ExplORe: Demystifying metrics

Tim Riley: Information Advisor

Metrics…

IOP Publishing journals see substantial Journal Impact Factor growth

20 Jun 2019 by Simon Davies

The 2018 Journal Impact Factors, published by Clarivate Analytics, show significant growth for journals published by IOP Publishing and its partners, with 83 per cent seeing an increase.

Particularly notable performances for individual journals include (in alphabetical order):

Most recent

IOP Publishing celebrates cutting-edge quantum research on World Quantum Day

IOP Publishing and IPEM mandate reporting of sex and gender in research

IOP Publishing celebrates outstanding peer reviewers

IOP Publishing releases its 2023 highlights report

DataSeer.ai and IOP Publishing Collaborate on Open Science Indicators and Open Data Pilot

20 University of Bristol academics named on Highly Cited Researchers 2023 list

Press release issued: 15 November 2023

A total of 20 University of Bristol academics have been named on Clarivate's Highly Cited Researchers 2023 list - up by three on last year.

The annual Clarivate Highly Cited Researchers list acknowledges the most influential researche

University of Bristol, 2023

The annual list acknowledges the most influential researchers in the world, who have published multiple papers frequently cited by their peers during the last decade.

The full list of names has been taken from papers ranked in the top 1% of most cited works for their field and publication year in the Web of Science citation index.

The 20 Bristol academics on the list this year are:

What is a highly cited paper worth? About £10,000 a year

Publishing a well-received paper could boost a scholar's income by $13,500, says US study

July 20, 2021

Jack Grove

Twitter: @jgro_the

Times Higher Education, 2021

SCIENTIFIC ETHICS >

One of the world's most cited scientists, Rafael Luque, suspended without pay for 13 years

The prolific chemist, who has published a study every 37 hours this year, has been sanctioned by the University of Córdoba over his research work for other institutions in Russia and Saudi Arabia

El Pais, 2023

Aims for today

- Types of metrics and their use
- Limitations of metrics
- Responsible use of metrics
- Further information

What are metrics?

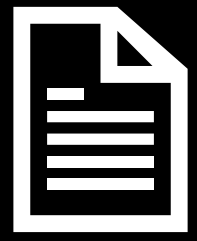
> Research metrics are quantitative measurements designed to evaluate research outputs and their impacts.

UK Research and Innovation, 2022

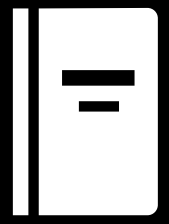
There are also research metrics designed to measure researchers themselves.

