

DISCUSSION PAPER/COMMENTARY**Supplement 1: The *Cited by N* link**D. V. Klopfenstein¹ | Will Dampier*²

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Summary

First, we show the *Cited by N* links as they currently appear in PubMed and Google Scholar (GS). Second, we show the placement of the *Cited by N* links and the *N References* links that we would like to see in the PubMed Graphical User Interface (GUI). Finally, we demonstrate a new method to annotate PubMed search results with citation data from the NIH Open Citation Collection (NIH-OCC) for command line interface (CLI) users.

1 | THE CURRENT FORWARD CITATION SEARCH

Figures 1 and 2 show how to find both the citation count (Fig 2 red 3) and the reference count (Fig 2 red 4) in PubMed by searching for a paper using its title. Figure 3 shows how to find the citation count (Fig 3 red 2), but not the reference count, in Google Scholar (GS).

Clicking on the *See all “Cited by” articles* link (Fig 2, red 3a) in PubMed will open a new page showing the list of citations. This is a forward citation search. Clicking on the *Show all 35 references* link (bottom of Fig 2) will open a new page showing the 35 references. This a reverse citation search. Both forward and reverse citation search functionality are useful in exploratory searches and systematic searches. The reference count and reverse search functionality is not available in GS.

GS shows a total of 353 citations (Fig 3, bottom left red box) versus PubMed’s 68 citation count. Since GS indexes preprints, white papers, theses, and papers not related to chemical and health sciences, it will show a higher citation count than PubMed. Higher citations counts do not always reflect better papers. For example, important research may have lower citation counts if it was published in a less prestigious journal. Also, citation count alone does not reflect how a paper is performing next to its peers. For example, a mathematical paper with a small number of citations may have a greater affect in its field than an oncology study having hundreds of citations¹.

2 | THE CITED BY N LINK

Clicking on the *Cited by 353* (Fig 3, bottom red box) in GS will open a page showing the first 10 or 20 citations (Fig 4). Researchers can not download the full 353 citations in bulk and instead must click and click and click to page through citation results 10 or 20 citations per page. However, GS’s *Cited by N* links (Fig 4, red boxes) are exceedingly popular and are missing in PubMed. Citation count data can aid the researcher in deciding which paper to examine next.

Clicking on *See all “Cited by” articles* (Fig 2 red 3a text) link in PubMed will open a new page showing the list of citations (Fig 5). Researchers can download the full 68 citations, plus the original paper seen at the top, in a variety of formats including comma-separated values (csv), PubMed ID (PMID) lists, and summaries using the “SAVE” button boxed in red (Fig 5).

But the *Cited by N* link is missing. The additional links we would like to see in the PubMed interface are drawn in (Fig 6 red boxes). Note that only the top paper has “Cited by 108” because the following 3 papers are new and do not yet have citations.

In addition to the *Cited by N* link for easier forward search citation, we would like to see an *N References* link to aid in reverse citation search.

Notice that PubMed's "Best Match" relevance sorting shows new papers at the top of the citation list, while GS's relevance sorting shows highly cited papers at the top. GS favoring highly cited papers by ranking them at the top of their list², coupled with the laborious work of clicking and clicking to traversing the citation list can cause highly cited papers to continue to gain more citations, while important new papers may be overlooked.

3 | ATTACH CITATION DATA TO PUBMED RESULTS

After finding an article in PubMed, to obtain the equivalent functionality of having ubiquitously featured *Cited by N* links and *N References* links (Fig 6 red boxes) scroll down to the section showing all "Cited by" articles (bottom of Fig 1 and top of 2) and save all results as PMIDs to a file (Fig 7).

Next, the file can be annotated with citation and translational data from the NIH Open Citation Collection, iCite, using either the graphical user interface (GUI) method or the command line interface (CLI) method described below. These methods provide information equivalent to that found using GS's *Cited by N*. In this example, PubMed writes the list of PMIDs into a file named "pmid-26379270-set.txt."

3.1 | Using the Graphical User Interface (GUI)

If you are not a command-line interface (CLI) user, or you are a CLI user and want to see the iCite graphs generated for your data, go to the iCite website at <https://icite.od.nih.gov/analysis> and click on the "New Analysis" link at the top of the page. Load the file, in this case "pmid-26379270-set.txt", containing the your PMIDs (Fig 8) and press the "Process" bar. Click on the "Citations" tab (Fig 9 red 2), which is next to the tabs, "Influence" and "Translation." You will then see a list of the citing PMIDs, each annotated with citation count (Fig 9, red 3), reference count, and the Relative Citation Ratio (RCR), which is a NIH metric that compares the performance of a paper against its peers in the same citation network³. An RCR is a normalized metric of influence that has a transparent methodology and is free³¹. For example, a RCR of ~12 means that a paper is being cited 12 times as expected as compared to its peers.

3.2 | Using *pmidcite* from the Command Line Interface (CLI)

A Command-Line Interface (CLI) can be preferable to a Graphical User Interface (GUI) because: processing can be automated from a script; time-consuming mouse clicking is reduced; and more data can be seen at once on a text screen than in a browser, giving the researcher a better overall impression of the full set of information.

Linux and Mac users already work from the command line. Windows users can get that Linux-like command line feeling while still running native Windows programs by downloading Cygwin from <https://www.cygwin.com/>

3.2.1 | Run *icite*

The open-source software, *pmidcite*, is a Python package written by this first author and is freely available at <https://github.com/dvklopfenstein/pmidcite>. NIH's iCite has a simple, clean, fast Application Programming Interface (API) which allows their citation data to be downloaded over the internet by libraries like *pmidcite*. NIH's iCite returns a succinct record for each PMID containing citation, reference counts and more. When you run *pmidcite*, you are downloading the same data as seen in the previous GUI example. To run the "icite" script, which is part of the *pmidcite* library, do:

```
$ icite -i pmid-26379270-set.txt -o icite-26379270-set.txt
69 WROTE: icite-26379270-set.txt
```

Running "icite" causes the PMIDs to be read from the PMID input ("-i") file specified with the argument "-i pmid-26379270-set.txt." The PMIDs are sent to NIH's iCite and citation data is downloaded and annotated to the PMIDs. The annotated PMID report is written to the output ("-o") file specified with the argument "-o icite-26379270-set.txt." The "69 WROTE: icite-26379270-set.txt" is text printed by icite letting the user know

that 69 PMIDs are annotated with citation data and written to “`icite-26379270-set.txt`.” The PMIDs in the file are printed in the same order that they were sorted in PubMed with the “Best Match” algorithm before being downloaded.

