Reports

The new-look of PubMed: A brief description of the changes in PubMed

Fabio Frisone [1, 2] *, Rosaria Micali [3]

Abstract

The advancement of technology has made it possible to obtain discrete results in terms of scientific information. Among the many innovations made recently, there is the possibility of accessing the changes and improvements offered by the new updated PubMed. This brief description aims at highlighting the main innovations operated by PubMed to make the field of scientific information more practical and reachable by everyone.

[1] Department of Cognitive Sciences, Psychology, Educational and Cultural Studies (COSPECS), University of Messina, Italy

[2] CRISCAT (International Research Center for Theoretical and Applied Cognitive Sciences) University of Messina and Universitary Consortium of Eastern Mediterranean, Noto (CUMO), Italy

[3] Library System, University of Messina, Italy

E-mail corresponding author: fabfrisone@unime.it

PubMed news

It is easy to recognize the merits that PubMed has always had for improving scientific information (Dogan et al., 2009; Falagas et al., 2008; Fiorini, Lipman, & Lu, 2017; Fontaine et al., 2009; Giglia, 2007, 2009, 2011; Hunter & Cohen, 2006; Islamaj et al., 2009; Lu et al., 2009; Plikus, Zhang, & Chuong, 2006; States et al., 2009; Williamson & Minter, 2019).

PubMed was prepared in front of the technological progress that has enabled a large collection of scientific material (AlRyalat, Malkawi, & Momani, 2019; Costantino, Montano, & Casazza, 2015; Caelleigh, 2000; Duffy et al., 2016; Fiorini et al., 2018; Frandsen et al., 2019; Gargiulo, Silvestri, & Ciampi, 2017; Gusenbauer & Haddaway, 2020; Jeong & Huh, 2017; Lu, 2011; Morshed & Hayden, 2020; Topper & Boehr, 2018; Tummers et al., 2019).

The new version of PubMed was formally announced in October 2019 and for a few months it was possible to test a trial version, PubMed Labs. Starting from 18 May 2020, the National Library of Medicine (NLM) has replaced the previous PubMed with the new updated PubMed (Kumar, 2020; Shashikiran, 2016), but the NLM also kept the so called "legacy version" (i.e. the old version) available at least until 09/30/2020, easily reachable from the homepage (Fig. 1, under *Explore*).

The designers of the new PubMed collected and considered feedbacks from researchers, clinicians, librarians, and curators and introduced many improvements, including:

- Summary display including the full author list and other citation details;

- Send to: Citation manager is available;

- RIS format is replaced by PubMed format;

- Search details including individual term translations;

- Citations in the Clipboard have been added to History as search number #0;

- Options to customize the number of items per page;

- Sort by publication date and reverse sort order;

- Persistent display preferences;

- See all similar articles;

- Download the results by year timeline;

- Improved search;

- Responsive Web Design (RWD);

- Updated Technology;

- A new and completely redesigned drop-down menu of the MeSH terms;

- Option to search free full-text papers only;

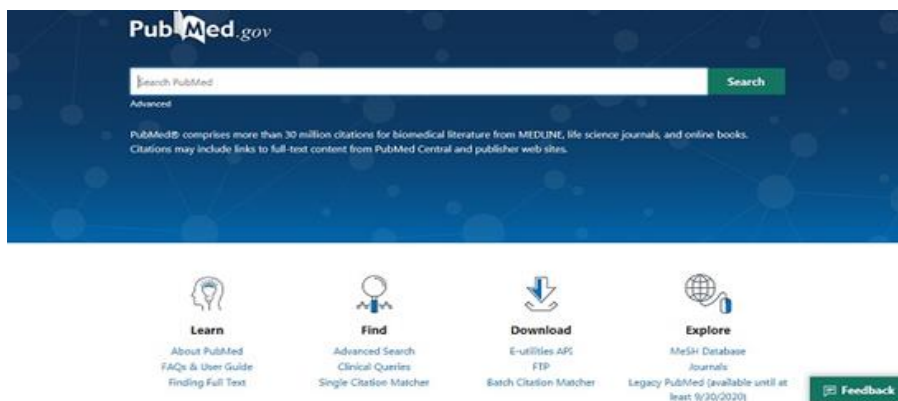- The addition, in the search results page, of snippets.

Fig. 1.

Fig. 1 shows the new PubMed design.

As shown in Fig. 1, the Updated PubMed has also had a new innovative web-design, the search bar is bigger and centred (Manca et al., 2017), while the tools and the features are now displayed under four different icons and subcategories. The single and the batch citation matcher links are differentiated in the new PubMed, as shown above (Fig. 1; under the *Find* and *Download* menus, respectively). However, one of the most interesting changes is the improvement in browsing. It has improved the browsing experience also for those who use small-screen devices, and Fig. 2 shows the innovations made to the summary display format. The updates allow viewing some citation details that concern not only the full author list but also the ability to view links where the free full-text article is available.

Furthermore, the web maintained the possibility of immediate identifying of the type of an article (for example, if it is a review or a meta-analysis) (Hogan Smith, 2018; Lanera et al., 2019).