Types of metrics and what they're used for

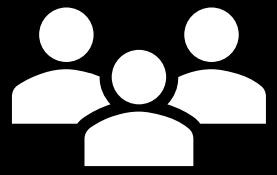
3 most common focuses for metrics



research outputs



journals



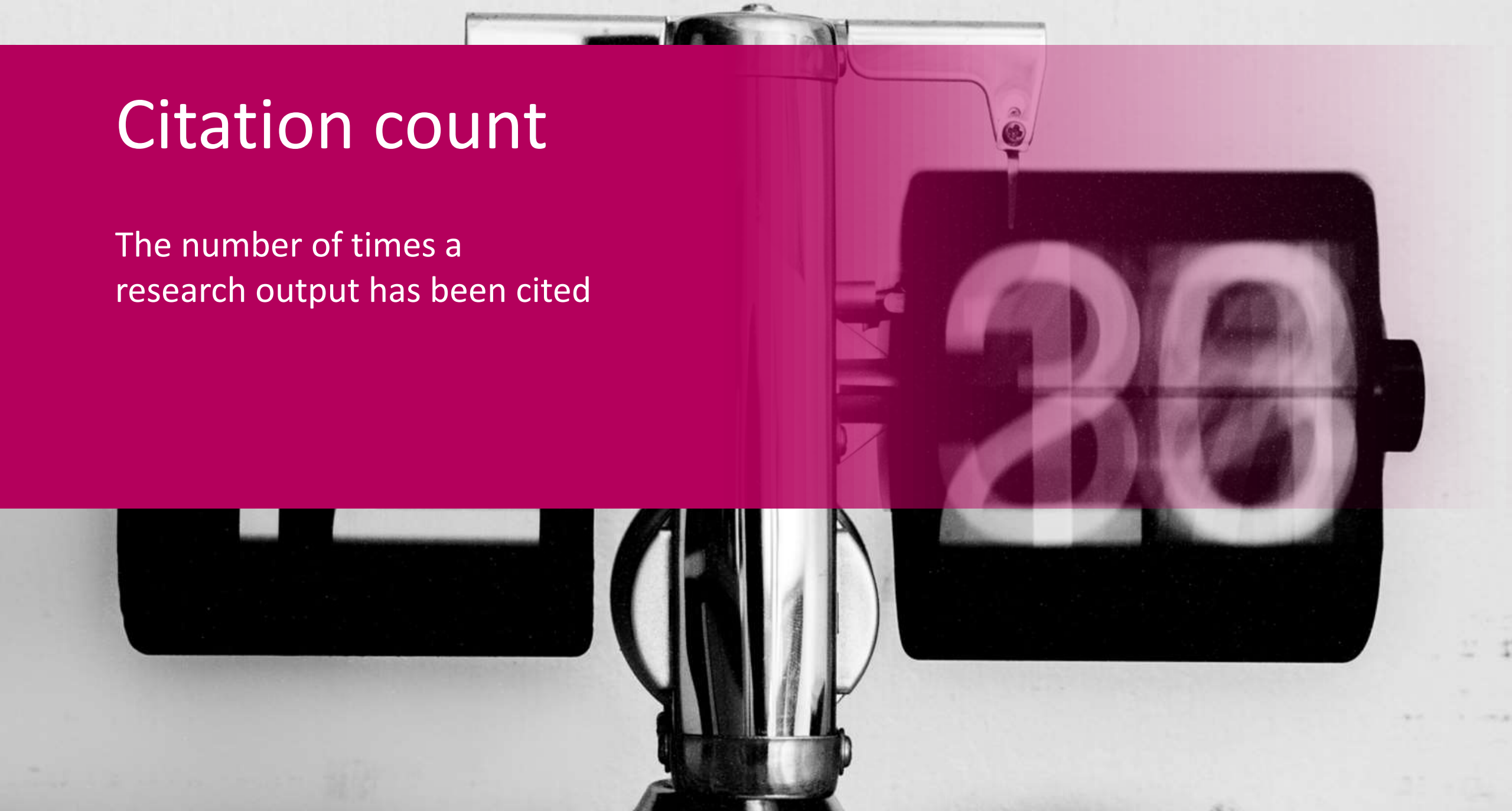
researchers & research groups

Article metrics

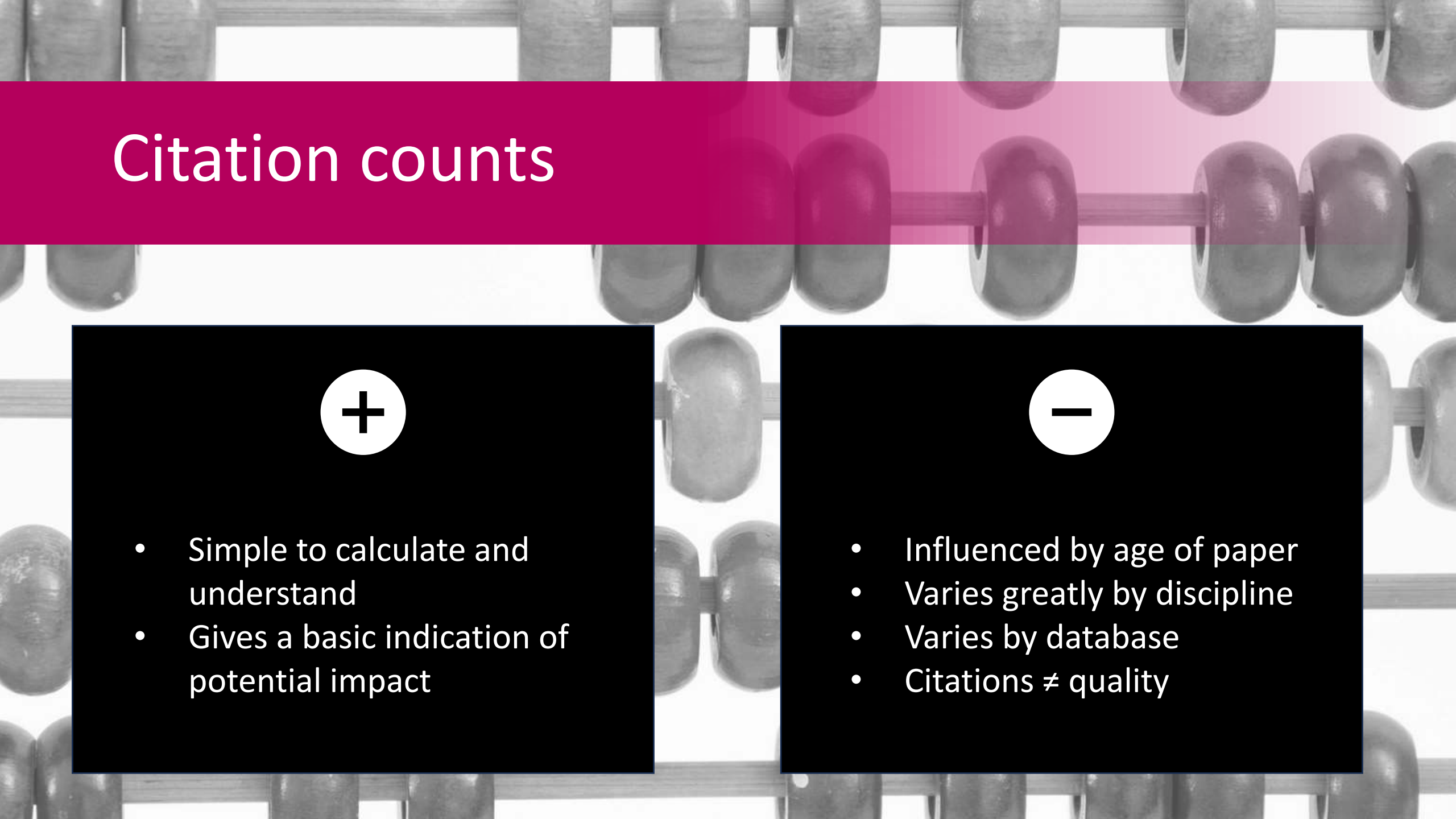
- Citation counts
- Article views
- Article downloads
- Category Normalized Citation Impact
- Percentile in subject area

Citation count

The number of times a
research output has been cited



Citation counts



- Simple to calculate and understand
- Gives a basic indication of potential impact

- Influenced by age of paper
- Varies greatly by discipline
- Varies by database
- Citations ≠ quality

Journal metrics

- Journal Impact Factor (JIF)
- Source Normalized Impact per Paper (SNIP)
- SCImago Journal Rank (SJR)
- CiteScore

Journal impact factor

The average number of citations received that year for articles published in the preceding two years.

Developed by publisher Clarivate, originally as a tool for librarians to manage journal subscriptions.

Journal impact factor

- Quick indication of average citations for articles appearing in a publication
- Familiar through years of use

