# Embedding data in research evaluation: Data citations unlock insights into data usage and impact

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MAKE DATA COUNT.

# MAKE DATA COUNT.

An initiative that works to build the tools and practices necessary so that the community can meaningfully assess how data are used.

Our vision: an ecosystem where **data are routinely evaluated and rewarded** as primary outputs.

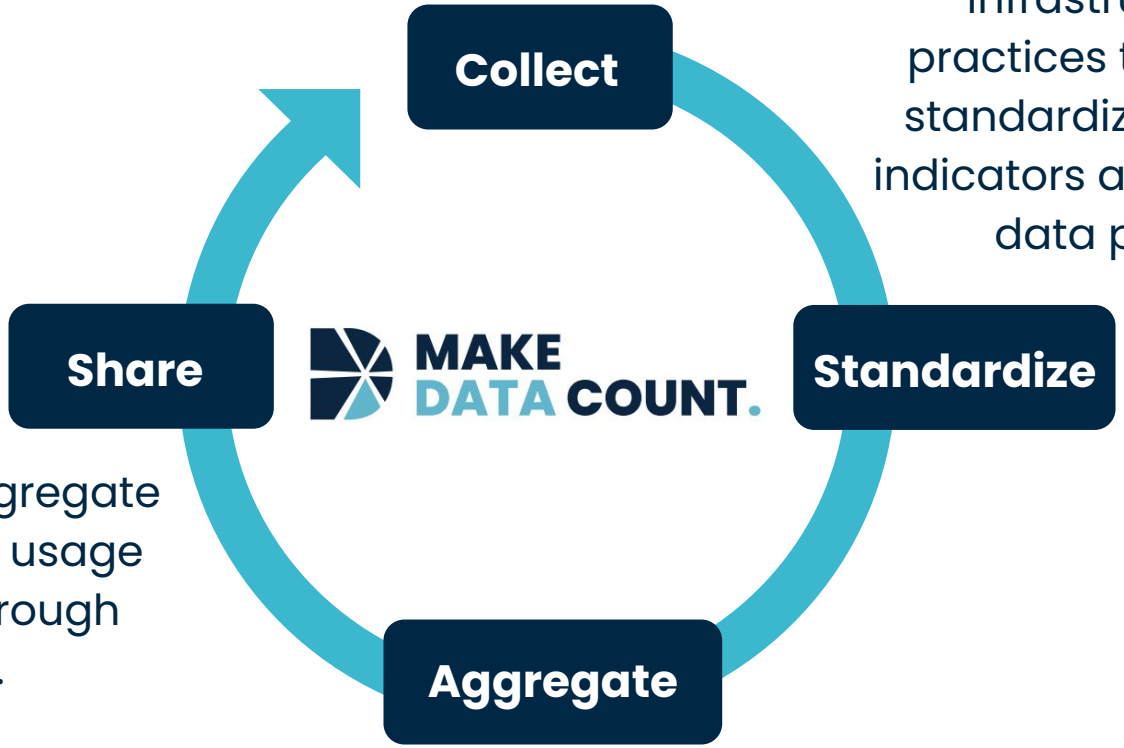
**Open infrastructure** to collect and share measures of data usage

**Standards & evidence** to contextualize data metrics

**Advocacy** to promote recognition of data usage & impact in assessment

# Collecting, standardizing, and sharing data usage

Infrastructure and practices to collect and standardize data usage indicators at repositories & data platforms.




Workflows to aggregate and share data usage information through DataCite.

Principles of Open Scholarly Infrastructure

All data usage information and metadata available with a CC0 license.

# Collecting, standardizing & sharing data usage counts

## 01 Implement MDC recommendations

Two approaches to collect data views & downloads normalized per the COUNTER standard:

- Usage tracker widget that collects counts on dataset landing pages.
- Log processing server wide.

