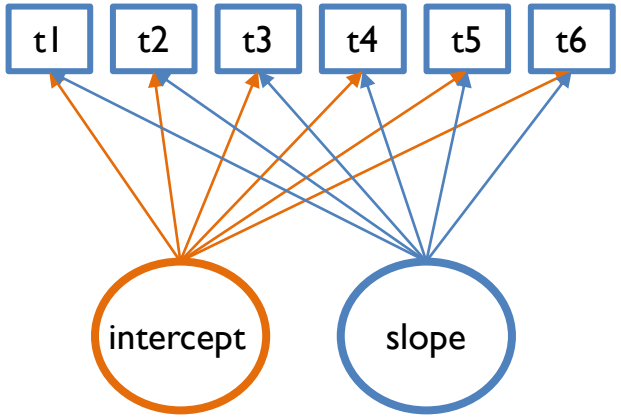
WHAT HAPPENED IN BETWEEN?



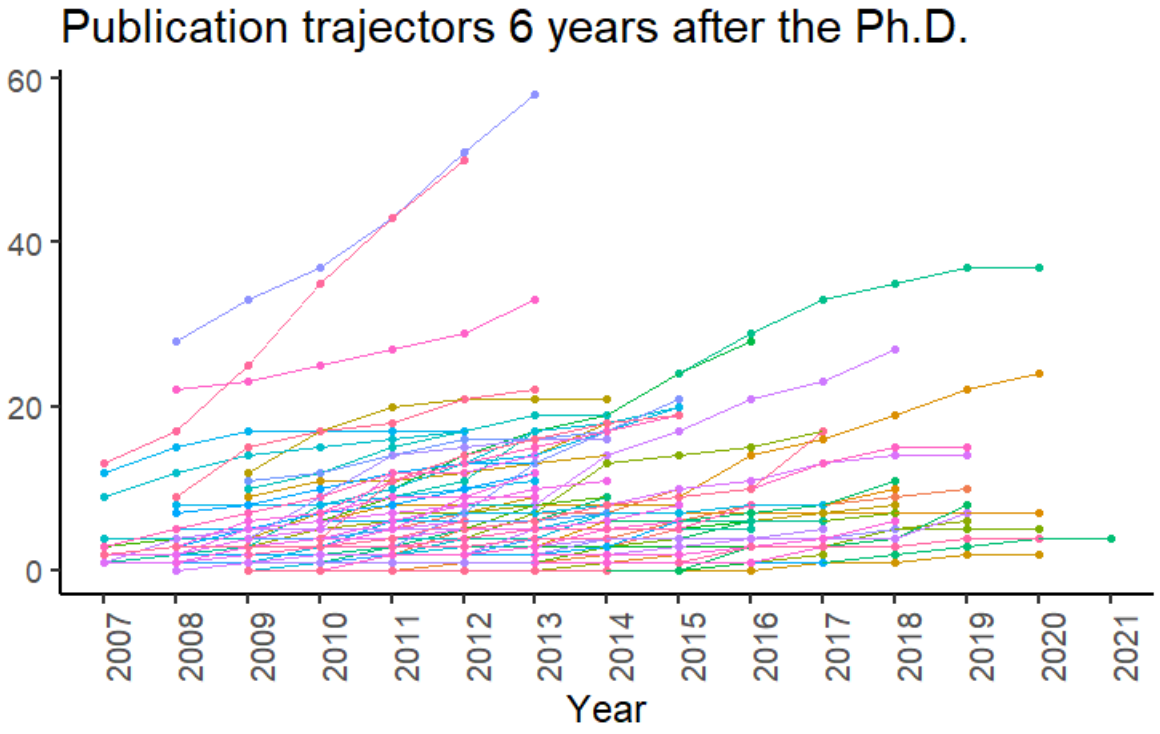


Sample restricted to those who completed their Ph.D. and for whom we had at least 6 repeated measures (*N* = 106)

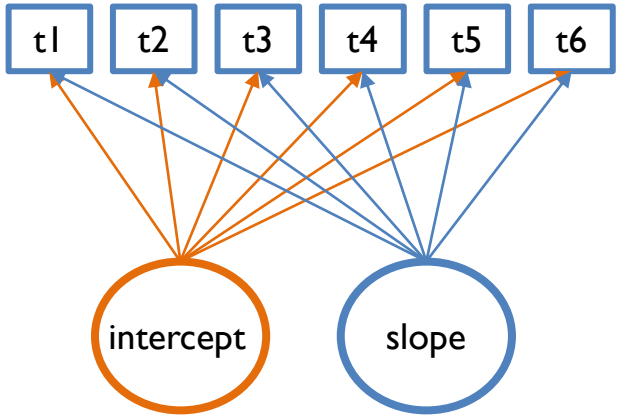
PREDICTING GROWTH



Latent growth curve modelling



GROWTH DIFFERENCES BETWEEN FIELDS



Regressions:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
i ~						
STEM	7.790	1.649	4.723	0.000	1.584	0.393
Health	4.121	1.097	3.757	0.000	0.838	0.315
Neuro	6.461	1.552	4.162	0.000	1.314	0.347
s ~						
STEM	1.619	0.457	3.545	0.000	1.326	0.329
Health	0.637	0.304	2.097	0.036	0.522	0.196
Neuro	0.373	0.430	0.868	0.386	0.305	0.081

- Compared to social science researchers, those from **STEM, health science, and neuroscience started with a higher number of publications** directly after finishing their Ph.D.
- Compared to the social science researchers, those from **STEM and health science showed a steeper increase in the number of publications** following the first 6 years after finishing their Ph.D.

ONLY RESEARCH DRIVE PREDICTS GROWTH

Regressions:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
i ~						
STEM	7.284	1.655	4.400	0.000	1.480	0.368
Health	4.226	1.086	3.892	0.000	0.859	0.322
Neuro	6.619	1.553	4.262	0.000	1.345	0.355
RD	0.290	1.007	0.288	0.773	0.059	0.026
NW	-0.126	1.006	-0.125	0.901	-0.026	-0.013
IND	-0.681	1.685	-0.404	0.686	-0.138	-0.054
TM	-1.316	1.046	-1.258	0.209	-0.267	-0.130
COOP	-1.331	1.209	-1.101	0.271	-0.270	-0.115
s ~						
STEM	1.389	0.443	3.136	0.002	1.136	0.282
Health	0.699	0.291	2.406	0.016	0.572	0.215
Neuro	0.192	0.416	0.463	0.643	0.157	0.042
RD	0.763	0.270	2.832	0.005	0.624	0.278
NW	0.385	0.269	1.429	0.153	0.315	0.163
IND	-0.070	0.451	-0.156	0.876	-0.058	-0.022
TM	-0.294	0.280	-1.051	0.293	-0.240	-0.117
COOP	-0.103	0.324	-0.319	0.750	-0.084	-0.036

None of the PPQ predictors related significantly to **initial levels** of publications by the end of the Ph.D.

Only research drive significantly related to **growth** in the number of publications over time

POTENTIAL FUTURE RESEARCH

Emerging hypotheses:

H1: The Ph.D. environment (e.g., supervisor's scholarly impact) predicts initial levels *and* growth

H2: Impact of personality factors (e.g., research drive) unfolds over time, only predicting growth