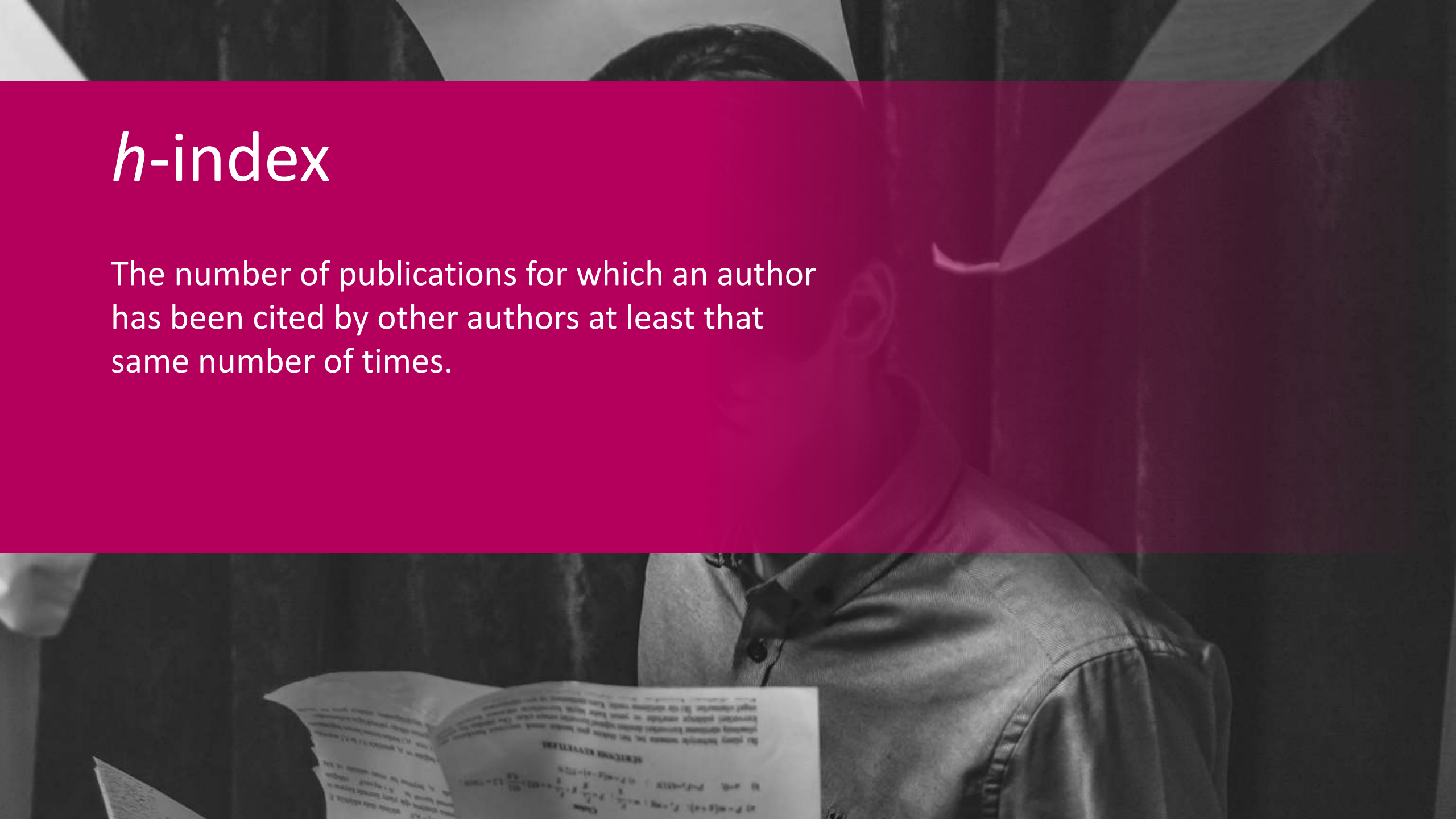
- Varies by discipline
- Timeframe is short
- Does not reflect citation variation within a journal
- Citations ≠ quality

