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Investigating potential APC caps on NIH-funded articles

Mr. Eric J. Schares, Iowa State University of Science and Technology

Eric Schares is the Engineering & Collection Analysis Librarian at Iowa State University. He serves as liaison to several engineering departments and conducts research on bibliometrics and open science. Eric has a B.S. in Electrical Engineering and a Masters of Library and Information Science.

Simulating potential APC caps on NIH-funded articles

Abstract

The United States National Institute of Health (NIH) is a major funder of scientific research, acknowledged by over 113,000 journal articles in calendar year 2025. On July 8, 2025 NIH Director Jay Bhattacharya announced a review of allowable publication costs such as Article Processing Charges (APCs) that can be paid with NIH grant funds. The agency released a Request for Information (RFI) with several suggested scenarios, including a cap on APCs.

To better understand and anticipate the effect of a proposed APC cap limit, this paper investigates characteristics of NIH-funded papers published in 2025. Specifically, we look at how many NIH-funded articles were published, what journals they appeared in, and what each journal's specific APC charge would be. Using the Dimensions database, records for 2025 articles that acknowledge NIH funding were exported and summarized as counts by journal. We then combine the counts with journal-level APC prices from major academic publishers to match journals to the specific APC fee levied during 2025.

Using this data, the effect of any potential APC cap can be simulated. The percentage of NIH articles and the percentage of journals that would fall above and below a given price cap level can be shown. For example, a hypothetical $2,000 allowable APC limit would cover 5.76% of journals and 5.08% of NIH-funded articles, assuming 2025 publication patterns are typical.

Data and code supporting this analysis are publicly available at https://github.com/eschares/ASEE-NIH-caps.

Introduction

The United States National Institute of Health (NIH) is a major funder of scientific research, allocating around $35B in extramural research in FY2024 [1]. This funding is distributed to universities, research centers, and laboratories to conduct the basic and applied research as described in grant awards. Results of this research are often published as peer-reviewed journal articles, and a single grant can produce multiple findings and articles. The NIH moved up the implementation of the OSTP Nelson memo [2], which requires grantees to make federally funded publications publicly available, to take effect July 1, 2025 [3].

Academic publishing has evolved through many models of access. Branching out from the traditional subscription model that required a reader to have an active subscription, Open Access (OA) models allow any reader access to published content. OA comes in many different color and gem labels (green, gold, hybrid, diamond, bronze, etc), but two are relevant for this analysis. One is Gold, where all articles in a journal are published OA; this will be referred to as "Fully OA" in this analysis. The other is Hybrid, where some articles in a journal are published OA, and the journal publishes a mixture of open and paywalled content. An Article Processing Charge (APC) is often paid to make an article OA; articles published OA in Hybrid journals are always a

result of an APC being paid, while OA articles appearing in Fully OA journals are not necessarily the result of an APC payment (such as an APC of $0, the so-called Diamond model).

These threads came together July 8, 2025, when NIH Director Jay Bhattacharya announced a review of allowable publication costs that can be paid using NIH grant funds [4]. The agency opened a Request for Information (RFI) and invited the academic community to comment on several proposed options [5]. These included the possibilities of:

1. disallowing any NIH grant funds to be used to pay APCs
2. setting a capped APC amount per-publication, proposing $2,000
3. allowing the allowable per-publication cap amount to be higher if the journal pays peer reviewers, proposing $1,000 more
4. setting an overall (not per-publication) capped allowable amount based on a percentage of the grant award, proposing 0.8% of the grant, or $20,000 total, whichever is greater
5. some combination of cap and award percentage, proposing a $6,000 per-publication limit up to the total amounts derived from scenario #4

Many publishers, libraries, consortia, organizations, and individuals submitted comments and released them publicly [6], [7], [8], [9]. The NIH made all 914 submitted comments open for inspection in a combined PDF [10], and a machine-readable version is also available [11].

To better understand and anticipate the effect of a proposed cap on APCs, this paper investigates characteristics of NIH-funded papers published in 2025 and indexed in the bibliometric database Dimensions [12].

Literature Review

Open Access dates to the three influential initiatives in 2002 and 2003– Budapest [13], Bethesda [14], and Berlin [15]. All three emphasized the need for access to scientific research and called for greater support in freeing science from behind reader paywalls. APCs followed shortly after as one way to realize this. BMJ introduced a new publication fee at a developing OA journal in 2003 [16], while PLOS launched two new OA journals in 2004 [17]. These APCs were set lower than today's standards, at $300 and $1500 per article, respectively (adjusted for inflation to December 2025, those values would be $535 and $2675).

APCs are set at different levels by individual journal and change year-to-year. APC prices are generally regarded as high and tend to increase over time [18] [19]**.** Current APC values range to over $12,000 [19], out of the reach of many authors. Researchers pay APCs through many ways, most often by using grant funds but also through institutional agreements between university libraries and publishers or by using personal finances [20].

Price caps have been proposed by other funders as an attempt to rein in the growth of APCs. Plan S, an OA initiative backed by a group of European funders, initially announced plans for an APC cap at €2,000 [21, p. 85]. However, the cap was viewed as interfering with author choice, voted

down, and abandoned by the time Plan S went into effect in 2021. The Swiss National Science Foundation (SNSF) has implemented an APC cap payable with agency funds to 3500 CHF beginning in 2027 [22]. The Bill and Melinda Gates Foundation stopped allowing any APCs to be paid with their funding starting from January 1, 2025 [23]. Grantees are now required to post their work as a preprint upon acceptance to satisfy OA availability [24].