All these features can be used now from any type of device.
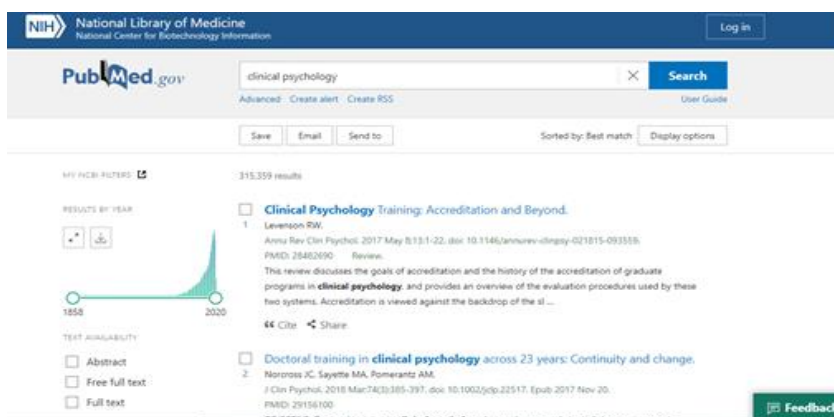
Fig. 2

Fig. 2 shows the innovations made to the summary display format.

The new updated PubMed now allows downloading citations in PubMed format, i.e. that format that uses the same character encoding as MEDLINE (Unicode UTF-8). This format allows keeping diacritics, thus reducing the possibility of errors in the export files.

PubMed innovations have always tried to keep up to date with technological advances and this is why, as seen in Fig. 3, citing an article now has become a quicker and more effective procedure, which does not require any redirection to other pages.

In this regard, to cite the article wanted, it is enough to click on the "cite" button, choose the format of the citation (AMA, MLA, APA, NLM), click on "copy" and paste the citation into the manuscript.
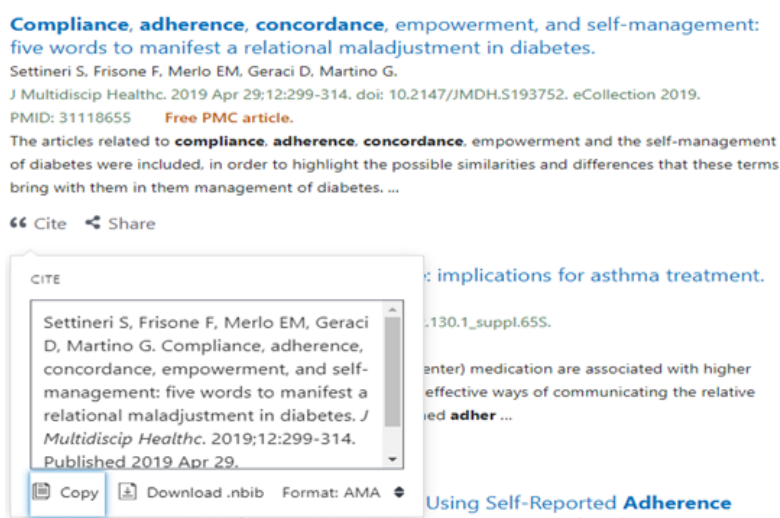
Fig. 3.

Fig. 3 indicates the possibility of directly copying the citation of the consulted article using the same character encoding of MEDLINE.

Not only the process of citing articles has been simplified, but also further steps have been taken to ensure that the articles needed to divulge can be easily shared through Twitter and Facebook platforms. This process is highlighted in Fig. 4.

Fig. 4.

Fig. 4 shows the simple process of sharing articles on the Twitter and Facebook platforms.

As in the legacy PubMed, also using "send to citation manager" facilitates the requests of many citation management programs.

To do this, just create a file for external citation management software as illustrated in Fig. 5. This allows not only saving citations in PubMed as a text (.txt) filing format but also in the .nbib filing.

Fig. 5

Fig. 5 shows the possibility of using "send to: citation manager" to save citations in a format other than the .txt file.

In order to make the use of research articles even more accurate, on the Advanced Search Page, there are the translations of the searched terms. It is possible to observe with Fig. 6 PubMed's search rules and syntax.
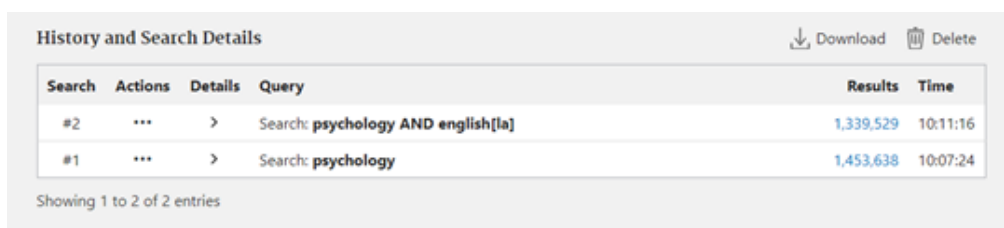
Fig. 6

Fig. 6 indicates the individual translations that can be found from PubMed's search details.

In "search details", it can be seen how the words or the phrases entered during the search phase by the user are automatically translated into a wider and more technical search formula that includes MeSH terms and Supplementary Concepts, i.e. names of chemicals and drugs.

Regarding the possibility of taking advantage of the history, it should be noted that this would automatically reset after 8 hours of inactivity. Besides, the capacity of PubMed's history can contain the last 500 searches carried out, and it is possible to delete the entire history or to delete only the data deemed unnecessary. Through the query box, Boolean search statements is used to filter the articles preferred to consult (Berardi et al., 2004).