3.2.2 | View citation data

The citation data is formatted in columns separated by spaces. To print the column headers and the citation data, two commands are run back-to-back. The first command is “`icite -H`”, which causes the column headers to be printed. The semi-colon (“;”) signifies the end first command. The second command is “`grep TOP icite-26379270-set.txt`.” The command, “`grep`”, is like the “`find`” command in word-processing programs, but it is used for ASCII text files. In this example, we are finding and printing all lines containing the text, “TOP”, in the “`icite-26379270-set.txt`” citation report. The text, “TOP”, signifies that the line contains citation data for a user-requested PMID, rather than a PMID that is a reference or citing paper of a user-requested PMID.

```
$ icite -H; grep TOP icite-26379270-set.txt
TYP PMID      RP HAMCc    % SD YR   cit cli ref au[00] (authors) title
TOP 26379270 R. H.... 99 4 2015  108 0 12 au[04] (Neal Robert Haddaway) The Role of Google Scholar in
TOP 32454855 .. H.... -1 i 2020    0 0 23 au[07] (Huimin Jin) Effectiveness and Safety of Acupuncture M
TOP 32408896 R. H.... -1 i 2020    0 0 79 au[03] (Emmanuel N-B Quarshie) Self-harm with suicidal and no
TOP 32235580 .. H.... -1 i 2020    0 0 40 au[02] (Charlene Elliott) The Power of Packaging: A Scoping I
```

3.2.3 | Column headers

The column header line, which starts with “TYP PMID ...” is printed first by running “`icite -H`.” Under the column header line is a list of papers, starting with the chosen Haddaway paper, and followed by papers that cite it. The columns, “`cit`” and “`ref`”, contain the citation count and reference count for the paper on the same line. There is a high citation count of 108 for the Haddaway paper. We only show 3 of the 108 citing papers for brevity. The 2020 papers have a citation count of zero, likely due to being so recently published.

Notice that the citation counts for PubMed (68), NIH’s iCite (108) and for GS (353) do not agree. The decision of which citation counts to use in the recommended new PubMed *Cited by N* links should be decided by PubMed. We do not believe that the differing citation counts are a major hindrance for a researcher in choosing their next paper to investigate while doing exploratory search. The data needed to choose the next paper to investigate is how new a paper is performing against its peers. Having the citations scaled lower, as in the PubMed citation counts will likely not have a great effect on displaying how each paper performs relative to others. Having the data to choose the next paper will speed the exploratory literature search faster than having all 353 GS citations. Once the researcher has become familiar with the subject through their exploratory literature search, then they can search in GS for additional papers.

The columns “PMID” and “YR” (YEAR) are the PubMed ID and the year that the paper was published.

3.2.4 | Column header key

To better understand the remaining columns containing additional NIH iCite data, print the key as shown below (“`icite -k`”). The key indicates that first the three letters of the line describes a paper’s “type” (TYP), which include user-requested paper (TOP), citing paper (CIT), or reference (REF). The keyword makes grepping easier. Doing “`grep TOP [file.txt]`”, will display one descriptive line for each user-requested PMID.

```
$ icite -k
```

KEYS TO PAPER LINE:

```
TYP PubMedID RP HAMCc % nihSD YEAR x y z au[A] (First Author) Title of paper
```

TYPE of relationship to the user-requested paper (TYP):

```
TOP: A user-requested paper
```

```
CIT: A paper that cited TOP
```

```
CLI: A clinical paper that cited TOP
```

REF: A paper referenced in the TOP paper's bibliography

NIH iCite details:

PubMedID: PubMed ID (PMID)

RP section:

R: Is a research article

P: iCite has calculated an initial Relative Citation Ratio (RCR) for new papers

HAMCc section:

H: Has MeSH terms in the human category

A: Has MeSH terms in the animal category

M: Has MeSH terms in the molecular/cellular biology category

C: Is a clinical trial, study, or guideline

c: Is cited by a clinical trial, study, or guideline

NIH section, based on Relative Citation Ratio (RCR):

?: NIH citation percentile rounded to an integer. -1 means "not determined" or TBD

nihSD: NIH citation percentile group: 0=-3SD 1=-2SD 2=+/-1SD 3=+2SD 4=+3SD or i=TBD

YEAR/citations/references section:

YEAR: The year the article was published

x: Number of unique articles that have cited the paper

y: Number of unique clinical articles that have cited the paper

z: Number of references

au[A]: A is the number of authors

The sections, "RP" and "HAMCc" contain descriptive citation and translation data from the NIH-OCC and are explained in the key. The "y" number near the bottom of the key is the number of clinical trials that have cited the paper. If any clinical trials cite the paper, a "c", rather than a "." is printed in the "c" position of the "HAMCc" section.

3.2.5 | The NIH section

The key to the NIH section is:

NIH section, based on Relative Citation Ratio (RCR):

?: NIH citation percentile rounded to an integer. -1 means "not determined" or TBD

nihSD: NIH citation percentile group: 0=-3SD 1=-2SD 2=+/-1SD 3=+2SD 4=+3SD or i=TBD

The RCR is not used in the CLI display because the NIH developers calculated the NIH citation percentile using the RCR, making the NIH citation percentile a reasonable proxy for the RCR score. The NIH citation percentile is better suited to the CLI because it takes less space than the RCR and is better for sorting on the command line.