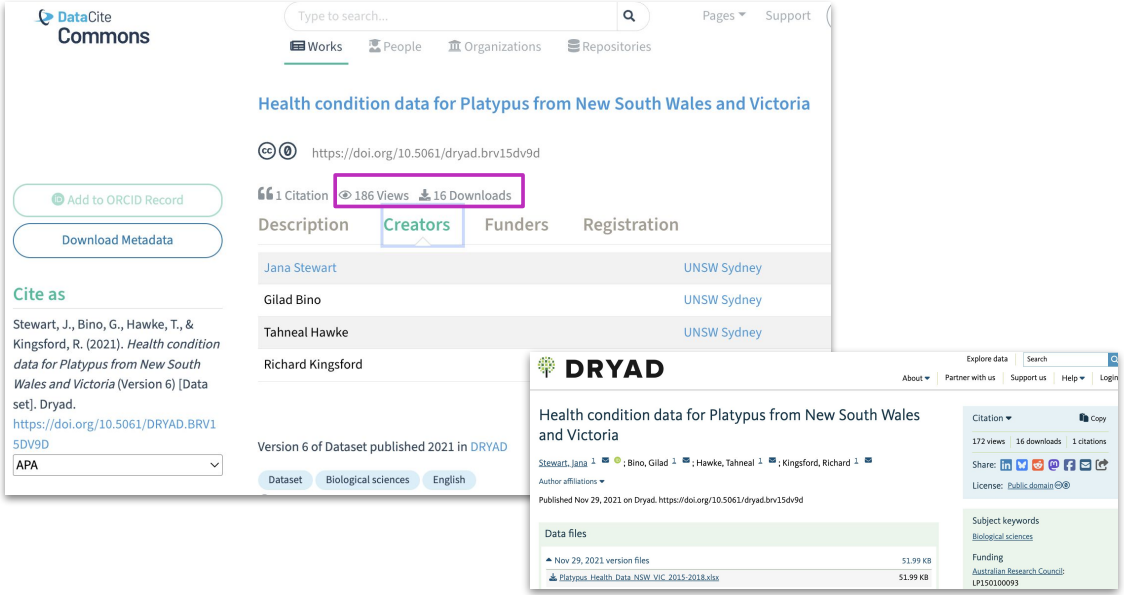
## 02 Share the data usage counts

- Display usage counts on dataset records to raise visibility & recognition for data creators.
- Submission of counts to DataCite enables aggregation & discoverability.

## 03 Review & gain insights

- Review usage counts for alignment with usage tracking standards or potential outliers.
- Gain insights into highly-used datasets and repository use over time.

Make Data Count infrastructure allows the community to collect and access standardized counts of data views and downloads.




commons.datacite.org/doi.org/10.5061/dryad.brv15dv9d

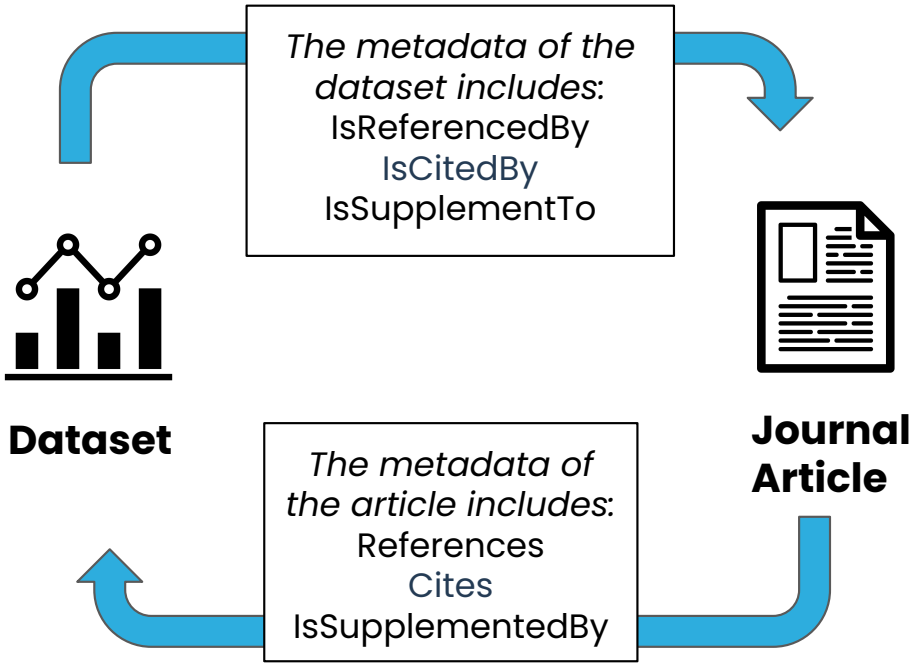
# Collecting, standardizing & sharing data citations