Fig. 7 shows the results of the psychology articles obtained before and after the English language filter.
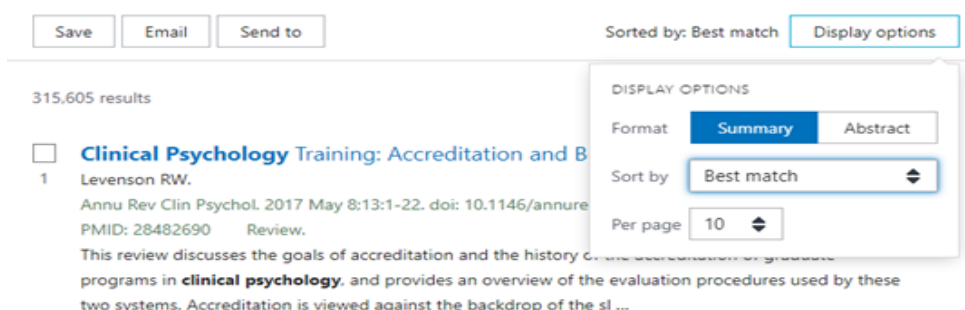
Fig. 7

History and Search Details					⤓ Download	🗑 Delete
Search	Actions	Details	Query		Results	Time
#2	•••	>	Search: **psychology AND english[la]**		1,339,529	10:11:16
#1	•••	>	Search: **psychology**		1,453,638	10:07:24

Showing 1 to 2 of 2 entries

Fig. 7 shows the history and search details compared with the Boolean search operators.

Concerning the sorting method of the search results, in the new PubMed the default option is "Best match" (Fiorini et al., 2018), so the most relevant results to the search terms are shown first, but it is also possible to choose between different sorting options by clicking on display options. As shown in Fig. 8, the options concern the format, sort by and per page.

Fig. 8

Save	Email	Send to		Sorted by: Best match	Display options

315,605 results

DISPLAY OPTIONS

Format — Summary / Abstract

☐ 1 **Clinical Psychology** Training: Accreditation and B
Levenson RW.
Annu Rev Clin Psychol. 2017 May 8:13:1-22. doi: 10.1146/annure
PMID: 28482690   Review.
This review discusses the goals of accreditation and the history of the accreditation of graduate programs in **clinical psychology**, and provides an overview of the evaluation procedures used by these two systems. Accreditation is viewed against the backdrop of the sl …

Sort by — Best match
Per page — 10

Fig. 8 shows how the browsing results are sorted.

The possibility of having persistent display preferences allows taking advantage of the same settings for subsequent searches, eliminating the time it would have taken to set up the preferences each time. Furthermore, as seen in Fig. 9, similar articles appear when browsing a specific article and this helps to speed up the data collection process on a topic.

Fig. 9

Similar articles

Voices of the five doctoral training councils in psychology: seeking common ground on Combined-Integrated doctoral training in psychology.
Blom-Hoffman J. Okun BF. Lifter K. Blashfield R. Crowley SL. Goodyear RK. Strein W. Winfrey LL.
J Clin Psychol. 2004 Sep;60(9):957-67. doi: 10.1002/jclp.20029.
PMID: 15316921

Report of roundtable on internship and training of clinical psychologists. 1947.
Dosier C.
J Clin Psychol. 2000 Mar;56(3):319-25. doi: 10.1002/(sici)1097-4679(200003)56:3<319::aid-jclp8>3.0.co;2-1.
PMID: 10726668   No abstract available.

Doctoral training in clinical psychology.
McFall RM.
Annu Rev Clin Psychol. 2006;2:21–49. doi: 10.1146/annurev.clinpsy.2.022305.095245.
PMID: 17716063   Review.

Fig. 9 shows the similar articles that the new PubMed suggests after the abstract of the article being consulted.

If you want to know how many articles have been published each year for a specific topic, the new PubMed allows, through the download button that is shown in Fig. 10, to download a CSV file that shows the results by year timeline.

Fig. 10

RESULTS BY YEAR

1858   2020

□ **Clinical Psychology**
1   Levenson RW.
    Annu Rev Clin Psychol. 201
    PMID: 28482690   Reviev
    This review discusses the g
    programs in **clinical psych**
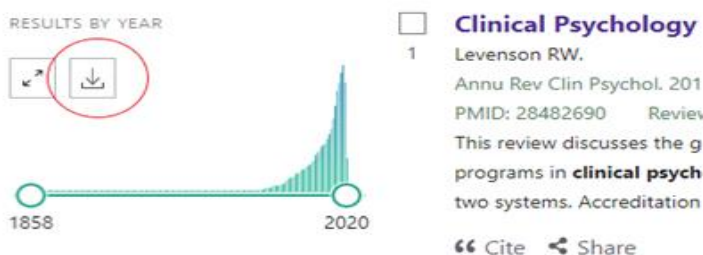   two systems. Accreditation
    " Cite   < Share

Fig. 10 shows the possibility of downloading a CSV file showing the results by year timeline.

These are just some of the new features that can be found on the new Updated PubMed. For example, to find out more about PubMed's improvements, it has become even easier now to find pertinent articles using the Best Match algorithm. Once the articles are found, it is possible, as shown in Fig. 11, to save them and send them by email or to the NCBI My Bibliography.