If the NIH percentile was displayed and used for sorting papers, the result would be unacceptably rigid sorting. Sorting such that a paper with a 55% NIH percentile is always shown ahead of a paper with a 45% percentile is not helpful, since both papers have a good citation performance. We created and added "NIH percentile group" ("nihSD"), so papers could be sorted by large performance groups, like good, high, and very high (Fig 10).

The performance groups are numbered from 0 to 4, with 0 being the lowest performing papers and 4 being the highest performing papers. Recent papers that have not had enough time to accumulate an RCR or NIH percentile are given an “i” as a placeholder for some number to be determined later.

3.2.6 | Summarizing a single paper

To print the summary for a single paper, do:

```
$ icite 27846867 -H
TYP PMID      RP HAMC%   % SD YR   cit cli ref au[00](authors) title
TOP 27846867 .. H.... 82 2 2016   13 0 17 au[03](Claire Stansfield) Exploring issues in the conduct of
```

This paper has 13 citations (“cit”) and 17 references (“ref”). Its NIH standard deviation group (“SD”) is a 2, so it is a paper that is performing well with its peers. With an NIH percentile (“%”) of 82%, it is almost in the high performing papers. The “PMID” for the paper is “27846867.” The “-H” argument causes the column headers to be printed.

3.2.7 | Examining the citations of a single paper

To get all citation details for a single paper, do:

```
$ icite 27846867 --verbose --no_references
TOP 27846867 .. H.... 78 2 2016   16 0 17 au[03](Claire Stansfield) Exploring issues in the conduct of
CIT 32511888 R. .... -1 i 2020    0 0 32 au[03](Simon Briscoe) How do Cochrane authors conduct web se
CIT 31343759 .. H.... -1 i 2020    0 0 12 au[03](Louise Harriss) Building safety in humanitarian progr
CIT 31541534 .. H.... -1 i 2019    3 0 80 au[04](Anthea Sutton) Meeting the review family: exploring r
CIT 30993756 R. H.... -1 i 2019    2 0 13 au[11](Stefanie Buckner) Dementia Friendly Communities in En
CIT 29353363 RP H.... -1 i 2019    2 0 6 au[01](Marko Curkovic) The Implications of Using Internet S
CIT 31866923 .. H.... -1 i 2019    0 0 51 au[07](Meg E Morris) Boxing for Parkinson’s Disease: Has Imp
CIT 29783954 RP H.... 98 4 2018   26 0 101 au[07](Monika Mueller) Methods to systematically review and
CIT 29193834 RP H.... 90 3 2018    8 0 29 au[05](Chris Cooper) Supplementary search methods were more
CIT 29179733 .. H.... 90 3 2017   10 0 49 au[04](Chris Cooper) A comparison of results of empirical st
CIT 29065246 .P H.... 77 2 2018    7 0 51 au[01](Simon Briscoe) A review of the reporting of web sear
CIT 30177007 RP H...c 66 2 2018    5 2 40 au[05](Filippo Bianchi) Restructuring physical micro-envirom
CIT 30424741 RP H.... 66 2 2018    5 0 16 au[02](Marko Ćurković) Bubble effect: including internet sea
CIT 30340498 RP HA...c 42 2 2018    3 2 44 au[05](Filippo Bianchi) Interventions targeting conscious de
CIT 30453942 RP H.... 17 2 2018    1 0 58 au[05](N Mahmoodi) Are publicly available internet resources
CIT 29137503 R. H.... 42 2 2017    4 0 6 au[11](Yasser Bhatti) Global Lessons In Frugal Innovation T
CIT 28789703 .. H.... 0 0 2017    0 0 37 au[02](Rosie Hanneke) Information sources for obesity preven
```

The “--verbose” option causes the citing papers to be printed.

The “--no_references” option prevents the references from being printed.

The requested paper, PMID “27846867” appearing on the “TOP” line, is printed along with its citing papers. Because the citations were downloaded using NIH-OCC and not from PubMed, PubMed’s “Best Match” relevance sort has not been run.

So *pmidcite*’s default sort of the citations (“CIT”) begins with sorting the group numbers in this order: “i, 4, 3, 2, 0.” Second, it sorts by year so that the newest papers are at the top of each group. Third, it sorts by NIH percentile (“%”).

Since all the newest papers do not have a NIH percentile yet (“-1”), the NIH percentile sort has no effect. For all new papers in the same year, the next sort uses the sum of the citations from both clinical (“cli”) and non-clinical (“cit”) papers. Finally, for new papers published in the same year that have the same number of citations, the final sort is done using the number of references (“ref”).

To get all citation details for the references for a single paper do:

```
$ icite 27846867 --verbose | grep REF
REF 26379270 R. H.... 99 4 2015 119 0 12 au[04](Neal Robert Haddaway) The Role of Google Scholar in I
REF 26052848 R. .... 98 4 2014 86 0 8 au[03](Quenby Mahood) Searching for grey literature for syst
REF 27686611 R. H.... 94 3 2016 24 0 37 au[07](Jean Adams) Searching and synthesising 'grey literatu
REF 26932789 R. H.... 91 3 2016 29 0 11 au[03](Wichor M Bramer) Comparing the coverage, recall, and
REF 26494010 R. H.... 97 3 2015 49 0 13 au[05](Katelyn Godin) Applying systematic review search meth
REF 24360284 R. H.... 86 3 2013 39 0 24 au[04](Wichor M Bramer) The comparative recall of Google Sch
REF 25928625 R. .... 61 2 2015 14 0 13 au[04](Sandy Oliver) Capacity for conducting systematic rev
REF 25889619 R. H.... 61 2 2015 10 0 9 au[01](Simon Briscoe) Web searching for systematic reviews:
REF 25031558 R. H.... 76 2 2014 29 0 23 au[04](Julie M Glanville) Searching ClinicalTrials.gov and t
REF 24785398 .. H...c 66 2 2014 18 1 45 au[05](Rebecca W Rees) 'It's on your conscience all the time
REF 26052650 R. .... 51 2 2014 11 0 11 au[05](Tamara Rader) Methods for documenting systematic rev
REF 26052653 R. .... 44 2 2014 9 0 13 au[03](Claire Stansfield) Search wide, dig deep: literature
REF 24160679 R. H.... 80 2 2013 31 0 40 au[03](Martin Boeker) Google Scholar as replacement for syst
REF 21439062 .. H...c 79 2 2011 35 2 24 au[04](Rebecca Rees) The views of young children in the UK a
REF 11706930 R. .... 40 2 2001 18 0 0 au[03](G Eysenbach) Evaluation of the usefulness of Internet
REF 23738438 R. H.... 13 1 2013 3 0 0 au[01](Karen Blakeman) Finding research information on the v
REF 26061784 R. H.... 8 1 2011 2 0 19 au[02](Karen Schucan Bird) Systematic literature searching :
```

The “grep REF” command causes only the references to be shown on the screen, not the user-requested (“TOP”) paper or its citing papers (“CIT”). The default sort order of the references is the same as the default sort order for the citations.

