Beyond Google: Comparing Search Functions on PubMed, ProQuest, and WorldCat

The modern Digital Age presents informational opportunities that previous generations could scarcely conceive of. Information is ubiquitous and instantaneous; people have virtually the sum total of human knowledge at their fingertips via computers and mobile devices thanks to easy-to-use platforms such as Google. However, this deluge of information comes at a cost; it inundates people without any ready means to separate the beneficial from the inaccurate. That easy, simple Google search returns so much unfiltered data that it can overwhelm the average information seeker. Several databases online can help cut through the noise and provide more accurate information on a variety of subjects, such as PubMed, ProQuest Dissertations & Theses Global, and WorldCat. Each of these systems has its positives and negatives, which can be seen through test searches regarding common societal health topics. This paper makes use of two scenarios – a parent investigating potential connections between the mumps, measles, and rubella (MMR) vaccine and autism and a social worker exploring links between gun violence in the community and mental health – to put these three databases through their paces.

1. PubMed Advanced Search

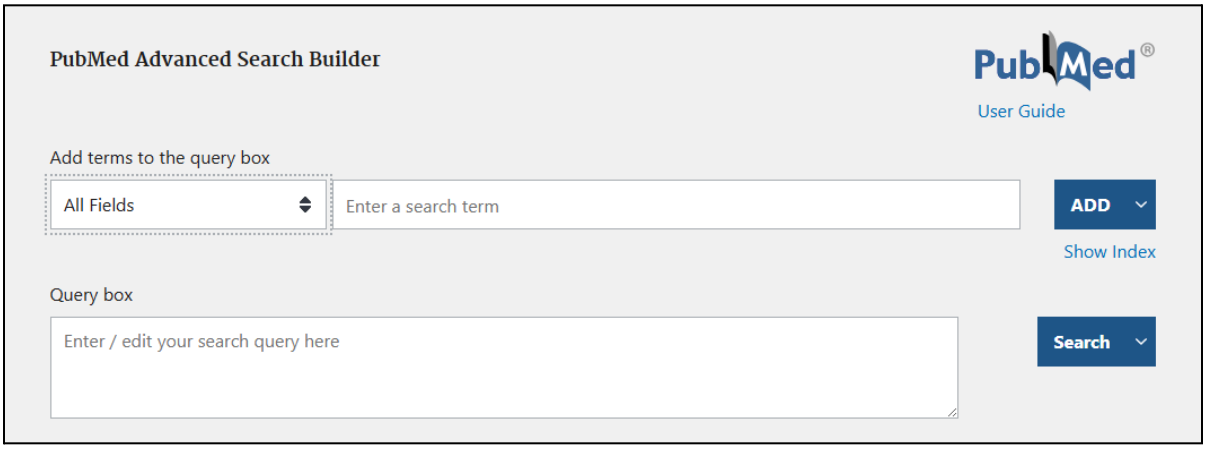

Figure 1.1. "PubMed Advanced Search Builder," *National Library of Medicine*, accessed 19 September 2025.

PubMed has been available to the public since it was developed in 1996 by the National Center for Biotechnology Information at the National Library of Medicine, which is part of the National Institutes of Health. The searchable database contains almost 40 million abstracts and

citations of literature related to biomedical and life sciences. (“About PubMed”). The site’s advanced search interface (see Figure 1.1) allows the user to build complex search strings by entering search terms and using a dropdown filter menu to designate which database field to search. Clicking “Add” inserts the search terms in the “Query box” below using a boolean operator selected from the dropdown menu attached to the button. In this fashion, the user builds a search query piece by piece until it is ready and then clicks on the “Search” button. The query itself can also be edited directly if needed.

While useful, the interface does require a learning curve. The search function is not like commercial search engines such as Google or common academic databases such as EBSCO. The nature of each box and how they interact is not immediately apparent, and users may find themselves puzzled over the differences between the fields “Enter a search term” and “Enter/edit your search query here” (see Figure 1.1). There is a user guide to offer help, but the link is understated even on the initial search page, located off to the right under the PubMed logo. As with any database, the system has its own quirks that add to that learning curve. One is the lack of a “keyword” filter. Instead, PubMed uses “All Fields” and has a sub-filter called “text words” that searches the text-based fields, including title, abstract, MeSH fields, publication types, names, corporate author, and comments and correction notes. The search filters include typical options, such as author, date of publication, and journal. The database also includes a range of other filters such as specific first, last, or corporate author names; dates of creation, modification, completion, and entry; conflict of interest statements; and grants and funding. Users can also search through the Medical Subject Headings (MeSH), a vocabulary system the National Library of Medicine uses to index PubMed articles (“PubMed User Guide”).