Make Data Count infrastructure enables collection and access to data citations.

The **RelatedIdentifier property** in the DataCite metadata schema creates links between objects.

Sub-properties:

- relatedIdentifierType
- relationType

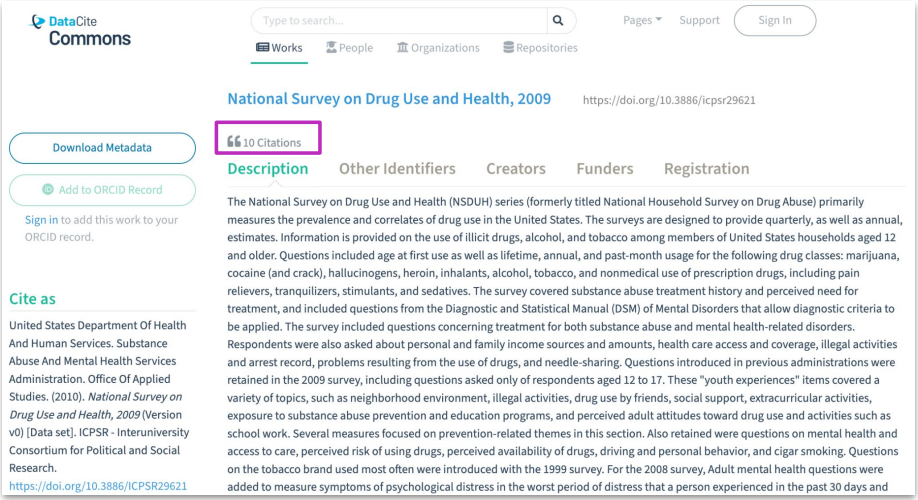


# Collecting, standardizing & sharing data citations

Make Data Count infrastructure enables collection and access to data citations.


```
"relatedIdentifiers": [
    {
"relationType": "IsCitedBy",
"relatedIdentifier": "10.2105/AJPH.2017.303743",
"resourceTypeGeneral": "JournalArticle",
"relatedIdentifierType": "DOI"
 }
  ],
```

**DataCite JSON**




commons.datacite.org/doi.org/10.3886/icpsr29621

# We lack a full picture of data citations

Existing processes do not yet provide the full picture on the use of data.

Only a fraction of data citations are reported as structured references.

Workflows needed to capture citations for different data identifiers.

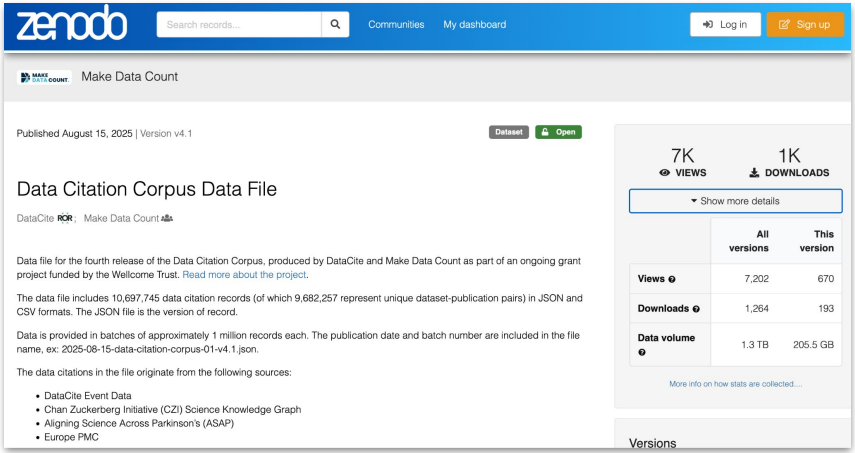
Citations identified by different groups are stored in different (and sometimes closed) locations.