To sort the most recent papers by reference count (“ref”), do:

```
$ icite 27846867 --verbose | grep -w i | sort -k10,10 -r
CIT 31541534 .. H.... -1 i 2019 3 0 80 au[04](Anthea Sutton) Meeting the review family: exploring
CIT 28789703 .. H.... -1 i 2017 0 0 36 au[02](Rosie Hanneke) Information sources for obesity preven
CIT 30993756 R. H.... -1 i 2019 2 0 13 au[11](Stefanie Buckner) Dementia Friendly Communities in E
CIT 29353363 RP H.... -1 i 2019 2 0 6 au[01](Marko Curkovic) The Implications of Using Internet S
```

To get only the most recent papers that have not yet been rated, “grep -w i” command looks for the lone “ i ”, in the report lines, which represents the NIH SD data. The “-w” option on grep means “i” must be a “word” by itself, not embedded in another word. Another grep that would produce the same result is “grep “-1 i”.”

This list is sorted by the number of references. So the paper with the most references (“80”) is at the top and the paper with the smallest number of references is at the bottom (“6”). The “-k10, 10” sort option causes the sort to only use the 10th column which is the reference count (“ref”). If you used “-k10”, the sort would start from the text at the 10th column and ending at the end of the line. In this case, since all of the reference counts are different there is no difference in the sort when using “-k10” or “-k10, 10”. Because “-k10” is shorter to type, it may preferable to use in this circumstance.

3.2.8 | Retaining a history

To retain a history of papers of interest, re-run “icite”, appending the paper’s NIH iCite information to a log file (“-a lit.txt”). If the name of the log file is “lit.txt”, do:

```
$ icite 27846867 -a lit.txt
```

The “lit.txt” can be saved and revision-managed using a tool like git and can be a reminder as to which papers were of interest and the order they were found.

4 | COMMENT ON *N* REFERENCES LINK

Researchers can access a document’s references using PubMed, but not GS. Only being able to traverse the literature in the forward direction by traversing to new papers that cited a paper, but not being able to traverse backwards to references in the paper hinders a researcher’s ability to dig deep into the literature.

Worse, it prevents a single author from confirming that a paper is erroneously marked as *Cited by* by another paper in GS. This potential breach in literature connectivity in GS may result in incorrect citations and the inability to measure the extent of this potential problem.

5 | CONCLUSION

The search experience in PubMed is superior to GS in many ways. But GS is good secondary source for researchers who want to find unreviewed, unpublished grey literature, which includes material like white papers, government documents, and annual reports. GS's "*N*" in its *Cited by N* will be higher than PubMed's "*N*" due to its inclusion of such materials.

We urge biomedical scientists who now use GS as their number one search interface for academic literature searches to take a look at PubMed and consider it for their primary source and GS for their secondary source.

References

1. Naik G. The quiet rise of the NIH's hot new metric. *Nature* 2016; 539(7628): 150–150. doi: 10.1038/539150a
2. Mayr P, Walter AK. An exploratory study of Google Scholar. *Online information review* 2007; 31(6): 814–830.
3. Hutchins BI, Yuan X, Anderson JM, Santangelo GM. Relative Citation Ratio (RCR): A New Metric That Uses Citation Rates to Measure Influence at the Article Level. *PLoS Biology* 2016; 14(9): e1002541. doi: 10.1371/journal.pbio.1002541

The screenshot shows a web browser window with the URL <https://pubmed.ncbi.nlm.nih.gov/26379270/>. The page header includes the NIH logo and the text "National Library of Medicine National Center for Biotechnology Information". The search bar contains the text "The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching". Below the search bar, the text "Found 1 result for The Role of Google Scholar in Evidence Reviews ..." is visible. The main content area displays the article title "The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching" in large red font. Below the title, the authors "Neal Robert Haddaway¹, Alexandra Mary Collins², Deborah Coughlin³, Stuart Kirk⁴" are listed. The abstract text is visible below the authors. On the right side, there are buttons for "Save", "Email", and "Send to", and a "Feedback" button at the bottom right. The page navigation section on the right includes "Title & authors", "Abstract", "Conflict of interest statement", "Figures", "Similar articles", "Cited by", "References", and "Publication".

1. Search for an article, by title

> PLoS One. 2015 Sep 17;10(9):e0138237. doi: 10.1371/journal.pone.0138237. eCollection 2015.

The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching

Neal Robert Haddaway¹, Alexandra Mary Collins², Deborah Coughlin³, Stuart Kirk⁴

Affiliations + expand
 PMID: 26379270 PMCID: PMC4574933 DOI: 10.1371/journal.pone.0138237
 Free PMC article

Abstract

Google Scholar (GS), a commonly used web-based academic search engine, catalogues between 2 and 100 million records of both academic and grey literature (articles not formally published by commercial academic publishers). Google Scholar collates results from across the internet and is free to use. As a result it has received considerable attention as a method for searching for literature, particularly in searches for grey literature, as required by systematic reviews. The reliance on GS as a standalone resource has been greatly debated, however, and its efficacy in grey literature searching has not yet been investigated. Using systematic review case studies from environmental science, we investigated the utility of GS in systematic reviews and in searches for grey literature. Our findings show that GS results contain moderate amounts of grey literature, with the majority found on average at page 80. We also found that, when searched for specifically, the majority of literature identified using Web of Science was also found using GS. However, our findings showed moderate/poor overlap in results when similar search strings were used in Web of Science and GS (10-67%), and that GS missed some important literature in five of six case studies. Furthermore, a general GS search failed to find any grey literature from a case study that involved manual searching of organisations' websites. If used in systematic reviews for grey literature, we recommend that searches of article titles focus on the first 200 to 300 results. We conclude that whilst Google Scholar can find much grey literature and specific, known studies, it should not be used alone for systematic review searches. Rather, it forms a powerful addition to other traditional search methods. In addition, we advocate the use of tools to transparently document and catalogue GS search results to maintain high levels of transparency and the ability to be updated, critical to systematic reviews.