1.1 Childhood Vaccinations and Autism

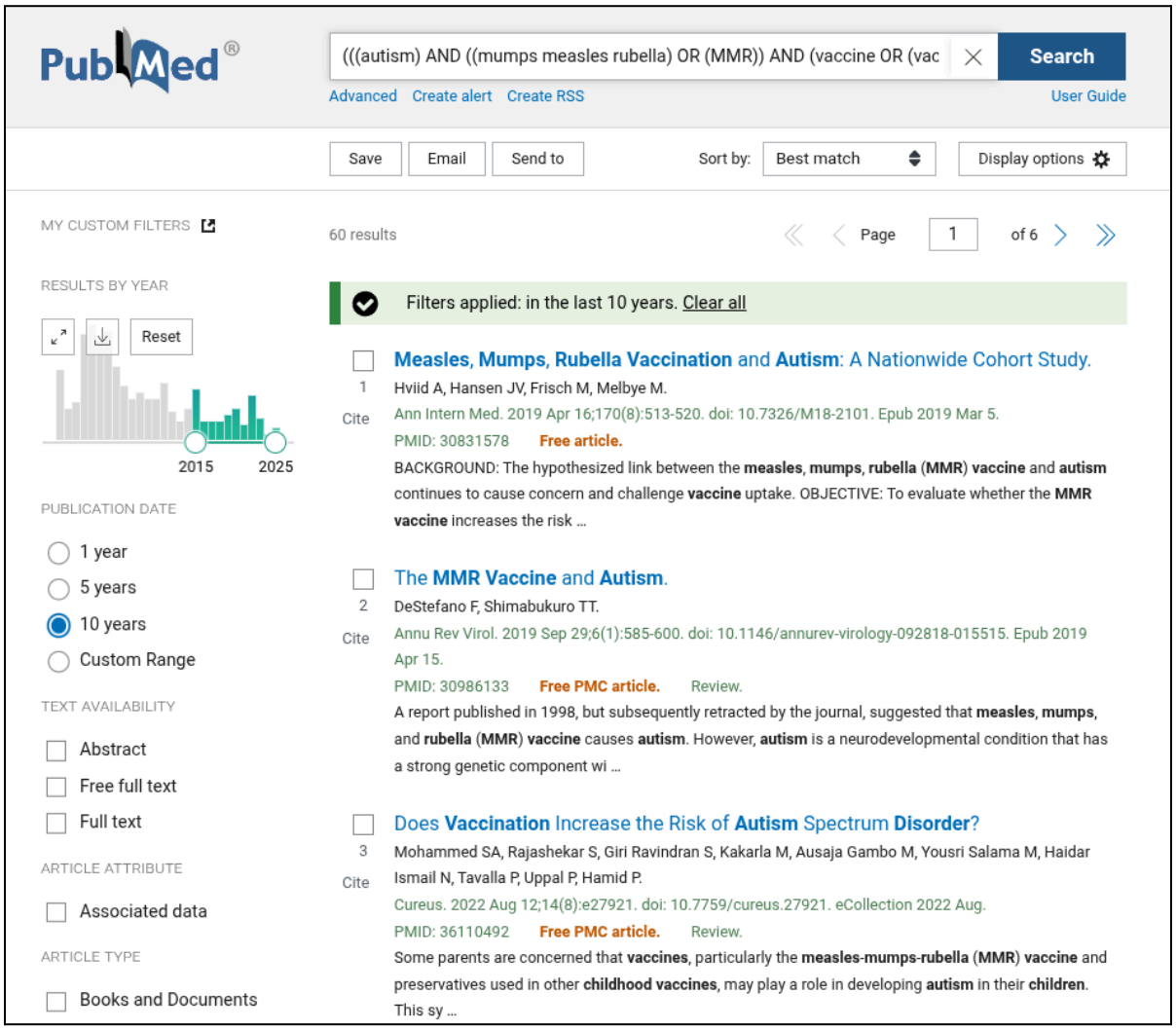

Figure 1.2. "PubMed MMR Search Results," *National Library of Medicine*, accessed 20 September 2025.

Once the search function was understood, developing a query to search for articles on potential connections between the mumps, measles, and rubella (MMR) vaccine and autism proved fairly straightforward. The final search query was: (((autism) AND ((mumps measles rubella) OR (MMR)) AND (vaccine OR (vaccination)) AND ((child) OR (children) OR (childhood))) NOT (mercury)) AND (English[Language]). This searches all fields for articles that include "autism" and "vaccines." This search string limits the search to those articles that discuss the MMR vaccine, but casts a slightly wider net by also including the phrase "mumps measles rubella" as well as the abbreviation. A similar tactic is taken with the limitation for

"childhood" vaccinations by allowing the variants "child" and "children." The "AND" boolean operator ensures that all these terms are included in final results. The "NOT" boolean excludes any articles that discuss potential mercury additives, while the "English[Language]" filter limits results to articles written in English. The initial search result included articles from 1998 to 2025 with 361 results. If limited to the past five years, 31 results appeared, while only three matching articles were published in the last year. The final search included articles published in the last decade, which resulted in 60 matches (see Figure 1.2).

The top three results, sorted by best match, yielded a variety of sources. The first was "Measles, Mumps, Rubella Vaccination and Autism: A Nationwide Cohort Study, written by Anders Hviid, Jørgen Vinsløv Hansen, Morten Frisch, and Mads Melbye. This article was published on April 16, 2019, in *Annals of Internal Medicin*e and was found under the MeSH terms adolescent; autistic disorder/epidemiology; autistic disorder/etiology; child; child, preschool; cohort studies; denmark/epidemiology; disease susceptibility; female; humans; infant; male; measles-mumps-rubella vaccine/adverse effects; proportional hazards models; registries; risk factors; siblings; and vaccination/adverse effects. This article can be found at: https://pubmed.ncbi.nlm.nih.gov/30831578. The second article was "The MMR Vaccine and Autism" by Frank DeStefano and Tom T. Shimabukuro, which was published September 29, 2019, in *Annual Review of Virology* and included the MeSH terms autistic disorder/etiology; humans; measles/epidemiology; measles/prevention & control; measles-mumps-rubella vaccine/administration & dosage; measles-mumps-rubella vaccine/adverse effects; mumps/epidemiology; mumps/prevention & control; rubella/epidemiology; and rubella/prevention & control. This article can be found at: https://pubmed.ncbi.nlm.nih.gov/30986133. The third result – "Does Vaccination Increase the Risk of Autism Spectrum Disorder?" by Shaza A Mohammed, Shriya Rajashekar, Suganya Giri Ravindran, Meghana Kakarla, Musa Ausaja Gambo, Mustafa Yousri Salama, Nathalie Haidar Ismail, Pardis Tavalla, Pulkita Uppal, and Pousette Hamid – was published August 12, 2022, in *Cureus Journal of Medical Science*. This source, which included no MeSH terms, can be found at https://pubmed.ncbi.nlm.nih.gov/36110492.