# The Data Citation Corpus

A large open resource of data citations.

The Corpus brings together citations identified by different methodologies, including persistent identifier metadata, curation, and full-text mining.

- ✓ Multiple sources: DataCite Event Data, Chan Zuckerberg Initiative, ASAP, EuropePMC
- ✓ Datasets with DOIs & accession numbers
- ✓ Transparency on provenance

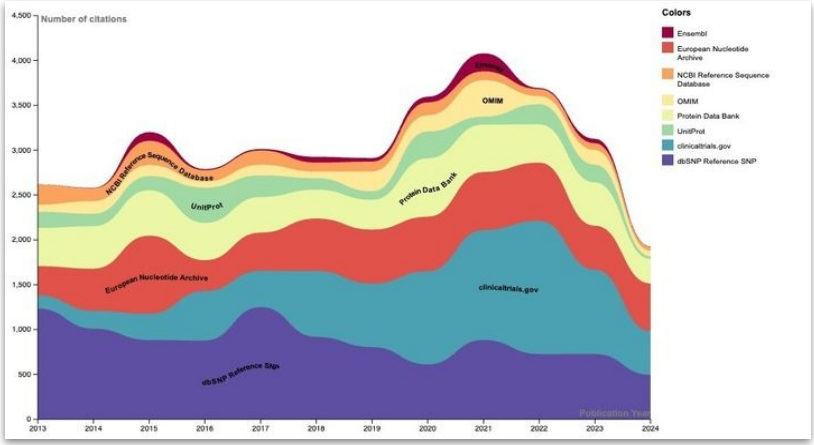


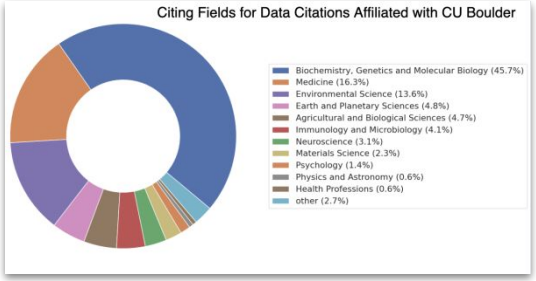

**The Data Citation Corpus aggregates 10 million data citations**

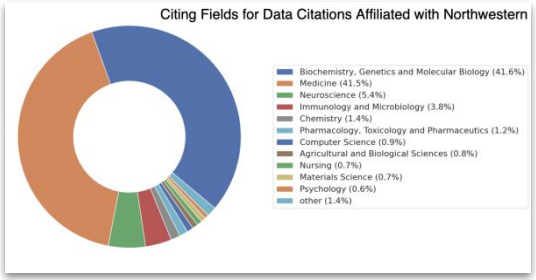
Corpus data file:
https://doi.org/10.5281/zenodo.11196858

# Data usage insights for libraries

Analysis of data citations for Northwestern University & the University of Colorado, Boulder, using data citations in the Data Citation Corpus and in Europe PMC.