Author metrics

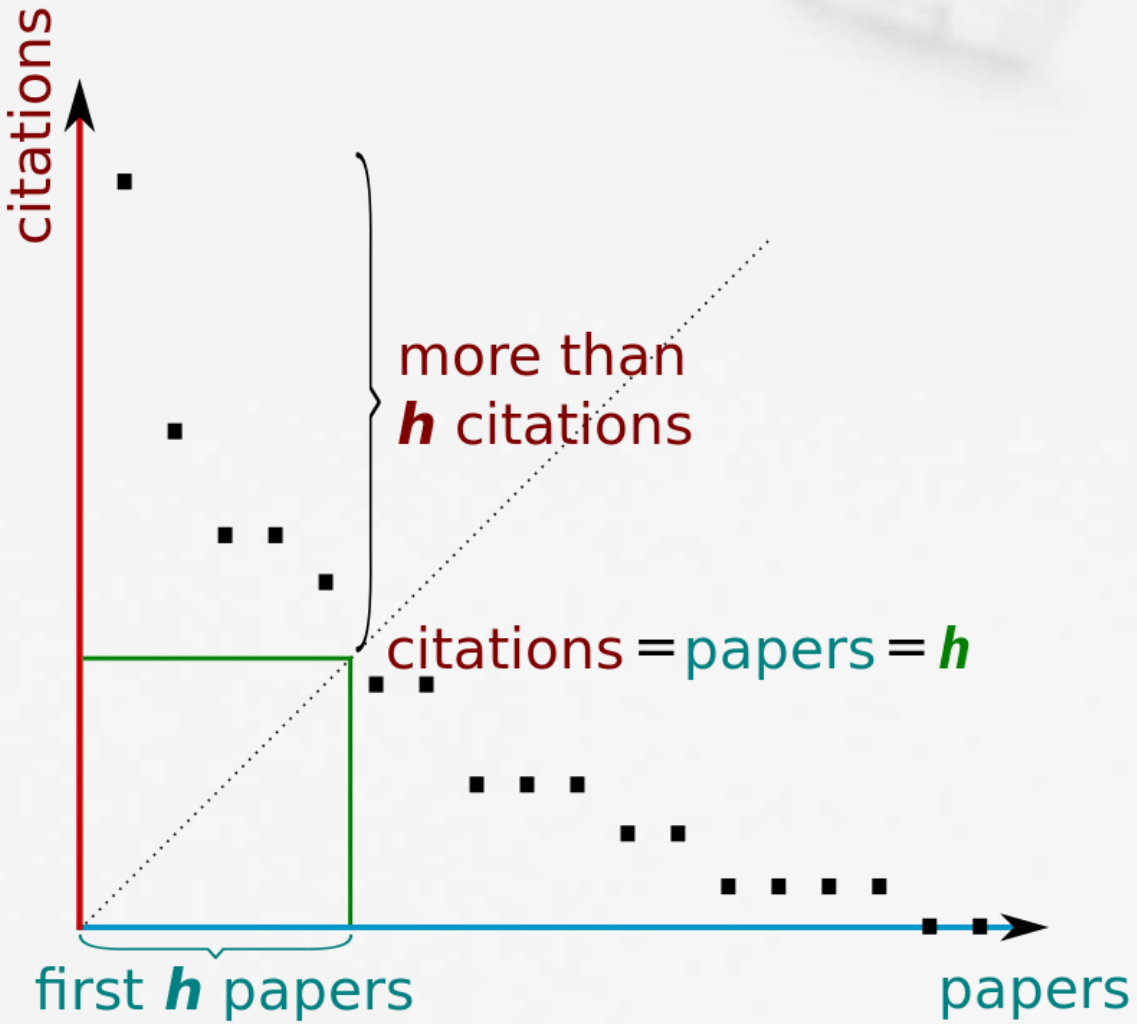
- *h*-index
- *g*-index
- *m*-index
- Author impact factor (AIF)

h-index

The number of publications for which an author has been cited by other authors at least that same number of times.