2. Scroll down to see "Cited by" papers

...

FIGURE 1 Searching for a specific paper by its title in PubMed. First, enter the article's title in the search box. Then press enter. Scroll down to see the forward citation.

The Role of Google Scholar in Ev x +

https://pubmed.ncbi.nlm.nih.gov/26379270/

For quick access, place your favorites here on the favorites bar. [Manage favorites now](#) | Other favorites

Cited by 68 articles **3. See citation count (68)**

Effectiveness and Safety of Acupuncture Moxibustion Therapy Used in Breast Cancer-Related Lymphedema: A Systematic Review and Meta-Analysis.
Jin H, Xiang Y, Feng Y, Zhang Y, Liu S, Ruan S, Zhou H.
Evid Based Complement Alternat Med. 2020 May 11;2020:3237451. doi: 10.1155/2020/3237451. eCollection 2020.
PMID: 32454855 [Free PMC article.](#) [Review.](#)

Self-harm with suicidal and non-suicidal intent in young people in sub-Saharan Africa: a systematic review.
Quarshie EN, Waterman MG, House AO.
BMC Psychiatry. 2020 May 14;20(1):234. doi: 10.1186/s12888-020-02587-z.
PMID: 32408896 [Free PMC article.](#)

The Power of Packaging: A Scoping Review and Assessment of Child-Targeted Food Packaging.
Elliott C, Truman E.
Nutrients. 2020 Mar 30;12(4):958. doi: 10.3390/nu12040958.
PMID: 32235580 [Free PMC article.](#) [Review.](#)

Knowledge and remaining gaps on the role of animal and human movements in the poultry production and trade networks in the global spread of avian influenza viruses - A scoping review.
Hautefeuille C, Dauphin G, Peyre M.
PLoS One. 2020 Mar 20;15(3):e0230567. doi: 10.1371/journal.pone.0230567. eCollection 2020.
PMID: 32196515 [Free PMC article.](#)

A Meta-Analytical Review of the Genetic and Environmental Correlations between Reading and Attention-Deficit Hyperactivity Disorder Symptoms and Reading and Math.
Daucourt MC, Erbeli F, Little CW, Haughbrook R, Hart SA.
Sci Stud Read. 2020;24(1):23-56. doi: 10.1080/10888438.2019.1631827. Epub 2019 Jul 8.
PMID: 32189961

3a. Click to see citations

Show more "Cited by" articles [See all "Cited by" articles](#)

References **4. See reference count (35)**

- Larsen PO, von Ins M. The rate of growth in scientific publication and the decline in coverage provided by Science Citation Index. *Scientometrics*. 2010;84:575–603. 10.1007/s11192-010-0202-z - DOI - PMC - PubMed
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- Noorden RV. Open access: The true cost of science publishing. *Nature*. 2013;495:426–429. 10.1038/495426a - DOI - PubMed
- Khabsa M, Giles CL. The number of scholarly documents on the public web. *PLOS ONE*. 2014;9:e93949 10.1371/journal.pone.0093949 - DOI - PMC - PubMed
- Collaboration for Environmental Evidence (CEE). Guidelines for Systematic Review and Evidence Synthesis in Environmental Management. Version 4.2. 2013. Environmental Evidence: www.environmentalevidence.org/Documents/Guidelines/Guidelines4.2.pdf

Show all 35 references

Feedback

FULL TEXT LINKS

[OPEN ACCESS TO FULL TEXT](#)

[PMC Full text](#)

ACTIONS

[Cite](#)

[Favorites](#)

SHARE

[Twitter](#) [Facebook](#) [Link](#)

PAGE NAVIGATION

[Title & authors](#)

[Abstract](#)

[Conflict of interest statement](#)

[Figures](#)

[Similar articles](#)

[Cited by](#)

[References](#)

[Publication types](#)

[MeSH terms](#)

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FIGURE 2 Searching for a specific paper by its title in PubMed. After entering the article's title in the search box and pressing enter, scroll down to see the forward citation in the "Cited by" section. The header of the "Cited by" section and the "References" section contain the count of citing items. To open a page with the list of citations, click *See all "Cited by" articles*, marked as step 3a.

The screenshot shows a web browser window with the Google Scholar search interface. The search bar at the top contains the text "The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching", which is highlighted with a red rectangular box. Below the search bar, the search results are displayed. The first result is for the article "The role of Google Scholar in evidence reviews and its applicability to grey literature searching" by NR Haddaway, AM Collins, D Coughlin, and S Kirk, published in PLoS one in 2015. The citation count "Cited by 353" is highlighted with a red rectangular box. Red annotations are present: "1. Search for an article by title" with an arrow pointing to the search bar, "2. Citation count(353)" with an arrow pointing to the citation count, and "2a. Click to see citations" with an arrow pointing to the article title. The browser's address bar shows the URL "scholar.google.com/scholar?hl=en&as_sdt=0%2C33&q=The+Role+of+Google+Scholar+in+Evidence+Revi...".

