

**Convergent validity of altmetrics and case studies for  
assessing societal impact: an analysis based on UK  
Research Excellence Framework (REF) data.  
Lutz Bornmann, Robin Haunschild & Jonathan Adams**





- Increasing governmental interest about the returns from research to society and the economy
- There has been a broadening of the impact concept (from academic to societal)
- Definition of societal impact: “Research has a societal impact when auditable or recorded influence is achieved upon non-academic organisation(s) or actor(s) in a sector outside the university sector itself – for instance, by being used by one or more business corporations, government bodies, civil society organisations, media or specialist/professional media organisations or in public debate” (Wilsdon et al., 2015, p. 6)
- Altmetrics have been proposed as possible societal impact indicator
- It is not clear whether they provide relevant information



- We address the question of the convergent and discriminant validity of altmetrics data for measuring societal impact
- We compare the altmetrics results with results based on bibliometric data for measuring academic impact
- Data from the UK Research Excellence Framework (REF) and the company Altmetric (see [www.altmetric.com](http://www.altmetric.com))
- We compare the impact of two groups of publications:
  - 1) Publications referenced as underpinning research in impact Case Studies (PCS): case studies are short documents each containing six relevant references and used by UK universities to describe the socio-economic impact of their research
  - 2) Publications submitted as REF Research Outputs (PRO): To demonstrate academic achievement, UK institutions submit four research publications for each selected research staff member



- Altmetrics cover a diverse range of data (e.g., views, downloads, clicks, notes, saves, tweets, shares, likes, recommends, tags, posts, trackbacks, discussions, bookmarks, and comments)
- In this study, we have included six altmetrics that are frequently investigated in altmetrics' studies: Blogs, Facebook, News, Twitter, Wikipedia, mentions in policy-related documents
- Traditional citations for comparison
- Predictions (societal and academic impact):
  - 1) Publications referenced as underpinning research in impact Case Studies (PCS): we predict high societal, but rather low citation impact for these publications
  - 2) Publications submitted as REF Research Outputs (PRO): we predict rather low societal, but high citation impact for these publications



- The REF output data including publication DOIs (outputs include articles, books, proceedings and audio and visual material) are available at <http://results.ref.ac.uk/>
- The REF case study IDs, the cited publications and their corresponding DOIs were shared with us by Digital Science (<https://www.digital-science.com>)
- Citation data from Elsevier's Scopus database
- Altmetrics data from the company Altmetric
- Citations were determined using a two-year citation window for all papers published before 2015
- The short citation window is a compromise between sufficient time to measure impact and the shortened time to be used as comparison with altmetrics data



- Bornmann and Haunschild (in press) proposed the use of the MHq indicator as a field- and time-normalized altmetrics indicator
- The indicator is especially designed for count data with many zeros
- Many zeros occur in most altmetrics data
- Because of the many zeros, the usual normalization procedures in bibliometrics cannot be applied to most altmetrics
- Normalized indicators in bibliometrics are usually calculated on the single paper level
- MHq is calculated on the aggregated level considering field and time of publication
- For the impact comparison of publication sets (here PRO and PCS), the number of papers mentioned (e.g. on Twitter) and not mentioned are compared



We therefore aggregated the data into three groups:

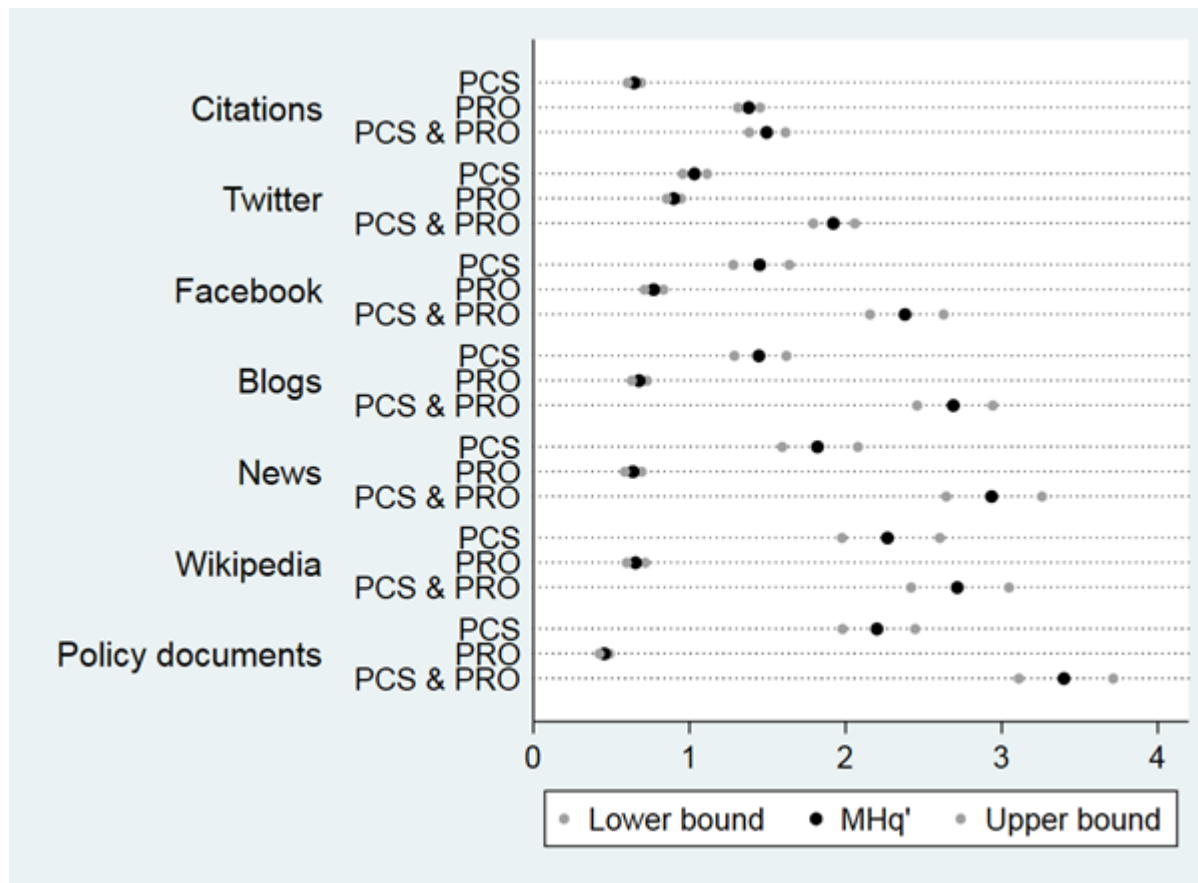
- 1) PCS (not part of PRO): 11,822 papers
- 2) PRO (not part of PCS): 120,784 papers
- 3) PCS & PRO (PRO, part of PCS): 5,703 papers

Analyzing convergent and discriminant validity in this study:  
expected metrics scores

	PCS (not part of PRO)	PRO (not part of PCS)	PCS & PRO (PRO, part of PCS)
Altmetrics	Higher	Lower	Highest
Citation impact	Lower	Higher	Highest

# Results

MHq values for PCS (case studies), PRO (publication output), and PCS & PRO separated by different indicators of impact (citations and altmetrics). The altmetrics are sorted by the impact difference







- We examined individual sources of altmetrics for measuring societal impact
- We expected that there should be high altmetrics scores for PCS (convergent validity) and low scores for PRO (discriminant validity)
- Our expectations with citations were the opposite
- Our results reveal that citations and news as well as mentions on Facebook, in blogs, in Wikipedia and in policy-related documents do appear to have a significant convergent and discriminant validity
- Especially mentions in Wikipedia and policy-related documents seem to be suitable for societal impact measurements



- The results for Twitter also agree with the expected pattern
- However, we found a low difference between Twitter impact for PCS and PRO
- This means that Twitter does not appear to be a valid source of data for assessing societal impact
- Our results also demonstrate the usefulness of the MHq indicator
- Since many zeros occur in altmetrics data, they should be used in combination with the MHq indicator



Thank you for your attention!