1.2 Gun Violence and Mental Health

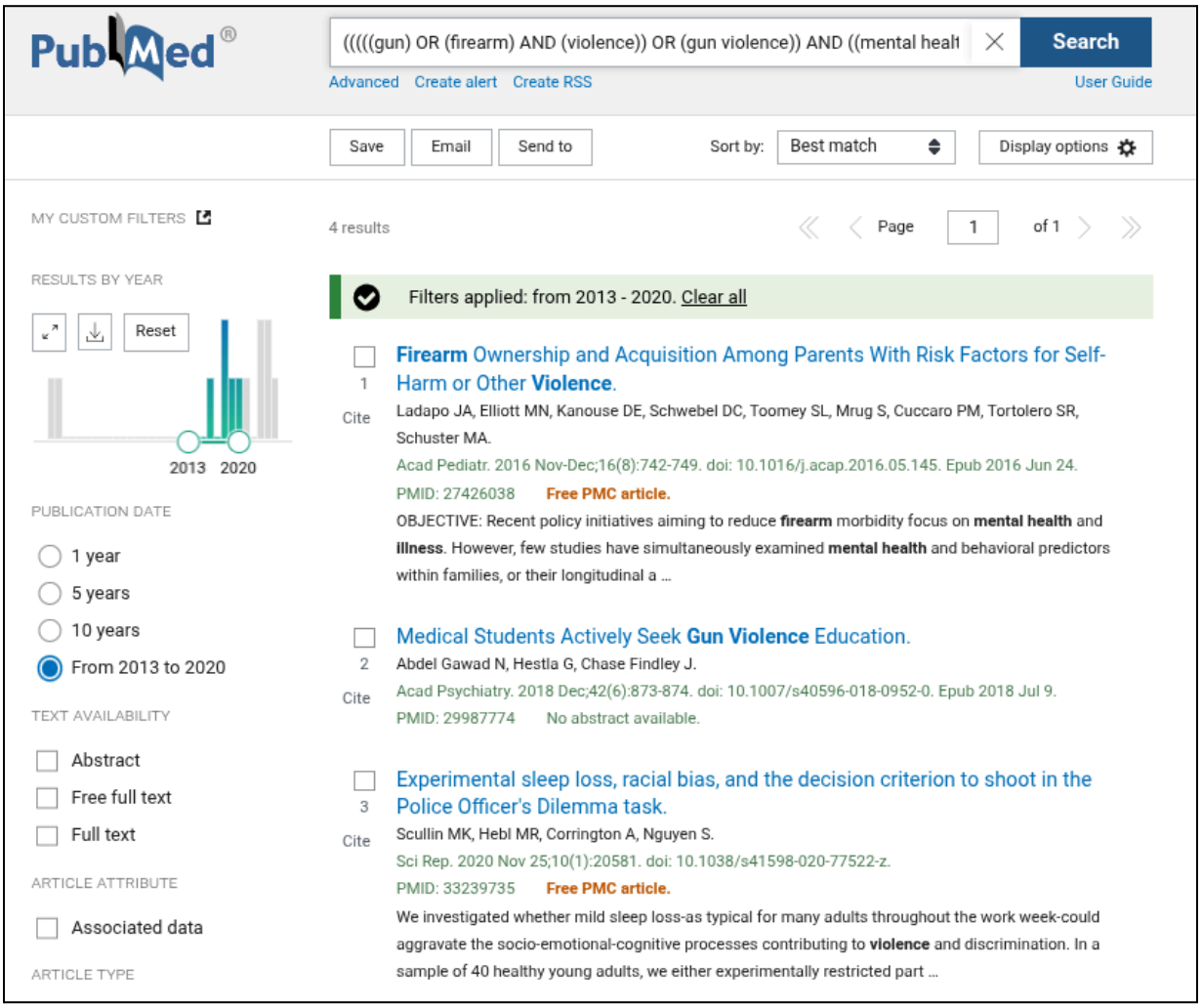

Figure 1.3. "PubMed Gun Violence Search Results," *National Library of Medicine*, accessed 20 September 2025.

Understanding the interface from the first search made formulating a query for gun violence and mental health in the local community easier. Defining "local" presented a bit of a challenge, however. Queries at the city level for Rosenberg, Texas, and county level for Fort Bend County yielded no results. The final query had to be widened to the metropolitan area of Houston: (((((gun) OR (firearm) AND (violence)) OR (gun violence)) AND ((mental health) OR (mental illness))) AND (English[Language])) AND (Houston). To ensure as wide a net as possible was cast, the query makes use of the "OR" boolean operator to include both "gun" and"firearm." A similar tactic was used to include articles that discussed either "mental health"

or “mental illness.” As with the MMR vaccine query, the search string uses a language filter to ensure results are in English. The initial search yielded a dozen results from 1994 to 2025. Narrowing the results to the last decade found 10 matching articles, and further narrowing found seven results in the last five years and two in the last year. The final search, which limited the query to those articles written between 2013 and 2020 inclusive yielded four results (see Figure 1.3).

Despite the low number, the query returned an interesting range of articles in the top three that discuss firearm ownership among parents, medical professionals seeking gun violence education, and sleep deprivation regarding law enforcement and the use of firearms. The first result was “Firearm Ownership and Acquisition Among Parents With Risk Factors for Self-Harm or Other Violence” by Joseph A. Ladapo, Marc N. Elliott, David E. Kanouse, David C. Schwebel, Sara L. Toomey, Sylvie Mrug, Paula M. Cuccaro, Susan R. Tortolero, and Mark A. Schuster. This article was published June 24, 2016, in *Academic Pediatrics* and included the MeSH terms adult; anxiety/epidemiology; anxiety disorders/epidemiology; binge drinking/epidemiology; bipolar disorder/epidemiology; depression; depressive disorder/epidemiology; female; firearms/statistics & numerical data; humans; logistic models; longitudinal studies; male; mental disorders/epidemiology; middle aged; multivariate analysis; odds ratio; ownership/statistics & numerical data; parents; risk factors; self-injurious behavior/epidemiology; somatoform disorders/epidemiology; stress, psychological/epidemiology; substance-related disorders/epidemiology; united states; violence/statistics & numerical data; and young adult. The article can be found at: http://pubmed.ncbi.nlm.nih.gov/27426038. The second result was “Medical Students Actively Seek Gun Violence Education” by Noha Abdel Gawad, Gregory Hestla, and J. Chase Findley, published July 9, 2018, in *Academic Psychiatry*. This result included the MeSH terms education, medical/methods; female; gun violence; homicide; humans; male; mental disorders/diagnosis; mental disorders/therapy; risk factors; students, medical/psychology; and suicide and can be found at: https://pubmed.ncbi.nlm.nih.gov/29987774. The third was “Experimental Sleep Loss, Racial Bias, and the Decision Criterion to Shoot in the Police Officer's Dilemma task.” This article by Michael K. Scullin, Michelle R. Hebl, Abby Corrington, and Stacy Nguyen was published November 25, 2020, in *Scientific Reports*, and includes MeSH terms attention/physiology; decision making/physiology; female; firearms; humans; male;

police/psychology; racism/psychology; signal detection, psychological/physiology; sleep/physiology; sleep deprivation/physiopathology; violence/psychology; wakefulness/physiology; and young adult. It may be found at: https://pubmed.ncbi.nlm.nih.gov/33239735.