Fig. 11

clinical psychology

Advanced   Create alert   Create RSS

Save   Email   Send to
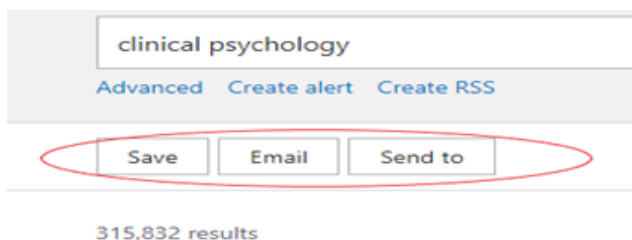
315,832 results

Fig. 11 shows the opportunity to save and send the search results by email or to the NCBI My Bibliography.

The ability to use filters has also been changed to make the research faster and more accurate (Damarell et al., 2020). As shown in Fig. 12, the additional filters offer a variety of results that allows the process to be accomplished by a great skimming with respect to the research needs.

Fig. 12

The Fig. 12 shows the possibilities offered by the additional filters of PubMed.

The research algorithm has been refined: it performs a broader search for synonyms, including plural forms, and the British/American English spelling variants (e.e. centre/center, behaviour/behavior). The truncation of a term (using "*" at the end of a word) that was previously limited to 600 variants (Shanman, 2017), is now unlimited. You can also narrow the results only to documents with the link to full-text, adding to search term "free full text [SB]".

The MeSH (Medical Subject Headings) archive, controlled vocabulary used to index the concepts and the subjects addressed in papers and articles - regardless of the language used by the author - was integrated into the new PubMed and the drop-down menu of MeSH terms was redesigned, as shown in Fig. 13.

Fig. 13
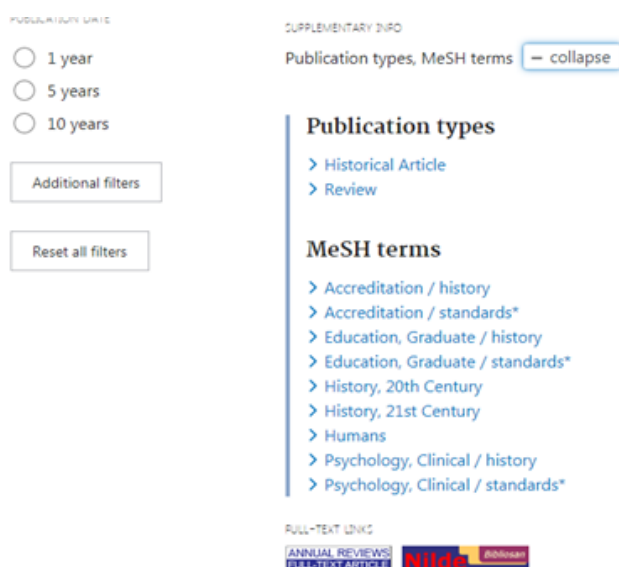
The Fig. 13 shows the drop-down menu of MeSH Terms.

In the abstract format, using the "Page navigation" menu, you can select the single parts of the record and scroll with the left and right arrows, navigating within the search results. Hovering the mouse over the "Prev. Result" and the "Next Result" buttons, an extract - called "snippet" - of the previous or next article pops up: this is an abstract excerpt in which the terms used for the research are highlighted in bold (as shown in Fig. 14).

The figure display has been entirely renovated to offer a cleaner and more intuitive look and it now features a full-screen in-page view that you can simply share by copying the URL.
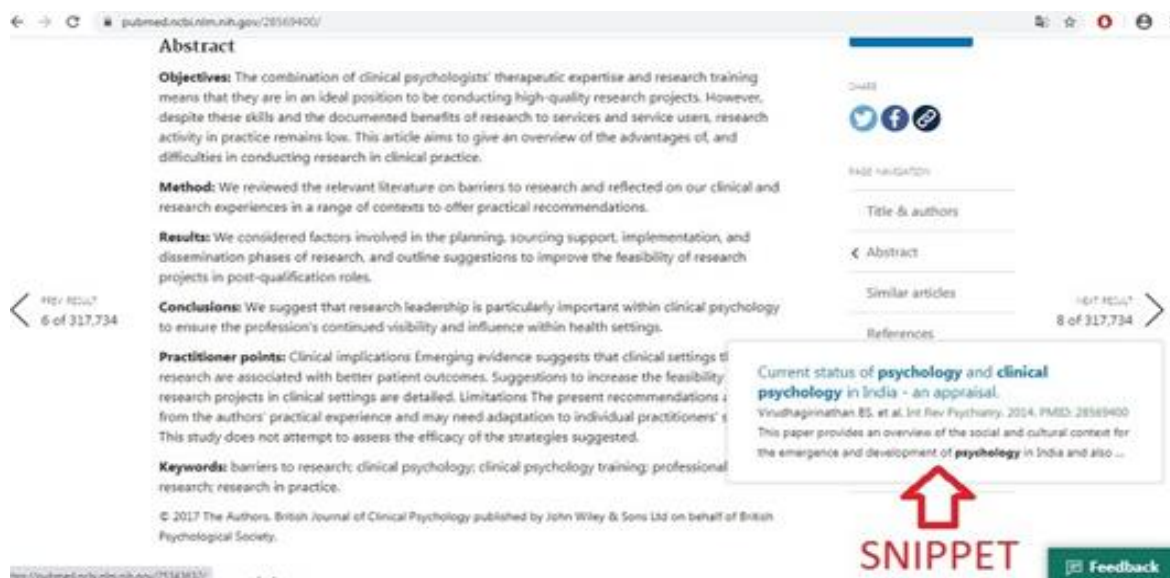
Fig. 14

Fig. 14 shows an example of a "snippet" that appears hovering the mouse over the "Next Result" arrow.