The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching

Scholar 1. Search for an article by title YEAR

[HTML] The role of Google Scholar in evidence reviews and its applicability to grey literature searching [HTML] plos.org

NR Haddaway, AM Collins, D Coughlin, S Kirk - PloS one, 2015 - journals.plos.org

Google Scholar (GS), a commonly used web-based academic search engine, catalogues between 2 and 100 million records of both academic and grey literature (articles not formally published by commercial academic publishers). Google Scholar collates results from across the internet and is free to use. As a result it has received considerable attention as a method for searching for literature, particularly in searches for grey literature, as required by systematic reviews. The reliance on GS as a standalone resource has been greatly debated ...

Cited by 353 Related articles All 16 versions

Showing the best result for this search. See all results

2. Citation count(353)
2a. Click to see citations

FIGURE 3 Searching for a specific paper by its title shows 353 citations in Google Scholar. First, enter the article's title in the search box. Then press enter. Then see the citation count.

Haddaway: The role of Google Sc x +

scholar.google.com/scholar?cites=2705149244580563206&as_sdt=5,33&scioldt=0,33&hl=en

Scholar About 353 results (0.03 sec) YEAR

The role of Google Scholar in evidence reviews and its applicability to grey literature searching

Search within citing articles

The association between first-episode psychosis and abnormal glycaemic control: systematic review and meta-analysis
 BI Perry, G McIntosh, S Weich, S Singh, K Rees - *The Lancet Psychiatry*, 2016 - Elsevier
 Background Schizophrenia might share intrinsic inflammatory disease pathways with type 2 diabetes. We aimed to assess whether first-episode psychosis, which could be described as developing schizophrenia, is associated with prediabetic markers, or developing diabetes ...
 ☆ **Cited by 86** Related articles All 6 versions

Comparing the coverage, recall, and precision of searches for 120 systematic reviews in Embase, MEDLINE, and Google Scholar: a prospective study [HTML] [springer.com](#)
 WM Bramer, D Giustini, BMR Kramer - *Systematic reviews*, 2016 - Springer
 Background Previously, we reported on the low recall of Google Scholar (GS) for systematic review (SR) searching. Here, we test our conclusions further in a prospective study by comparing the coverage, recall, and precision of SR search strategies previously performed ...
 ☆ **Cited by 84** Related articles All 21 versions

Broad threat to humanity from cumulative climate hazards intensified by greenhouse gas emissions [PDF] [usda.gov](#)
 C Mora, D Spirandelli, EC Franklin, J Lynham... - *Nature Climate ...*, 2018 - nature.com
 The ongoing emission of greenhouse gases (GHGs) is triggering changes in many climate hazards that can impact humanity. We found traceable evidence for 467 pathways by which human health, water, food, economy, infrastructure and security have been recently ...
 ☆ **Cited by 81** Related articles All 20 versions

Diagnostic utility of cerebrospinal fluid α -synuclein in Parkinson's disease: a systematic review and meta-analysis
 P Eusebi, D Giannandrea, L Biscetti... - *Movement ...*, 2017 - Wiley Online Library
 Background The accumulation of misfolded α -synuclein aggregates is associated with PD. However, the diagnostic value of the α -synuclein levels in CSF is still under investigation. Methods A comprehensive search of the literature was performed, yielding 34 studies ...
 ☆ **Cited by 69** Related articles All 7 versions

FIGURE 4 The first four of 353 citations for a specific paper. Each citation for the paper, “The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching” has its own citation count, shown in the red boxes, aiding the user to choose the next paper to investigate.

Cited In for PMID: 26379270 - Se x +

https://pubmed.ncbi.nlm.nih.gov/?linkname=pubmed_pubmed_...

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TEXT AVAILABILITY

Abstract

Free full text

Full text

ARTICLE ATTRIBUTE

Associated data

ARTICLE TYPE

Books and Documents

Clinical Trial

Meta-Analysis

Randomized Controlled Trial

Review

Systematic Review

PUBLICATION DATE

1 year

5 years

10 years

Cited In for PMID: 26379270

69 results

1 **The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching.**
Haddaway NR, Collins AM, Coughlin D, Kirk S.
PLoS One. 2015 Sep 17;10(9):e0138237. doi: 10.1371/journal.pone.0138237. eCollection 2015.
PMID: 26379270 **Free PMC article.**
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2 **Effectiveness and Safety of Acupuncture Moxibustion Therapy Used in Breast Cancer-Related Lymphedema: A Systematic Review and Meta-Analysis.**
Jin H, Xiang Y, Feng Y, Zhang Y, Liu S, Ruan S, Zhou H.
Evid Based Complement Alternat Med. 2020 May 11;2020:3237451. doi: 10.1155/2020/3237451.
eCollection 2020.
PMID: 32454855 **Free PMC article.** Review.
Cite Share

3 **Self-harm with suicidal and non-suicidal intent in young people in sub-Saharan Africa: a systematic review.**
Quarshie EN, Waterman MG, House AO.
BMC Psychiatry. 2020 May 14;20(1):234. doi: 10.1186/s12888-020-02587-z.
PMID: 32408896 **Free PMC article.**
Cite Share

4 **The Power of Packaging: A Scoping Review and Assessment of Child-Targeted Food Packaging.**
Elliott C, Truman E.
Nutrients. 2020 Mar 30;12(4):958. doi: 10.3390/nu12040958.
PMID: 32235580 **Free PMC article.** Review.
Cite Share

Feedback

FIGURE 5 The first three of 68 citations for a specific paper as they currently appear in PubMed. The original paper, “The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching”, is at the top of the list. All 68 citing papers can be downloaded or shown on the page by scrolling down and clicking, “Show more.”