2. ProQuest Dissertation & Theses Global (Advanced Search)

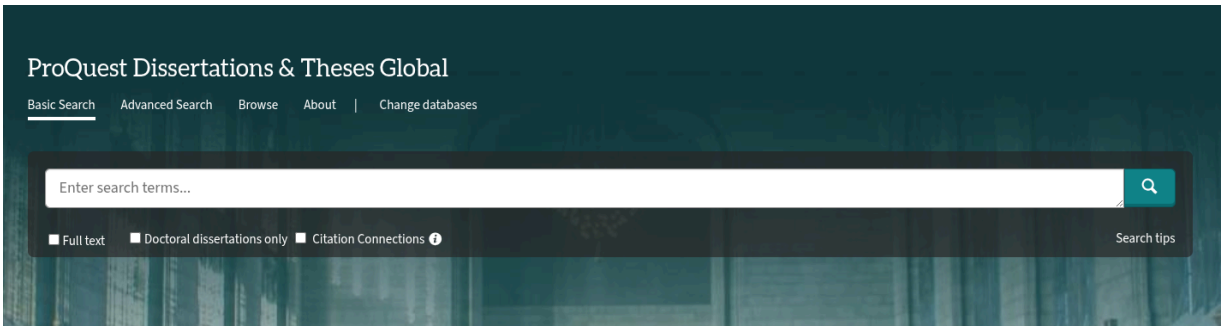

Figure 2.1. "ProQuest Dissertations & Theses Global Search Interface," *ProQuest Dissertations & Theses Global*, accessed 20 September 2025.

ProQuest Dissertations & Theses Global offers a database of 6 million records of dissertations and theses from more than 4,100 schools in 70 countries, including "metadata from 1606-current and full text from 1997-current, with select older titles" ("About ProQuest"). The interface is fairly intuitive. The standard search (see Figure 2.1) is much like commercial search engines, offering a single search field for simple searches. The advanced search looks familiar to those accustomed to academic databases such as EBSCO and includes a universal search function, as well as the ability to search by a variety of fields, such as author, full text, subjects, index terms, and ISBN. Other possible search fields include advisor, committee members, degree, university, and references cited. Where PubMed builds the search query as search terms are added one at a time, the ProQuest advanced search lets the user add lines of search boxes to search for specific text in specified fields by a boolean operator (AND, OR, NOT). The search query as a text string is displayed with the results. This format is more friendly for the average user than the PubMed approach.

2.1 Childhood Vaccinations and Autism

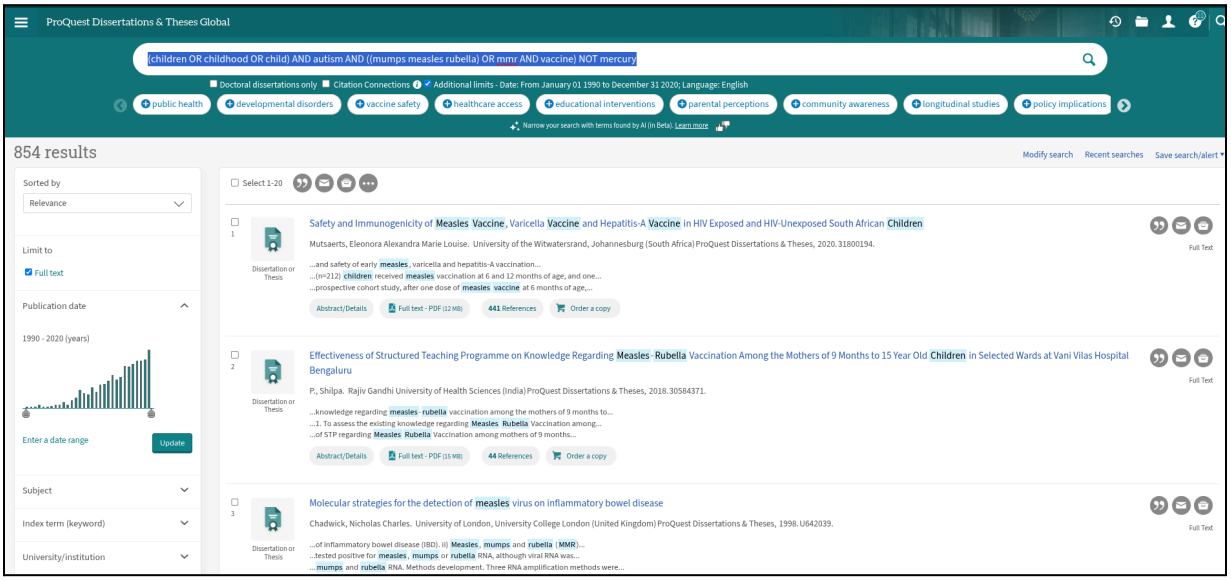

Figure 2.2. "ProQuest MMR Search Results," *ProQuest Dissertations & Theses Global*, accessed 20 September 2025.

The query for works about potential connections between childhood vaccines and autism – (children OR childhood OR child) AND autism AND ((mumps measles rubella) OR mmr AND vaccine) NOT mercury – went fairly quickly, informed by lessons learned from the PubMed searches. This query regarding autism uses the boolean OR operator to incorporate any of "childhood," "children," or "child," as well as "mumps measles rubella" or "MMR" to specify the type of vaccine. The "NOT" boolean kicks out any references to "mercury." Additional limits on the search included articles from the dates January 01, 1990, to December 31, 2020, and English-language only, which resulted in 854 articles (see Figure 2.2).