Calculating an *h*-index



A graph of number of publications against citations for those publications

Source: Wikimedia Commons

h-index

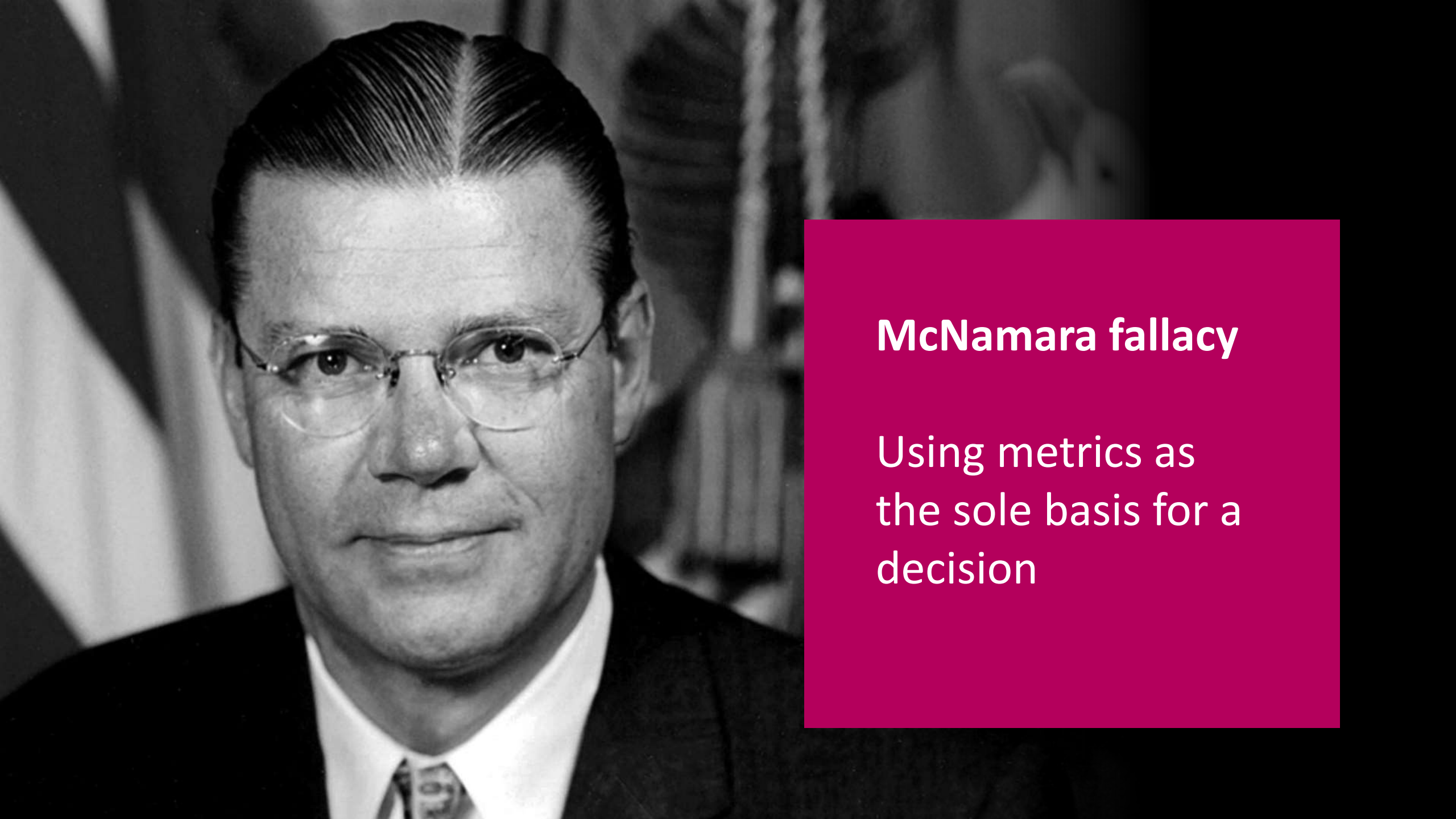
- Single, simple metric
- Not affected by papers with abnormally high or low citations
- Can be used for groups

- Influenced by career length
- Varies by discipline
- Inconsistent and unintuitive
- Downplays impactful papers
- Citations ≠ quality

Altmetrics

Measure impact outside traditional academic context, e.g. social media engagement, blogs, Facebook, X/Twitter, news mentions etc.

Limitations of metrics



McNamara fallacy

Using metrics as the sole basis for a decision

Problems with relying solely on metrics

- Focus on quantity over quality
- Illusion of objectivity and comparability
- Limited information – lack nuance and context

Goodhart's law

When a measure becomes a target, it ceases to be a good measure.