All these innovations now appear easier to use thanks to the responsive web design (RWD) (Bernacki et al., 2016; Hussain & Mkpojiogu, 2015; Kang & Satterfield, 2019; Phunkaew, Phandan, & Wongwatkit, 2019; Subić, Krunić, & Gemović, 2014), which allows you to have the opportunity to research in any type of circumstance and with any type of mobile device such as mobile phone or tablet.

The updated technology of new PubMed also uses both an open-source enterprise search system called Solr and MongoDB, and these tools offer numerous improvements in terms of archiving, searching and retrieving data (Wanner & Baumann, 2019).

A further improvement regarding the backup capabilities comes thanks to the enhancement of the cloud architecture. In this sense, Fig. 15 shows the updated PubMed architecture features.

Fig. 15

Fig. 15 shows the updated PubMed architecture features, an image provided by Kathi Canese, National Center for Biotechnology Information.

Although further improvements can be made (Frisone, 2018; Manca et al., 2018; Merlo, 2018; Miah et al., 2017; Settineri, 2018; Settineri et al., 2018; Settineri & Femminò, 2019; Settineri & Merlo, 2019; Wildgaard & Lund, 2016), the advantages of the new PubMed updated are many and contribute to the advancement of world research (Bhaskar et al., 2015; Cortegiani, Manca, & Giarratano, 2020; Cortegiani et al., 2019; Huh, 2016; Rogers et al., 2020; Sperandeo et al., 2019; Turner, 2016). To find out all the news, just as shown in Fig. 16, click on FAQs and User Guide or watch the video at the link:

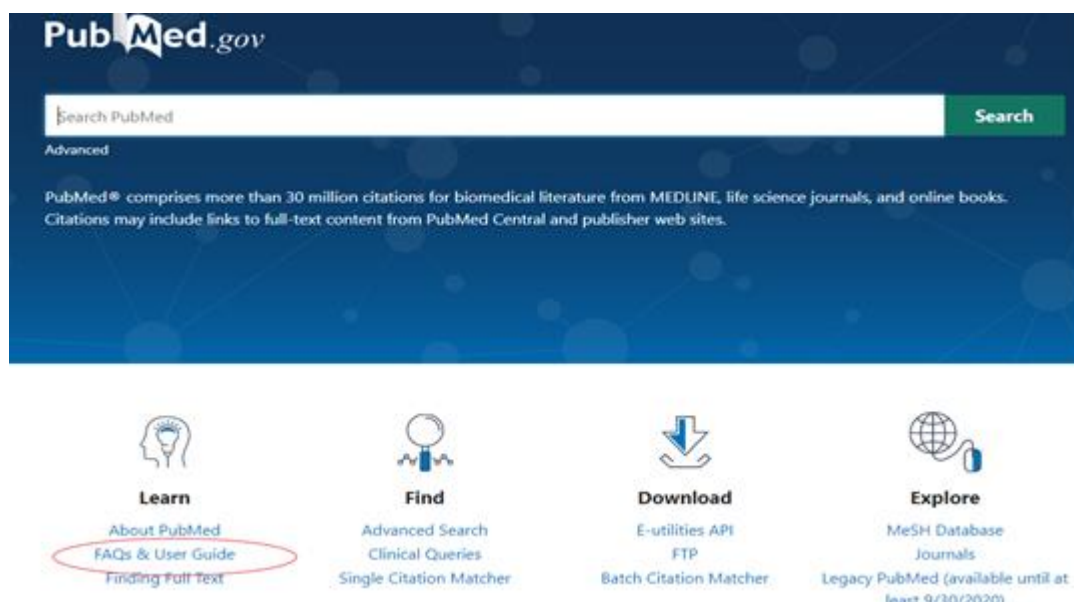https://www.nlm.nih.gov/oet/ed/pubmed/events/2019_09.html.

Fig. 16.

Fig. 16 shows how to get more information about the updated PubMed.

References

1. AlRyalat, S. A. S., Malkawi, L. W., & Momani, S. M. (2019). Comparing bibliometric analysis using PubMed, Scopus, and Web of Science databases. *JoVE (Journal of Visualized Experiments)*, (152), e58494. https://doi.org/10.3791/58494

2. Berardi, M., Lapi, M., Leo, P., Malerba, D., Marinelli, C., & Scioscia, G. (2004, September). A data mining approach to PubMed query refinement. In *Proceedings. 15th International Workshop on Database and Expert Systems Applications, 2004.* (pp. 401-405). IEEE. https://doi.org/10.1109/DEXA.2004.1333507

3. Bernacki, J., Błażejczyk, I., Indyka-Piasecka, A., Kopel, M., Kukla, E., & Trawiński, B. (2016, March). Responsive web design: testing usability of mobile web applications. In *Asian Conference on Intelligent Information and Database Systems* (pp. 257-269). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-49381-6_25

4. Bhaskar, P., Buzzi, M., Geraci, F., & Pellegrini, M. (2015, September). From literature to knowledge: Exploiting pubmed to answer biomedical questions in natural language. In *International Conference on Information Technology in Bio-and Medical Informatics* (pp. 3-15). Springer, Cham. https://doi.org/10.1007/978-3-319-22741-2_1