When sorted by best results, the top three works came from schools in South Africa, India, and the United Kingdom. The first was *Safety and Immunogenicity of Measles Vaccine, Varicella Vaccine and Hepatitis-A Vaccine in HIV Exposed and HIV-Unexposed South African Children*, a 320-page PhD dissertation by Eleonora Alexandra Marie Louise Mutsaerts at University of the Witwatersrand, Johannesburg, published on April 26, 2020. The work may be found by clicking here (hyperlinked text is used here due to the lengthy nature of these URLs; this particular link, for example, is more than 950 characters). The second result, *Effectiveness of Structured Teaching Programme on Knowledge Regarding Measles-Rubella Vaccination Among*

the Mothers of 9 Months to 15 Year Old Children in Selected Wards at Vani Vilas Hospital Bengaluru, was a 146-page master's thesis by Shilpa P. at Rajiv Gandhi University of Health Sciences. This thesis, published on December 7, 2018, can be found by clicking here. The third work returned was *Molecular Strategies for the Detection of Measles Virus on Inflammatory Bowel Disease* by Nicholas Charles Chadwick. This 254-page PhD dissertation was published in February 1998 from the University College London and can be found by clicking here.

2.2 Gun Violence and Mental Health

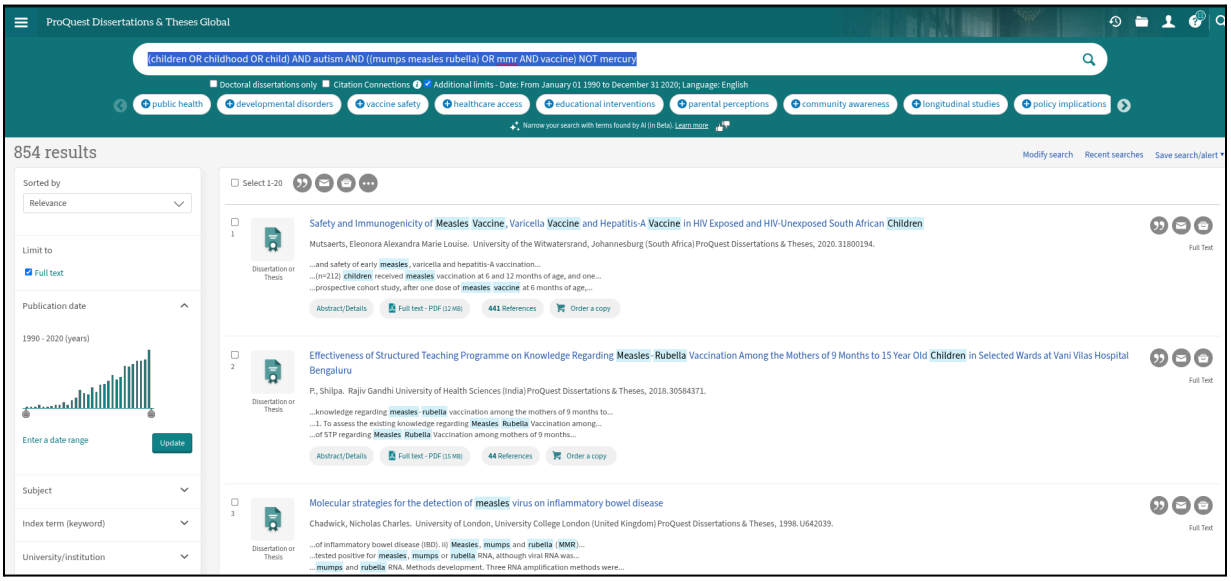

Figure 2.3. "ProQuest Gun Violence Search Results," *ProQuest Dissertations & Theses Global*, accessed 20 September 2025.

Due to the broad nature of dissertations and theses, the decision was made to forgo attempts to find works related to the local or regional level. Instead, the query was limited to the state of Texas: (guns OR firearms) AND violence AND ("mental health" OR "mental Illness") AND Texas. As before, the boolean "OR" is used to include works that discuss violence in terms of guns or firearms tied to those about mental health or mental illness. Other limits included a date range of January 01, 2010, to December 31, 2020, and English-language results. This search returned a total of 10,648 relevant works (see Figure 2.3).

When sorted by best match, the top three results included two from the United States and one from Canada. The first, *Weapon-Involved Violence and Mental Illness: An Empirical*

Examination of the Policy Assumptions for Firearm and Other Dangerous Weapon Prohibitions, is a PhD dissertation by Heath J. Hodges at The University of Nebraska-Lincoln. This 204-page work includes 204 references, was published in July 2018, and can be found by clicking here. The second work was *A Case Study of Motives and Methods of Mass Murderers and Whether They Relate to Mental Illness*, a 100-page master's thesis with 137 references by Gregory C. Towe at the University of Central Missouri in November 2015. It can be found by clicking here. The third result – *Firearm Violence in the African American Community: African American Legislators' Perceptions of Firearm Violence Prevention Legislation* – was a 133-page PhD dissertation with 118 references published in August 2014 and written by Erica D. Payton at The University of Toledo and can be found by clicking here.