Charles Goodhart, British Economist

Metrics can be gamed

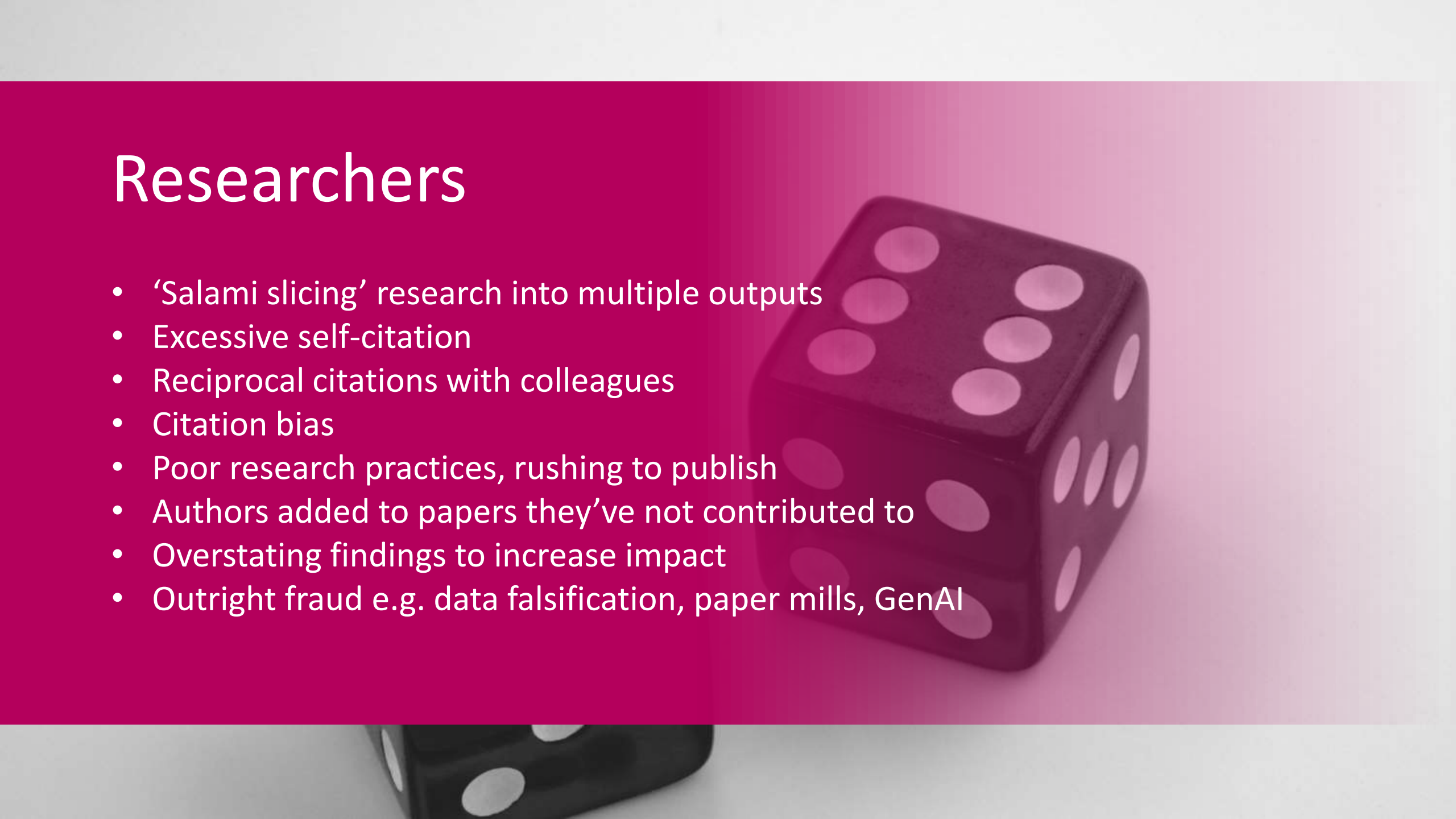
Questionable or fraudulent activities to artificially boost publication or citation rates

Publishers

- Citable ‘front matter’ in journals
- Questionable peer reviewing
- Not publishing null results or replication studies
- Encouraging authors to cite papers by reviewers or the same publisher

Researchers

- ‘Salami slicing’ research into multiple outputs
- Excessive self-citation
- Reciprocal citations with colleagues
- Citation bias
- Poor research practices, rushing to publish
- Authors added to papers they’ve not contributed to
- Overstating findings to increase impact
- Outright fraud e.g. data falsification, paper mills, GenAI



What can we do about this?

Using metrics responsibly

Leiden Manifesto for Research Metrics

10 principles for the measurement of research performance proposed by 5 academic experts in 2015

Find out more: **www.leidenmanifesto.org**

DORA

San Francisco Declaration on Research Assessment

Over 20,000 individuals and 3,000 organisations, including University of Aberdeen

Find out more: **www.abdn.ac.uk/toolkit/systems/dora/**

Key principles

- **Robustness**: base metrics on data with the most accuracy and scope
- **Humility**: quantitative evaluation supports, not supplants, qualitative, expert assessment
- **Transparency**: those being evaluated can test and verify the results
- **Diversity**: account for discipline variation, use a range of indicators to reflect diverse research and researcher career paths
- **Reflexivity**: recognise, anticipate and respond to systemic effects of indicators

Researcher actions 1

Make assessments based on scientific content rather than publication metrics, when involved in committees making decisions about funding, recruitment and promotion

