

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

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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.





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 <u>beyond</u> the field (e.g., practitioner involvement)
- Use multiple measures to avoid psychometric deficiency

Scholarly Impact: A Pluralist Conceptualization

Academy of Management Learning & Education, 2014, Vol. 13, No. 4, 623-639. http://dx.doi.org/10.5465/amle.2014.012

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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





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"

Time management

Indidate				3.00					
nchmark					mi	in: 1.43, m	ean: 2	.80 ma	x: 4.00

Uses a reasonable time management, but is more short than long term focused. Uses deadlines, but may have a rather flexible attitude towards them. Tries to meet appointments, but attaches a lot of importance to following own interests too. Prefers structure, but leaves room for unplanned events. Tries to set the right priorities, but can be distracted or go with the flow too.

Research drive

Ber

Candidate	2.38	
Benchmark		min: 1.25, mean: 2.80 max: 4.00

Strives for good quality in the research work, but can also be relativistic about it. Does not necessarily aim for a highly creative, conclusive, or influential piece of work. Prefers to be in control, but can adjust to uncertain aspects and events concerning own thesis. Gives priority to the research work, but does not neglect other important aspects of life. Can live with some ambiguities in the work. Finds a middle ground between intrinsic and external motivation as far as the attitude with respect to the research work is concerned.

Networking and presentation

Candidate	3.78
Benchmark	min: 1.56, mean: 3.00 max: 4.00
Likes discussing own research with experts in the field and has no trouble approaching	

fun discussing his/her research with others. Has no problem contacting strangers to make research arrangements. Seeks out opportunities to give presentations about own research interests.Likes to go to meetings and conferences. Finds it easy to approach well-known scholars when running into them.

Independence and coping with criticism

Candidate	3.50
Benchmark	min: 1.50, mean: 2.85 max: 4.00

Easily recovers from receiving criticism on the research work. Considers it a learning experience rather than an attack. Has an open-minded, pro-active view to feedback on own research work, and sees this as an opportunity to improve the quality of the thesis. Welcomes evaluations as positive challenges and not as a threat. Is self-propelled in the research work. Can work independently from supervisors' comments and is able to set own priorities. Finds it easy to discuss bothering aspects of the project with supervisors. Is able to stay on course despite setbacks.

Cooperation and openness to feedback

Candidate	2.50
Benchmark	min: 1.40, mean: 2.77 max: 3.60
Despite some hesitation will ask for opinions and help of others when	necessary, but will also try to solve own problem. Finds a

Place and restance with a second plant and here of our and the port out a when recessary, our with a second by the source of the plant. If the second between working without feedback and actively asking for comments. Will comply with requests as long as own Ph.D. schedule is not hampered. Finds a reasonable balance between team interest and own project.

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	.23 I ^{**}	.028	.201**
Emotional stability	.210***	.53 I ^{**}	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.

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 <u>beyond</u> the field
 - Number of subject areas published (i.e., interdisciplinarity)
 - Academic-corporate collaboration (i.e., practitioner perspective)

NARCIS - National Academic Research and Collaborations Information System







Predictors

Cooperation (COOP) Independence (IND)

Networking (NW) Research drive (RD)

ime management (TM)

Impact inside the field is best predicted by research drive

Explained variance h-index

2. Research drive (RD) 0.82 Networking (NW) Independence (IND) 0.45 Time management (TM) 0.21 Cooperation (COOP) 2.5 0.0 0.5 1.0 1.5 2.0 0 2 3 Complete dominance: (1) RD > TM,NW,IND,COOP; (2) NW > IND,COOP Complete dominance: (1) RD > TM,NW,IND,COOP; (2) NW > IND,COOP

Explained variance top journal publications

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



Impact beyond the field is best predicted by networking

 Research drive (RD)
 3.37

 Networking (NW)
 22

 Independence (IND)
 0.23

 Time management (TM)
 0.23

 Cooperation (COOP)
 0.05

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 Complete dominance: (1) RD > TM,NW,IND,COOP; (2) NW > TM,IND,COOP
 Complete

Explained variance subject areas



Explained variance academic-corporate collaboration

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

FURTHER DEVELOPMENT OF THIS WORK





NO EQUIDISTANT MEASUREMENT





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



- 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:

9							
		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
Г	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
	ТМ	-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