Cited In for PMID: 26379270 - Se x +

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Abstract

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ARTICLE ATTRIBUTE

Associated data

ARTICLE TYPE

Books and Documents

Clinical Trial

Meta-Analysis

Randomized Controlled Trial

Review

Systematic Review

PUBLICATION DATE

1 year

5 years

10 years

Cited In for PMID: 26379270

69 results

1 **The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching.**
Haddaway NR, Collins AM, Coughlin D, Kirk S.
PLoS One. 2015 Sep 17;10(9):e0138237. doi: 10.1371/journal.pone.0138237. eCollection 2015.
PMID: 26379270 **Free PMC article.** **Cited by 95** **12 References**
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2 **Effectiveness and Safety of Acupuncture Moxibustion Therapy Used in Breast Cancer-Related Lymphedema: A Systematic Review and Meta-Analysis.**
Jin H, Xiang Y, Feng Y, Zhang Y, Liu S, Ruan S, Zhou H.
Evid Based Complement Alternat Med. 2020 May 11;2020:3237451. doi: 10.1155/2020/3237451. eCollection 2020.
PMID: 32454855 **Free PMC article.** **Review.** **23 References**
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3 **Self-harm with suicidal and non-suicidal intent in young people in sub-Saharan Africa: a systematic review.**
Quarshie EN, Waterman MG, House AO.
BMC Psychiatry. 2020 May 14;20(1):234. doi: 10.1186/s12888-020-02587-z
PMID: 32408896 **Free PMC article.** **79 References**
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4 **The Power of Packaging: A Scoping Review and Assessment of Child-Targeted Food Packaging.**
Elliott C, Truman E.
Nutrients. 2020 Mar 30;12(4):958. doi: 10.3390/nu12040958
PMID: 32235580 **Free PMC article.** **Review.** **40 References**
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Feedback

FIGURE 6 The first three of 68 citations for a specific paper as we would like it to appear in PubMed. We would like to see a *Cited by N* link and a *N References* link on the same line as the PubMed ID (PMID). Recently published citing papers (items 2 through 4) lack a *Cited by N* link because they do not yet have citations which are associated with a PMID.

Cited In for PMID: 26379270 - Se x +

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Save citations to file

Selection: All results

Format: PMID

Create file Cancel

1. All results

2. As PMIDs

3. Save to a file

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RESULTS BY YEAR

2015 2020

TEXT AVAILABILITY

Abstract

Free full text

Full text

ARTICLE ATTRIBUTE

Associated data

Cited In for PMID: 26379270

69 results

1 The Role of Google Scholar in Evidence Reviews and Its Applicability to Grey Literature Searching.
Haddaway NR, Collins AM, Coughlin D, Kirk S.
PLoS One. 2015 Sep 17;10(9):e0138237. doi: 10.1371/journal.pone.0138237. eCollection 2015.
PMID: 26379270 Free PMC article.

“ Cite Share

2 Effectiveness and Safety of Acupuncture Moxibustion Therapy Used in Breast Cancer-Related Lymphedema: A Systematic Review and Meta-Analysis.
Jin H, Xiang Y, Feng Y, Zhang Y, Liu S, Ruan S, Zhou H.
Evid Based Complement Alternat Med. 2020 May 11;2020:3237451. doi: 10.1155/2020/3237451.
eCollection 2020.
PMID: 32454855 Free PMC article. Review.

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FIGURE 7 Save PMIDs into a file. Click the “Save” button. Then save all results as PMIDs into a file.

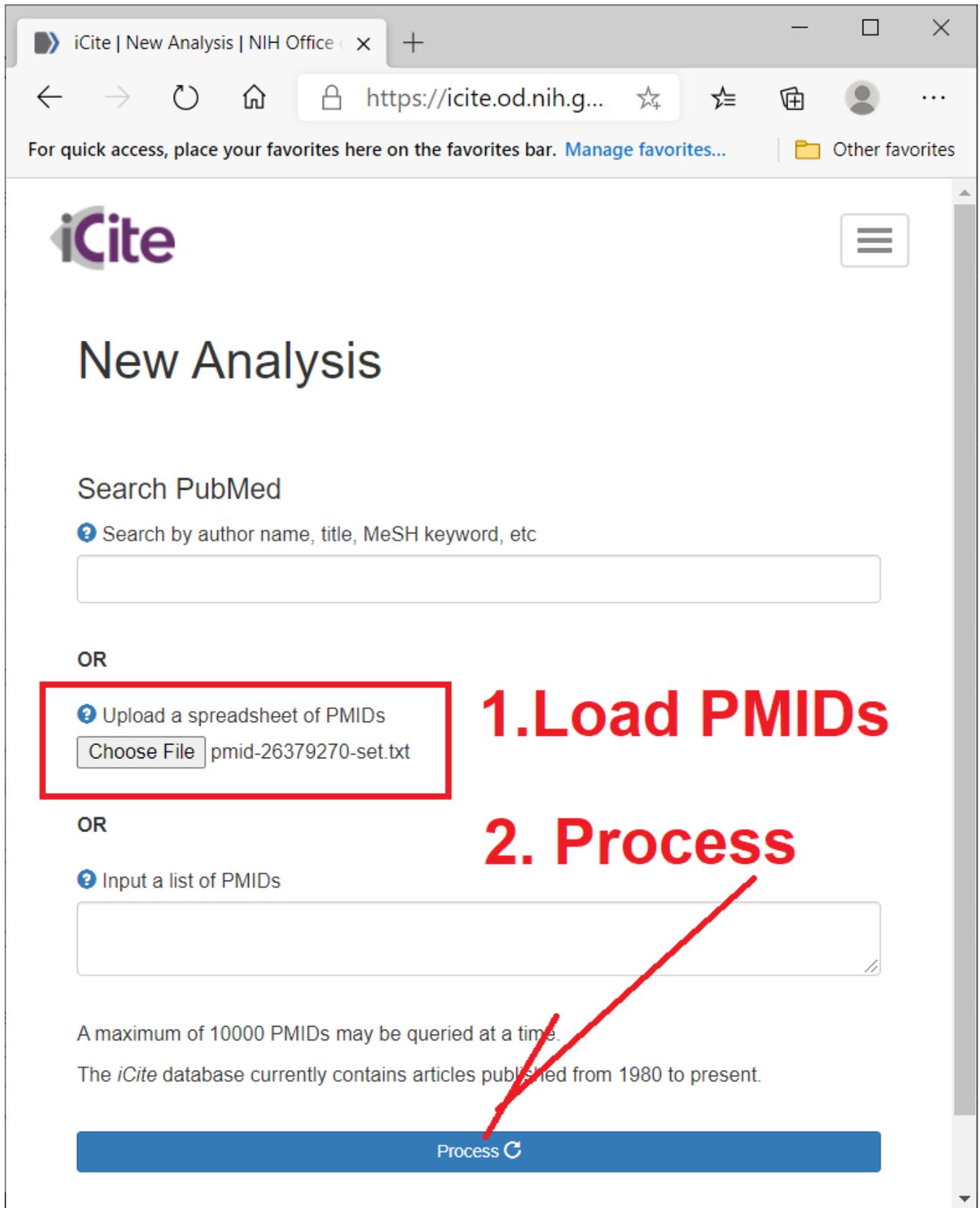


FIGURE 8 Annotate PMIDs with NIH iCite citation data. Load the PMIDs into iCite and process.