Researcher actions 2

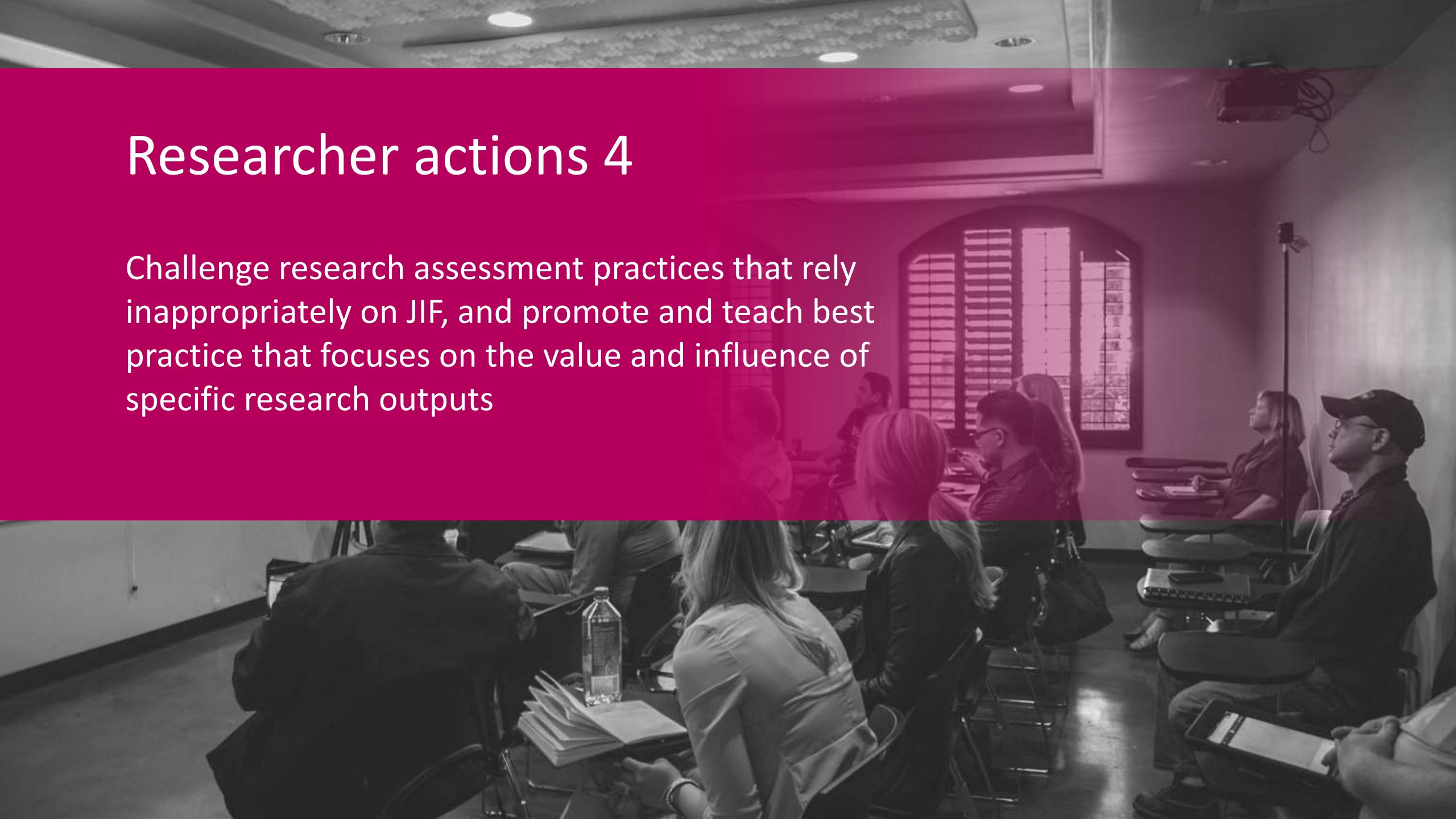
Cite primary literature in which observations are first reported rather than reviews to give credit where credit is due

Researcher actions 3

Use a range of article metrics and indicators on personal/supporting statements, as evidence of the impact of individual published articles and other research outputs

Researcher actions 4

Challenge research assessment practices that rely inappropriately on JIF, and promote and teach best practice that focuses on the value and influence of specific research outputs



Find out more

www.abdn.ac.uk/library/support/research-metrics-2296.php

openresearch@abdn.ac.uk

Any Questions?