**Most used repositories**: dbSNP, Protein Data Bank, European Nucleotide Archive

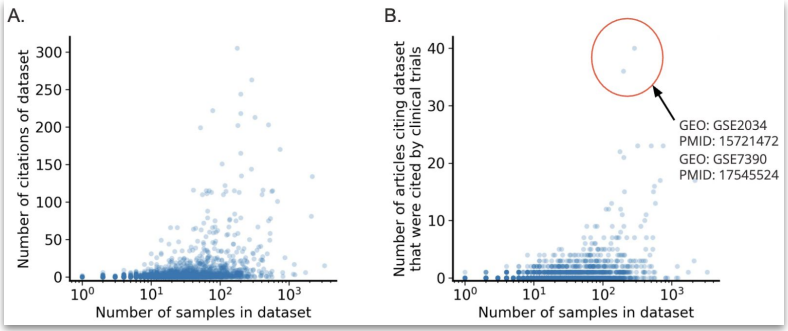
**Data-intensive research areas at Northwestern University**: cancer, immunology, infectious diseases, biochemistry, molecular biology, neuroscience.

**Data-intensive research areas at University of Colorado, Boulder**: environmental sciences (microbial ecology, polar research), molecular biology, genetics, plant sciences.

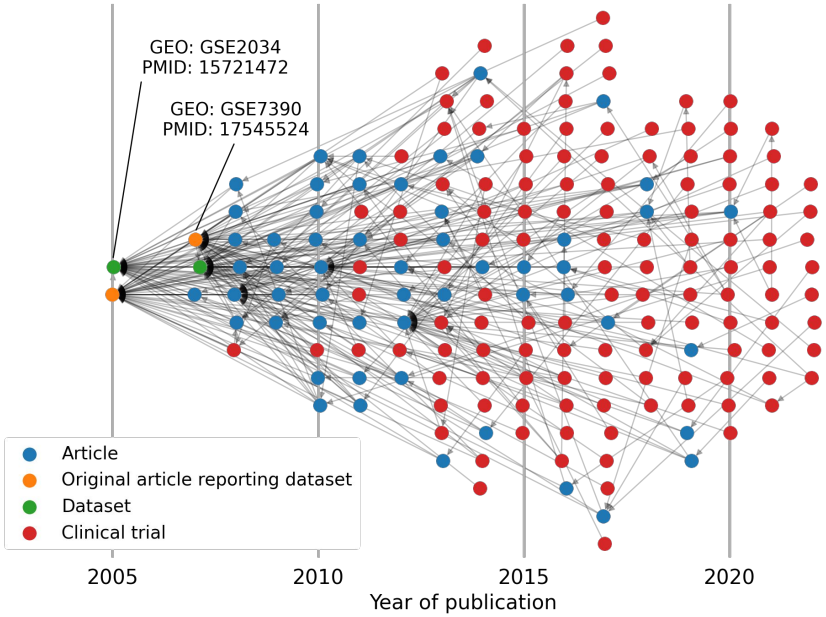
*Wittenberg, J., Portenoy, J., Puebla, I., & Holmes, K. (2025). Automating data citation at scale to advance open data metrics. Association of College & Research Libraries (ACRL 2025), Minneapolis. Zenodo.* https://doi.org/10.5281/zenodo.15130354

# Insights into translational data impact

Collaboration with researchers at Northwestern University: The Data Citation Corpus as a basis to trace how datasets move from basic science into health applications.




Identified two GEO datasets for human data with a high number of citations.




Citation networks between the GEO datasets and the articles reporting the datasets, and the publications that subsequently cited those articles. 55 non-clinical trial articles cite GSE2034 & GSE7390, these were later cited by 124 clinical trials.

*Richardson, R., Puebla, I., Portenoy, J., Gutzman, K., & Holmes, K. (2025). Opening up translational data impact through the Data Citation Corpus. Zenodo. https://doi.org/10.5281/zenodo.15299655*

# Advancing data evaluation at institutions

A partnership between HELIOS Open and Make Data Count, the **'Implementing data evaluation in academia' Working Group** has developed resources to support implementation of data evaluation in institutional processes.

## Implementation guide

- Sample language for tenure & promotion policies
- Researcher CV template
- Guidance for review committees

01

Tenure & Promotion Policies

Sample Language

This section contains sample text that may be included in policy documents to signal recognition of data contributions and open scholarship practices. Institutions are encouraged to adapt and extend the examples as appropriate to their needs. The article 'Ten simple rules for recognizing data and software contributions in hiring, promotion, and tenure' provides further guidance and considerations for recognizing data and software in institutional processes.