Results for pmid-26379270-set.txt

1. PMID file

2. Click "Citations"

3. See citations annotated with counts

4. Export citation data

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iCite

New Analysis Global RCR Stats How to cite Help

Influence Translation **Citations**

Total Pubs: 69 Pubs Per Year: 11.50 Total Citations: 320 Citations Per Pub: MAX 108, MEAN 4.64, SEM 1.66, MED 1.00

Customization

From 2015 To 2020

Only research articles Only papers cited by clinical articles Only clinical articles

PMID	Year	Title	Authors	Journal	Total Citations	Total References	RCR
26379270	2015	The Role of Google Scholar in Evidence Reviews and Its Appli...	Neal Robert Haddaway, Alexar	PLoS ONE	108	12	12.63
26932789	2016	Comparing the coverage, recall, and precision of searches for 1	Wichor M Bramer, Dean Giusti	Syst Rev	27	11	3.72
27134485	2016	Specialist Bibliographic Databases.	Armen Yuri Gasparyan, Marlen	J. Korean Med. Sci.	5	77	0.99
27540405	2016	A scoping review of weight bias by community pharmacists tov	Andrea L Murphy, David M Ga	Can Pharm J (Ott)	6	83	1.00

FIGURE 9 Annotate PMIDs with NIH iCite citation count data. Annotated citations appear as a list under the red “3” and do not retain their order sorted by PubMed’s “Best Match” algorithm. The annotated citation data can be exported (red “4”).

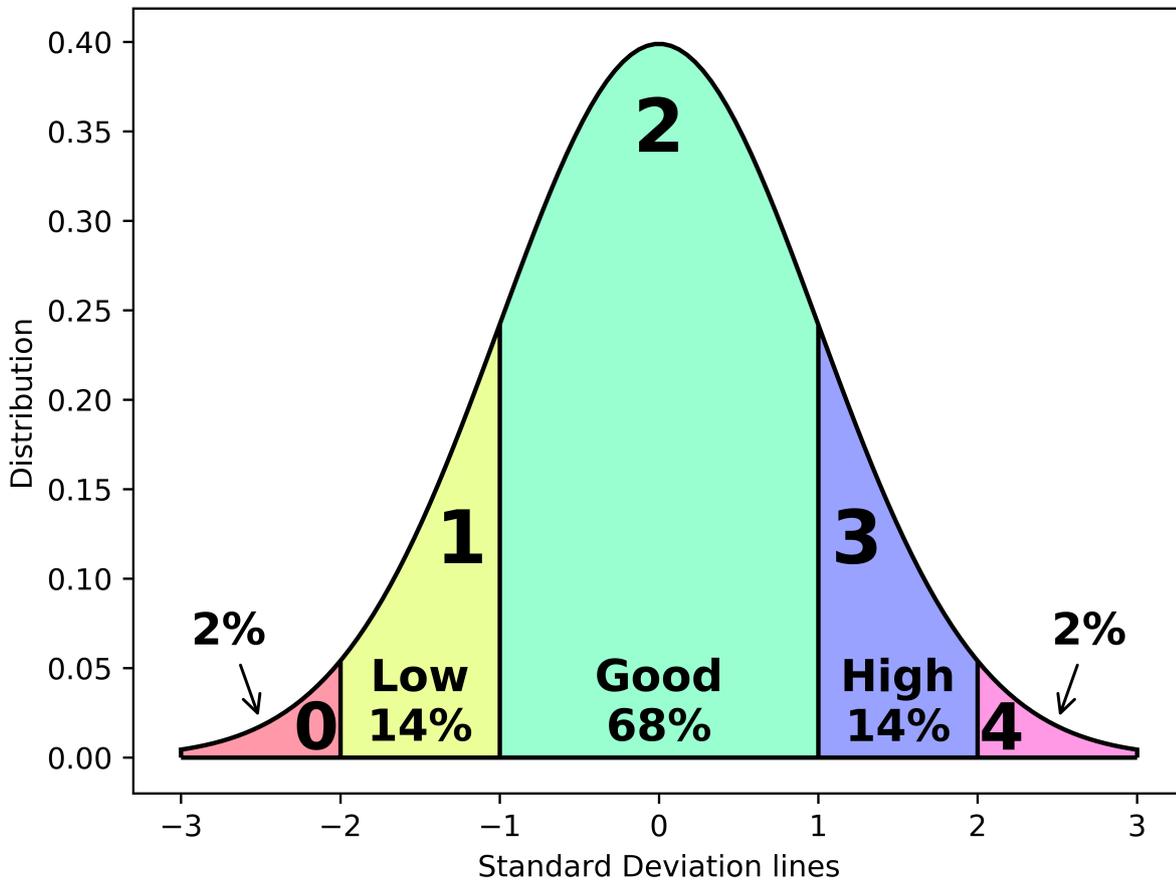


FIGURE 10 NIH percentile groups. There are 5 numbered NIH percentile groups. The lowest performing papers are given a 0. The highest performing papers are given a 4.

How to cite this article: D. V. Klopfenstein and W. Dampier (2020), Commentary to Gusenbauer and Haddaway 2020: Evaluating retrieval qualities of Google Scholar and PubMed, *Research Synthesis Methods*, 20NN;00:N–N.