3. WorldCat

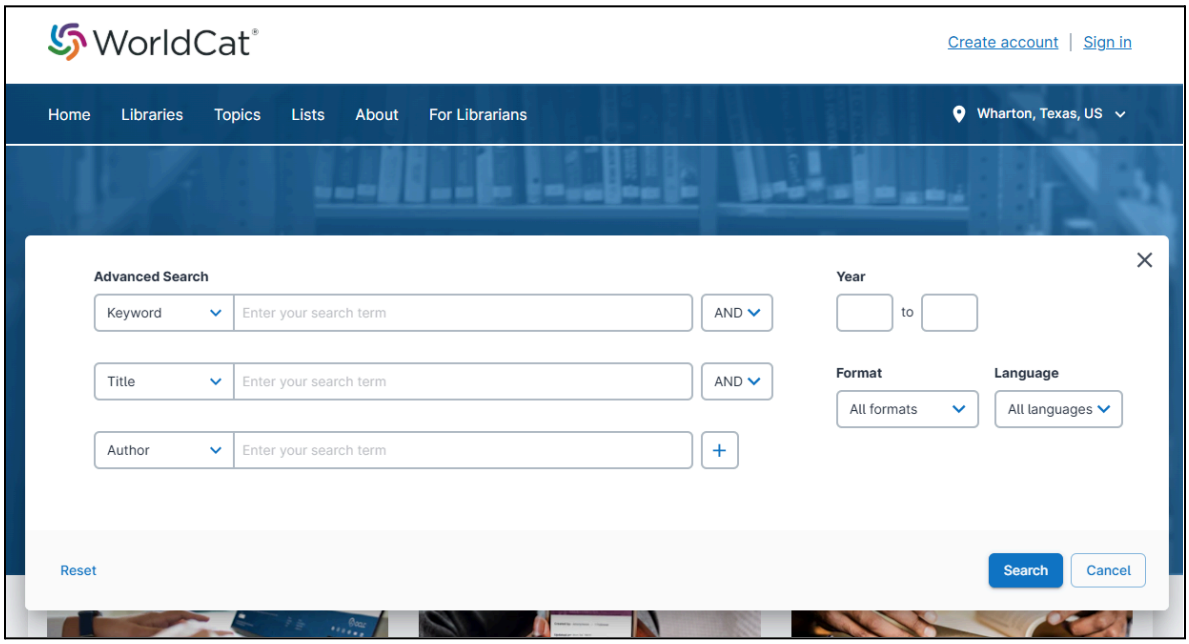

Figure 3.1. "WorldCat Advanced Search," *WorldCat.org*, accessed 19 September 2025.

WorldCat is a database created by OCLC (formerly the Online Computer Library Center) from thousands of libraries including their collections in the system over the last five decades. The database includes "physical items like books, audiobooks, maps, musical scores, and recordings, along with electronic items like ebooks, e-journals, articles, and digital images you can access online" ("About WorldCat.org"). Its advanced search interface is closer to ProQuest

than PubMed, although the default setup does require its own learning curve. The page presents three search fields pre-selected to search keyword, title, and author (see Figure 3.1). Searching for multiple keywords initially appears to require a complex string to be entered into the keyword field. However, a closer examination reveals the other fields make use of dropdown menus that can be adjusted, and more lines can be added. The search fields are limited to five lines, however, which means that more complex search queries are required – unlike ProQuest, which allows for multiple single-line queries that it combines to create the final, complex query. WorldCat uses similar boolean operators and search filters, although it does include a "keyword" filter that most users are likely to be familiar with, which the other two databases lack. A general lack of user-friendliness further hinders WorldCat's usefulness to the average browser. Unlike ProQuest and PubMed, WorldCat's search function is not forgiving of stray characters, such as parentheses and quotation marks or duplicated boolean operators. Whereas the other two ignore or provide a warning of these errors, these strays "break" WorldCat's search, often with little to no indication as to what happened. Such issues likely result from legacy systems that have not been updated to the same standards as other search engines.

3.1 Childhood Vaccinations and Autism

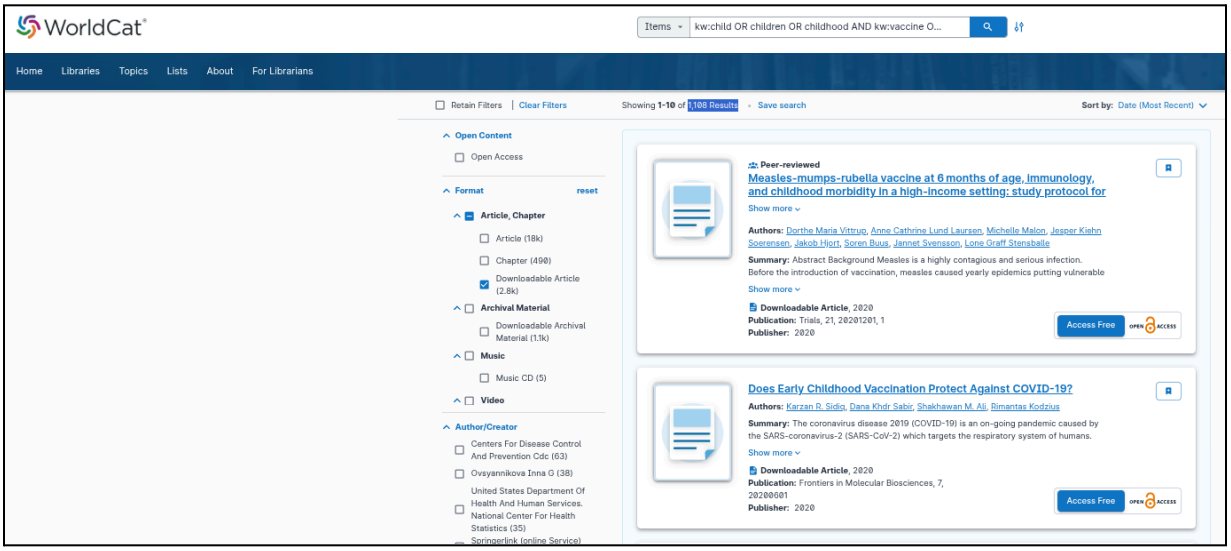

Figure 3.2. "WorldCat MMR Search Results," *WorldCat.org*, accessed 20 September 2025.