5. Blom-Hoffman, J., Okun, B. F., Lifter, K., Blashfield, R., Crowley, S. L., Goodyear, R. K., ... & Winfrey, L. L. (2004). Voices of the five doctoral training councils in psychology: Seeking common ground on Combined-Integrated doctoral training in psychology. *Journal of clinical psychology*, *60*(9), 957-967. https://doi.org/10.1002/jclp.20029

6. Caelleigh, A. S. (2000). PubMed Central and the new publishing landscape: shifts and tradeoffs. https://doi.org/10.1097/00001888-200001000-00004

7. Canese K. (2019). The New PubMed Updated: Homepage, User Guide, My NCBI Alerts and Collections, and More. *NLM Technical Bulletin*. Sep-Oct;(430):e5.

8. Cortegiani, A., Manca, A., & Giarratano, A. (2020). Predatory journals and conferences: why fake counts. *Current Opinion in Anesthesiology*, *33*(2), 192-197. https://doi.org/10.1097/ACO.0000000000000829

9. Cortegiani, A., Sanfilippo, F., Tramarin, J., & Giarratano, A. (2019). Predatory open-access publishing in critical care medicine. *Journal of Critical Care*, *50*, 247-249. https://doi.org/10.1016/j.jcrc.2018.12.016

10. Costantino, G., Montano, N., & Casazza, G. (2015). When should we change our clinical practice based on the results of a clinical study? Searching for evidence: PICOS and PubMed. *Internal and emergency medicine*, *10*(4), 525-527. https://doi.org/10.1007/s11739-015-1225-5

11. Damarell, R. A., Lewis, S., Trenerry, C., & Tieman, J. J. (2020). Integrated Care Search: development and validation of a PubMed search filter for retrieving the integrated care research evidence. *BMC medical research methodology*, *20*(1), 12. https://doi.org/10.1186/s12874-020-0901-y

12. Dogan, R. I., Murray, G. C., Névéol, A., & Lu, Z. (2009). Understanding PubMed user search behavior through log analysis. *Database*, *2009*, bap018.
https://doi.org/10.1093/database/bap018

13. Dosier, C. (1947). Report of roundtable on internship and training of clinical psychologists. *Journal of Clinical Psychology*.
https://doi.org/10.1002/1097-4679(194704)3:2<184::AID-JCLP2270030212>3.0.CO;2-N

14. Duffy, S., de Kock, S., Misso, K., Noake, C., Ross, J., & Stirk, L. (2016). Supplementary searches of PubMed to improve currency of MEDLINE and MEDLINE In-Process searches via Ovid. *Journal of the Medical Library Association: JMLA*, *104*(4), 309.
https://doi.org/10.3163/1536-5050.104.4.011

15. Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, web of science, and Google scholar: strengths and weaknesses. *The FASEB journal*, *22*(2), 338-342.
https://doi.org/10.1096/fj.07-9492LSF

16. Fiorini N, Canese K, Bryzgunov R, et al. (2018). PubMed Labs: an experimental system for improving biomedical literature search. *Database (Oxford)*.
https://doi.org/10.1093/database/bay094

17. Fiorini, N., Canese, K., Starchenko, G., Kireev, E., Kim, W., Miller, V., ... & Ostell, J. (2018). Best match: new relevance search for PubMed. *PLoS biology*, *16*(8), e2005343.
https://doi.org/10.1371/journal.pbio.2005343

18. Fiorini, N., Leaman, R., Lipman, D. J., & Lu, Z. (2018). How user intelligence is improving PubMed. *Nature biotechnology*, *36*(10), 937-945.
https://doi.org/10.1038/nbt.4267

19. Fiorini, N., Lipman, D. J., & Lu, Z. (2017). Cutting edge: towards PubMed 2.0. *Elife*, *6*, e28801.
https://doi.org/10.7554/eLife.28801

20. Fontaine, J. F., Barbosa-Silva, A., Schaefer, M., Huska, M. R., Muro, E. M., & Andrade-Navarro, M. A. (2009). MedlineRanker: flexible ranking of biomedical literature. *Nucleic acids research*, *37*(suppl_2), W141-W146.
https://doi.org/10.1093/nar/gkp353

21. Frandsen, T. F., Eriksen, M. B., Hammer, D. M. G., & Christensen, J. B. (2019). PubMed coverage varied across specialties and over time: a large-scale study of included studies in Cochrane reviews. *Journal of clinical epidemiology*, *112*, 59-66.
https://doi.org/10.1016/j.jclinepi.2019.04.015

22. Frisone, F. (2018). Most cited articles in Clinical Psychology. *MEDITERRANEAN JOURNAL OF CLINICAL PSYCHOLOGY*, *6*(1).
https://doi.org/10.6092/2282-1619/2018.6.1907

23. Gargiulo, F., Silvestri, S., & Ciampi, M. (2017, July). A big data architecture for knowledge discovery in PubMed articles. In *2017 IEEE Symposium on Computers and Communications (ISCC)* (pp. 82-87). IEEE.
https://doi.org/10.1109/ISCC.2017.8024509

24. Giglia, E. (2007). Beyond Pubmed-other free access biomedical databases. *Europa medicophysica*.

25. Giglia, E. (2009). New year, new PubMed. *European journal of physical and rehabilitation medicine*, *45*(1), 155-159.