Research productivity and open scholarship

Our institution recognizes research practices designed to make research more reliable, rigorous, and aligned to open scholarship. The evaluation process is transparent and values the broad spectrum of research products that researchers produce and openly share as part of their research. When describing their research productivity, faculty are encouraged to document and share open datasets, software, workflows, protocols, code, and other scholarly products that contribute to research transparency, accessibility, and impact, alongside traditional research outputs such as journal publications.

Assessments of research productivity at our institution incorporate attributes related to open data and open research outputs, such as those below:

- Creation or curation of datasets that are shared openly to the extent that this is ethically and legally possible.
- Creation and open sharing of research or analysis tools, workflows, software or code.
- Creation of resources for facilitating research, such as data collections, or platforms for hosting and/or interacting with large datasets to facilitate collaborative research. This also includes platforms to interact with closed data that cannot be shared in their raw form due to privacy or ethical concerns.

Open scholarship practices

Faculty who adopt open scholarship practices — including data management and sharing, open access publications and preprints, open methods and workflows (e.g., preregistration), open educational materials, and open code — are recognized for their contributions to scientific rigor and reproducibility.

Assessment of research contributions

The evaluation of research contributions includes consideration toward evidence of adherence to community standards for open and reproducible scholarship, complete reporting of activities across the research cycle (e.g. via preregistration and adherence to reporting guidelines) and the development and open sharing (where ethically and legally permitted) of research tools, instruments, code, and data.

Evaluators consider the time, complexity, and collaborative nature of producing high-quality reusable datasets and data infrastructures. This includes curating, maintaining, and sharing datasets ethically and sustainably. Evaluators may also want to recognize contributions that enhance accessibility in research, particularly work that addresses the specific needs of underrepresented communities.

Research that involves the use of existing datasets or collections of datasets is also considered, and researchers are encouraged to discuss these approaches and how they relate to practices in their field in their personal statements for consideration by the evaluators.

Evaluation of potential for impact

The evaluation of the potential for impact of the research contributions can be informed by a wide range of indicators that span beyond traditional publication metrics. Indicators of potential for impact may include quantitative measures, contextual information, and qualitative evidence. Such indicators may include:

- Complete reporting of results and open sharing of research outputs associated with published articles, through preregistrations, open data, code and/or materials
- Counts of open datasets and other open outputs
- Citations to data, software or preregistrations
- Dataset views and downloads
- Software downloads and installs
- Use of the data, software or open outputs in projects, activities, or collaborations that advanced understanding in the field or addressed knowledge gaps
- Evidence of adherence to community standards for open scholarship (e.g. FAIR principles) and standards for conducting ethically sound and reproducible research
- Evidence of community engagement or endorsement of the open data or other open outputs developed

The outline of the potential for impact for the research contributions can take a narrative format where the researcher provides a contextualized description of their key data and open outputs and how they advanced the generation of new ideas, tools, methodologies or knowledge. This outline can include a description of the pathways to impact that the researcher envisions for their data and open outputs, including possible future reuses that might advance research endeavours, spur innovation, or bring societal benefit.

https://makedatacount.org/explore-resources/institutions/

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- Institutional case studies
- Maturity model for data evaluation to be released this month

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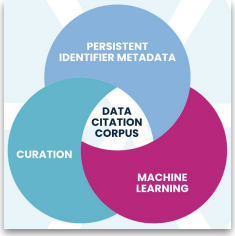
# Engage with Make Data Count




Explore the **Data Citation Corpus** data file and share your feedback.

Are you collecting data citations? Contribute these to the Corpus.

Get in touch about ways to **implement usage tracking** at your repository.


**Share your data evaluation examples and perspectives**, we'll be happy to amplify your story.

# Thank you
# Danke

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**Zenodo community:** zenodo.org/communities/makedatacount