Once WorldCat's idiosyncrasies were better understood, the search for works relating to childhood vaccines and autism could begin, resulting in a query of "kw:child OR children OR

childhood AND kw:vaccine OR vaccines OR vaccination AND kw:mmr OR (mumps measles rubella) NOT kw:Mercury." This search string works similarly to the previous two, although it specifies keyword with "kw," which the other databases did not require. It searches for MMR/mumps measles rubella combined with vaccine/vaccines/vaccination and child/children/childhood while restricting references to mercury. This search resulted in 20,538 hits. The size of the search result is largely due to WorldCat's broader base of materials than the specialized PubMed and ProQuest databases. Limiting to English narrowed the search to 15,315 results, and further limitation to works published between 2000 and 2020 yielded 9,335 results. Selecting only articles further narrowed the list to 8,046 results, and selecting downloadable articles to specify the ones accessible resulted in a total of 1,108 hits (see Figure 3.2).

Sorting the articles by the most recent revealed another issue arising from WorldCat's design. Because it searches holdings from multiple libraries, any given search is likely to result in repeated matches. In this case, three of the first four results were the same article. Accounting for the duplicates, the top three articles came from a variety of journals in 2020. The first was "Measles-Mumps-Rubella Vaccine at 6 Months of Age, Immunology, and Childhood Morbidity in a High-Income Setting: Study Protocol for a Randomized Controlled Trial" by Dorthe Maria Vittrup, Anne Cathrine Lund Laursen, Michelle Malon, Jesper Kiehn Soerensen, Jakob Hjort, Soren Buus, Jannet Svensson, and Lone Graff Stensballe. This article was published on December 10, 2020, in the journal *Trials*, and can be found here: https://trialsjournal.biomedcentral.com/articles/10.1186/s13063-020-04845-7. The second result, "Evaluation of Varicella Vaccine Effectiveness as Public Health Tool for Increasing Scientific Evidence and Improving Vaccination Programs" by Francesco Vitale and Emanuele Amodio, was published in the November-December 2020 edition of *Jornal de Pediatria* and can be found here: https://www.sciencedirect.com/science/article/pii/S0021755720301856?via%3Dihub. The third result was "Safety of Measles, Mumps, and Rubella Vaccine in Egg Allergy: In Vivo and in Vitro Management," written by Stefania Magistà, Marcello Albanesi, Nada Chaoul, Danilo Di Bona, Elisabetta Di Leo, Eustachio Nettis, Maria Filomena Caiaffa, and Luigi Macchia and published on November 15, 2020, in *Clinical and Molecular Allergy*. This article can be found here: https://clinicalmolecularallergy.biomedcentral.com/articles/10.1186/s12948-020-00136-3.

3.2 Gun Violence and Mental Health

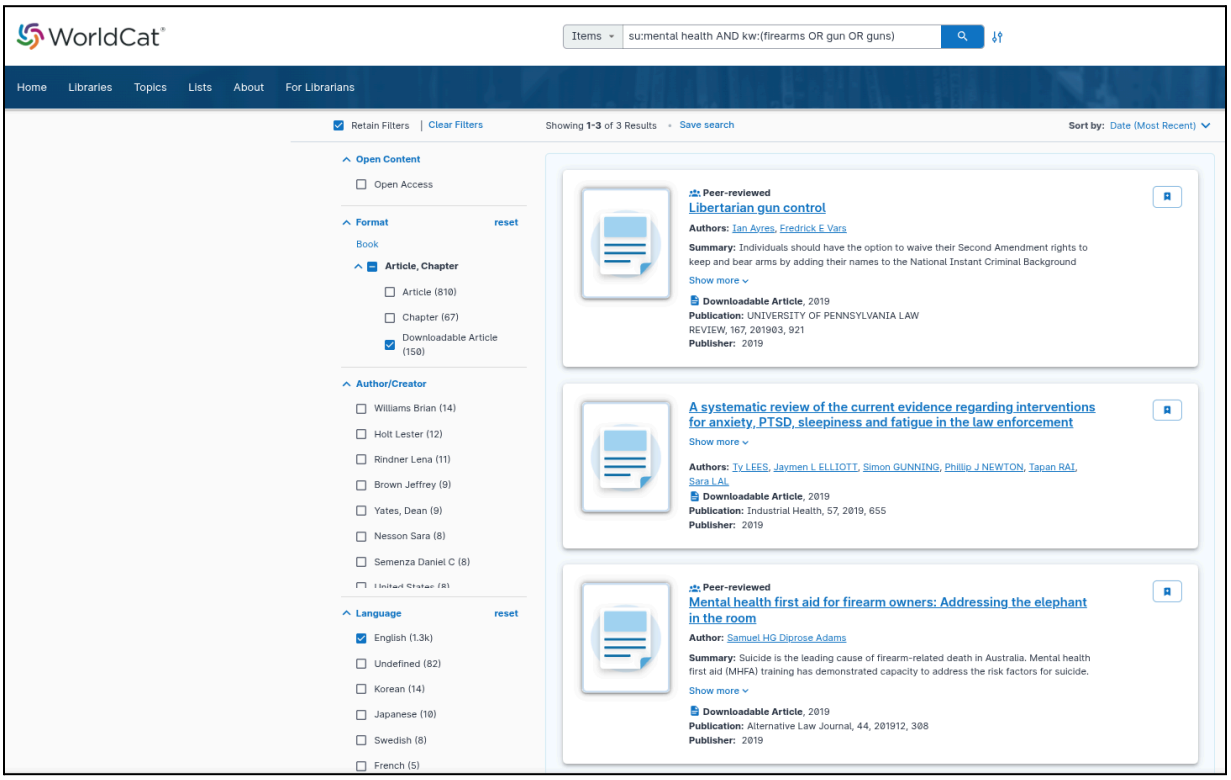

Figure 3.3. "WorldCat Gun Violence Search Results," *WorldCat.org*, accessed 20 September 2025.