26. Giglia, E. (2011). PubMed in progress: latest changes in MeSH and MyNCBI. *European Journal of Physical and Rehabilitation Medicine*, *47*(3), 525-528.

27. Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research synthesis methods*, *11*(2), 181-217.
https://doi.org/10.1002/jrsm.1378

28. Hogan Smith, K. (2018). Review of PubMed Health. *Journal of Consumer Health on the Internet*, *22*(1), 80-87.
https://doi.org/10.1080/15398285.2018.1415594

29. Horne, R. (2006). Implications for Asthma Treatment Compliance, Adherence, and Concordance. *Chest*, *130*, 65-72.
https://doi.org/10.1378/chest.130.1_suppl.65S

30. Huh, S. (2016). What is the meaning of becoming PubMed Central journal?. *Korean Journal of Medical Education*, *28*(3), 265.
https://doi.org/10.3946/kjme.2016.38

31. Hunter, L., & Cohen, K. B. (2006). Biomedical language processing: what's beyond PubMed?. *Molecular cell*, *21*(5), 589-594.
https://doi.org/10.1016/j.molcel.2006.02.012

32. Hussain, A., & Mkpojiogu, E. O. (2015). The effect of responsive web design on the user experience with laptop and smartphone devices. *Jurnal Teknologi*, *77*(4), 41-47.
https://doi.org/10.11113/jt.v77.6041

33. Islamaj Dogan, R., Murray, G. C., Névéol, A., & Lu, Z. (2009). Understanding PubMed® user search behavior through log analysis. *Database*, *2009*.
https://doi.org/10.1093/database/bap018

34. Jeong, G. H., & Huh, S. (2017). Bibliometric and content analysis of medical articles in the PubMed database published by North Korean authors from 1997 to July 2017. *Sci Ed*, *4*(2), 70-75.
https://doi.org/10.6087/kcse.98

35. Kang, S. R., & Satterfield, D. (2019). Visual Identity Design for Responsive Web. In *Advanced Methodologies and Technologies in Network Architecture, Mobile Computing, and Data Analytics* (pp. 1828-1836). IGI Global.
https://doi.org/10.4018/978-1-5225-7598-6.ch135

36. Kumar, A. (2020). Medline [R], PubMed, PubMed Central.... Let's try to decipher. *Journal of Indian Society of Periodontology*, *24*(3), 187-187.

37. Lanera, C., Berchialla, P., Sharma, A., Minto, C., Gregori, D., & Baldi, I. (2019). Screening PubMed abstracts: is class imbalance always a challenge to machine learning?. *Systematic Reviews*, *8*(1), 317.
https://doi.org/10.1186/s13643-019-1245-8

38. Levenson, R. W. (2017). Clinical psychology training: Accreditation and beyond. *Annual review of clinical psychology*, *13*, 1-22.
https://doi.org/10.1146/annurev-clinpsy-021815-093559

39. Lu, Z. (2011). PubMed and beyond: a survey of web tools for searching biomedical literature. *Database*, *2011*.
https://doi.org/10.1093/database/baq036

40. Lu, Z., Wilbur, W. J., McEntyre, J. R., Iskhakov, A., & Szilagyi, L. (2009). Finding query suggestions for PubMed. In *AMIA Annual Symposium Proceedings* (Vol. 2009, p. 396). American Medical Informatics Association.

41. Manca, A., Cugusi, L., Dvir, Z., & Deriu, F. (2017). PubMed should raise the bar for journal inclusion. *The Lancet*, *390*(10096), 734-735.
https://doi.org/10.1016/S0140-6736(17)31943-8

42. Manca, A., Moher, D., Cugusi, L., Dvir, Z., & Deriu, F. (2018). How predatory journals leak into PubMed. *CMAJ*, *190*(35), E1042-E1045.
https://doi.org/10.1503/cmaj.180154

43. McFall, R. M. (2006). Doctoral training in clinical psychology. *Annu. Rev. Clin. Psychol.*, *2*, 21-49.
https://doi.org/10.1146/annurev.clinpsy.2.022305.095245

44. Merlo, E. M. (2018). Index of scientific production during the 5 years of the MJCP. *MEDITERRANEAN JOURNAL OF CLINICAL PSYCHOLOGY*, *6*(1).
https://doi.org/10.6092/2282-1619/2018.6.1907

45. Miah, S., Fung, V., Pang, K., & Begum, H. (2017). Curing 'PubMed fever'. *The Clinical Teacher*, *14*(2), 150-150.
https://doi.org/10.1111/tct.12610

46. Morshed, T., & Hayden, S. (2020). Google Versus PubMed: Comparison of Google and PubMed's Search Tools for Answering Clinical Questions in the Emergency Department. *Annals of Emergency Medicine, 75*(3), 408-415.
https://doi.org/10.1016/j.annemergmed.2019.07.003

47. Phunkaew, T., Phandan, C., & Wongwatkit, C. (2019, October). Design and Evaluation of Interactive Learning Story and User Interface Prototyping for Mobile Responsive Learning Application. In *2019 4th International Conference on Information Technology (InCIT)* (pp. 132-137). IEEE.
https://doi.org/10.1109/INCIT.2019.8912103

48. Plikus, M. V., Zhang, Z., & Chuong, C. M. (2006). PubFocus: semantic MEDLINE/PubMed citations analytics through integration of controlled biomedical dictionaries and ranking algorithm. *BMC bioinformatics*, *7*(1), 424.
https://doi.org/10.1186/1471-2105-7-424

49. Rogers, J. R., Mills, H., Grossman, L. V., Goldstein, A., & Weng, C. (2020). Understanding the nature and scope of clinical research commentaries in PubMed. *Journal of the American Medical Informatics Association*, *27*(3), 449-456.
https://doi.org/10.1093/jamia/ocz209

50. Settineri, S. (2018). "First division" and "Second division" Sciences. *Mediterranean Journal of Clinical Psychology*, *6*(1).
https://doi.org/10.6092/2282-1619/2018.6.1842

51. Settineri, S., & Femminò, N. (2019). Science Communication in Clinical Psychology. *Mediterranean Journal of Clinical Psychology*, *7*(1). https://doi.org/10.6092/2282-1619/2019.7.2142

52. Settineri, S., Frisone, F., Alibrandi, A., & Merlo, E. M. (2019). Emotional suppression and oneiric expression in psychosomatic disorders: early manifestations in emerging adulthood and young patients. *Frontiers in psychology*, *10*, 1897. https://doi.org/10.3389/fpsyg.2019.01897

53. Settineri, S., Frisone, F., Alibrandi, A., Pino, G., Lupo, N. J., & Merlo, E. M. (2018). Psychological Types and Learning Styles. *Mediterranean Journal of Clinical Psychology*, *6*(3). https://doi.org/10.6092/2282-1619/2018.6.2005

54. Settineri, S., Frisone, F., Merlo, E. M., Geraci, D., & Martino, G. (2019). Compliance, adherence, concordance, empowerment, and self-management: five words to manifest a relational maladjustment in diabetes. *Journal of multidisciplinary healthcare*, *12*, 299. https://doi.org/10.2147/JMDH.S193752

55. Settineri, S., Merlo E. M., (2019). MJCP and Clinical Psychology. *Mediterranean Journal of Clinical Psychology*, *7*(3). https://doi.org/10.6092/2282-1619/2019.7.2346

56. Shanman, R. (2017). Phrase truncation in PubMed searches. *Journal of the Medical Library Association: JMLA*, *105*(4), 404. https://doi.org/10.5195/JMLA.2017.252

57. Shashikiran, N. (2016). MEDLINE, pubmed, and pubmed central®: Analogous or dissimilar. *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, *34*(3). https://doi.org/10.4103/0970-4388.186748

58. Sperandeo, R., Messina, G., Iennaco, D., Sessa, F., Russo, V., Polito, R., ... & Mosca, L. (2019). What does personality mean in the context of mental health? A topic modeling approach based on abstracts published in PubMed over the last 5 years. *Frontiers in psychiatry*, *10*. https://doi.org/10.3389/fpsyt.2019.00938

59. States, D. J., Ade, A. S., Wright, Z. C., Bookvich, A. V., & Athey, B. D. (2009). MiSearch adaptive pubMed search tool. *Bioinformatics*, *25*(7), 974-976. https://doi.org/10.1093/bioinformatics/btn033

60. Subić, N., Krunić, T., & Gemović, B. (2014). Responsive web design–Are we ready for the new age. *Online Journal of Applied Knowledge Management*, *2*(1), 93-103.

61. Topper, L., & Boehr, D. (2018). Publishing trends of journals with manuscripts in PubMed Central: changes from 2008–2009 to 2015–2016. *Journal of the Medical Library Association: JMLA*, *106*(4), 445. https://doi.org/10.5195/JMLA.2018.457

62. Tummers, M., van Hoorn, R., Levering, C., Booth, A., van der Wilt, G. J., & Kievit, W. (2019). Optimal search strategies for identifying moderators and predictors of treatment effects in PubMed. *Health Information & Libraries Journal*, *36*(4), 318-340. https://doi.org/10.1111/hir.12230

63. Turner, J. R. (2016). Pubmed, pubmed central, and impact factor. *Cellular and Molecular Gastroenterology and Hepatology*, *2*(5), 537.
https://doi.org/10.1016/j.jcmgh.2016.07.004

64. Wanner, A., & Baumann, N. (2019). Design and implementation of a tool for conversion of search strategies between PubMed and Ovid MEDLINE. *Research synthesis methods*, *10*(2), 154-160.
https://doi.org/10.1002/jrsm.1314

65. Wildgaard, L. E., & Lund, H. (2016). Advancing PubMed? A comparison of third-party PubMed/Medline tools. *Library Hi Tech*.
https://doi.org/10.1108/LHT-06-2016-0066

66. Williamson, P. O., & Minter, C. I. (2019). Exploring PubMed as a reliable resource for scholarly communications services. *Journal of the Medical Library Association: JMLA*, *107*(1), 16.
https://doi.org/10.5195/JMLA.2019.433

Sitography

1)   National Library of Medicine Technical Bulletin. (n. d.). *An Updated PubMed Is on Its Way.*

https://www.nlm.nih.gov/pubs/techbull/ma19/ma19_pubmed_update.html

2)   National Library of Medicine. (n. d.). *A New PubMed: Highlights for Information Professionals.*

https://www.nlm.nih.gov/oet/ed/pubmed/events/2019_09.html.