Surprisingly, the search on WorldCat for articles relating to gun violence and mental health proved the most difficult. As with previous searches, the initial attempt looked for articles related to the local city, then widening out to county, metro area, state, and even the United States. Each produced no relevant results; the most common was an article from the *Brazilian Journal of Psychiatry* about electroconvulsive therapy. This is partially due to the fact that the search was limited to the year 2019 and to accessible articles. However, given the prevalence of guns and gun violence in the U.S. and Texas in particular, this remains surprising. Only by testing different combinations of keywords and subjects was a query string finally found that was successful in even finding three accessible sources from 2019 that were somewhat relevant. The final query – su:mental health AND kw:(firearms OR gun OR guns) – used the subject of "mental health" with keywords "firearms" or "gun" or "guns." The first article was "Libertarian Gun Control" by Ian Ayres and Fredrick E. Vars, published in 2019 in the *University of Pennsylvania Law Review*. This article can be found here:

https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=9659&context=penn_law_review. The second article was "A Systematic Review of the Current Evidence Regarding Interventions for Anxiety, PTSD, Sleepiness and Fatigue in the Law Enforcement Workplace" by Ty Lees, Jaymen L. Elliott, Simon Gunning, Phillip J. Newton, Tapan Rai, and Sara Lal. This article, published in *Industrial Health* on February 13, 2019, can be found here: https://www-jstage-jst-go-jp.libezp.lib.lsu.edu/article/indhealth/57/6/57_2018-0088/_pdf/-char/en. The third article – "Mental Health First Aid for Firearm Owners: Addressing the Elephant in the Room" by Samuel H.G. Diprose Adams – was published in 2019 in the *Alternative Law Journal* and can be found here: https://journals-sagepub-com.libezp.lib.lsu.edu/doi/pdf/10.1177/1037969X19856758.

Conclusion

PubMed, ProQuest Dissertations & Theses Global, and WorldCat all have their positives and negatives. Each allows for building complex search queries through an advanced search function, although PubMed and ProQuest have fewer limitations. While any platform's search engine will require some kind of learning curve, ProQuest's search interface is more intuitive than the other two. The most striking difference among the three arises from the databases they pull from. WorldCat is by far the most varied as it draws from thousands of libraries' collections and includes everything from images to books to periodicals, both online and in print. PubMed is the most limited, as its entire database is designed for biomedical and life science articles. ProQuest Dissertations & Theses Global lies somewhere in between. While it has access to a huge number of works on a variety of subjects, the works themselves are limited to theses and dissertations. Oddly, WorldCat surfaces as the most limited source despite its broad knowledge base. This is partly due to limiting the gun violence search to a specific year and articles accessible online, but one might still reasonably expect to land a sizable number of resources given the subject matter. It must also be noted that the differing search parameters for each database also limits this report's ability to make broad inferences. Still, the work here does highlight the usefulness of these various databases over a more general, commercial search engine like Google when it comes to finding specific sorts of information.

Works Cited

"About ProQuest Dissertations & Theses Global." *ProQuest Dissertations & Theses Global*, https://www.proquest.com/pqdtglobal/productfulldescdetail?accountid=12154.

"About PubMed." *National Library of Medicine*, https://pubmed.ncbi.nlm.nih.gov/about.

"About WorldCat.org." *WorldCat.org*, https://search.worldcat.org/about.

“ProQuest Dissertations & Theses Global Search Interface.” *ProQuest Dissertations & Theses Global*, https://www.proquest.com/pqdtglobal?accountid=12154&parentSessionId=bg1B4UtBOSoIXtB%2F18waGH70qEPmGlGn385rr30wecc%3D. Accessed 20 September 2025.

“ProQuest Gun Violence Search Results.” *ProQuest Dissertations & Theses Global*, https://www.proquest.com/pqdtglobal/results/ECBD8458A6494913PQ/1?accountid=12154. Accessed 20 September 2025.

“ProQuest MMR Search Results” *ProQuest Dissertations & Theses Global*, https://www.proquest.com/pqdtglobal/results/E55350BFCAE14020PQ/1?accountid=12154. Accessed 20 September 2025.

“PubMed Advanced Search Builder.” *National Library of Medicine*, https://pubmed.ncbi.nlm.nih.gov/advanced. Accessed 19 September 2025.

“PubMed Gun Violence Search Results.” *National Library of Medicine*, https://pubmed.ncbi.nlm.nih.gov/?term=%28%28%28%28%28gun%29+OR+%28firearm%29+AND+%28violence%29%29+OR+%28gun+violence%29%29+AND+%28%28mental+health%29+OR+%28mental+illness%29%29%29+AND+%28English%5BLanguage%5D%29%29+AND+%28%28%28Rosenberg%29+OR+%28Fort+Bend%29+OR+%28Houston%29%29+AND+%28%28Texas%29+OR+%28TX%29%29%29&filter=dates.2013-2020. Accessed 20 September 2025.

“PubMed MMR Search Results.” *National Library of Medicine*, https://pubmed.ncbi.nlm.nih.gov/?term=%28%28%28autism%29+AND+%28%28mumps+measles+rubella%29+OR+%28MMR%29%29+AND+%28vaccine+OR+%28vaccination%29%29+AND+%28%28child%29+OR+%28children%29+OR+%28childhood%29%29%29+NOT+%28mercury%29+%29+AND+%28English%5BLanguage%5D%29&filter=datesearch.y_10. Accessed 20 September 2025.

"PubMed User Guide." *National Library of Medicine*, 25 June 2025, https://pubmed.ncbi.nlm.nih.gov/help.

"WorldCat Advanced Search," *WorldCat.org*, https://search.worldcat.org/#advancedsearch accessed 19 September 2025.

"WorldCat Gun Violence Search Results." *WorldCat.org*, https://search.worldcat.org/search?q=su%3Amental+health+AND+kw%3A%28firearms+OR+gun+OR+guns%29&datePublished=2019-2019&inLanguage=eng&itemSubType=artchap-digital&limit=10&offset=1&orderBy=publicationDateDesc&itemSubTypeModified=artchap-digital. Accessed 20 September 2025.

"WorldCat MMR Search Results." *WorldCat.org*, https://search.worldcat.org/search?q=kw%3Achild+OR+children+OR+childhood+AND+kw%3Avaccine+OR+vaccines+OR+vaccination+AND+kw%3Ammr+OR+%28mumps+measles+rubella%29++NOT+kw%3AMercury+&datePublished=2000-2020&inLanguage=eng&itemSubType=artchap-digital&orderBy=publicationDateDesc&itemSubTypeModified=artchap-digital. Accessed 20 September 2025.