Previous work has investigated similar questions of NIH-funded papers and journal APCs, but only considered articles published in the first half of 2025 [9], [25]. This paper builds on the analysis to examine bibliographic metadata after the entire year 2025 has completed, extends coverage to include more journals, and visualizes the data in different ways.

Methods

To better understand and anticipate the effect of proposed APC cap limits, this analysis investigates characteristics of NIH-funded articles. Specifically, it looks at how many NIH-funded articles were published in 2025, what journals they appeared in, and what each journal's specific APC charge would be.

The Dimensions database paid web interface was used to collect publication metadata. Dimensions was chosen as the data source because of its wider and more inclusive journal indexing than Web of Science or Scopus [12], while also having better article type [26] and funding filters than OpenAlex [27]. Funding information is a particular weakness of OpenAlex [28], though efforts are underway to improve this in 2026.

Calendar year 2025 provides the most recent data to investigate NIH-supported author behavior. Avoiding the recently completed year by analyzing an alternate time frame (such as mid-2024 to mid-2025) would introduce a month component to the data scope, a metadata element not always deposited by publishers. Past research has also shown that Dimensions is particularly quick to index scholarly works from a just-completed year, with 93% of a year's eventual record count appearing as soon as January 4 [29].

Another significant advantage of Dimensions is its predefined NIH Funder Group. This reunifies the 27 institutes and centers that comprise the agency, making it easy to search for NIH-funded articles with one click, regardless of the exact wording the author used in the funding acknowledgment. Other search filters were set to Publication Type = Article which removes book chapters and conference proceedings, and Document Type = Research Article or Review Article which removes editorials, conference abstracts, letters to the editor, and corrections (see Figure 1).

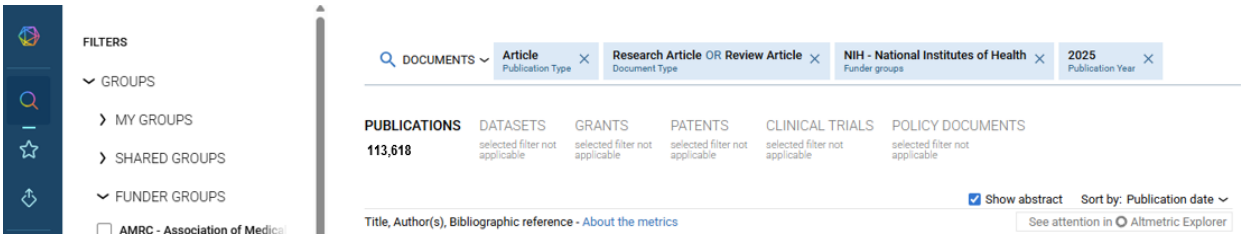

Figure 1. Screenshot of Dimensions database during data export

The query was run on February 3, 2026 and resulted in 113,618 articles. The full DOI-level dataset was exported from the web interface in three batches to get under the 50k record export limit. They were then re-unified to one dataset. The DOI-level records were summarized as counts per journal, and the journal was matched to a pre-release of a updated APC dataset that includes 2025 values [19]. Matching journal to APC was done via ISSN using a left merge, meaning all journals in the article count list were preserved and information about APCs was added. Any journal that did not match an APC had the price cell left blank and the price was manually investigated. In most cases, the reason for no match was that the journal did not offer an APC payment option and was solely closed access. However, in some cases the journal did offer an APC but was simply not included in a publisher's APC list file for unknown reasons.

The exported datafile contained 100% of articles, but for practical reasons not all were included in the following analysis. About 300 journals were unable to be matched to an APC price and were manually investigated to fill in the data. Once journals with at least 15 NIH-funded articles in 2025 were finished, this group was selected for the next step. The 15+ article limit comprised 91,467 articles of the 113,618 total results (80.5%), and 1,582 unique journals of the total 7,671 titles (20.6%). This adheres to Bradford's Law [30], which describes the diminishing returns when moving outside a "core" set of journals. It is also a near perfect reflection of the 80/20 rule of thumb known as the Pareto principle, stating that 80% of outcomes are the result of 20% of causes [31]. By complement, the remaining 20% of articles (22,151) are scattered over the remaining 80% of journals (6,089).

Graphs and Results

With the dataset of journals, article volume, and APC prices constructed, several visualizations are presented here to explore various aspects of the data and analysis.

Figure 2 shows a distribution plot graphing the fraction of a curve, ranging from 0-1, that is at or below any given x-axis value. In this case, the fraction of journals (red) and articles (blue) in this dataset at or below any given APC value can be seen. Each journal or article contribute one increment of vertical distance at the appropriate APC value, and notable vertical "jumps" in the curves are labeled to provide more context on why the increase occurred. For example, the article-level jump around x=7,000 is the result of the considerable number of articles published in *Nature Communications*, the largest volume journal in this dataset with 2,473 articles. This piles datapoints upon the same APC value, stacking the blue curve and making it jump. Other

examples are the JAMA family of journals, which all charge an APC of $6,000, and the ACS family of journals causing a spike of publication activity at $4,500.

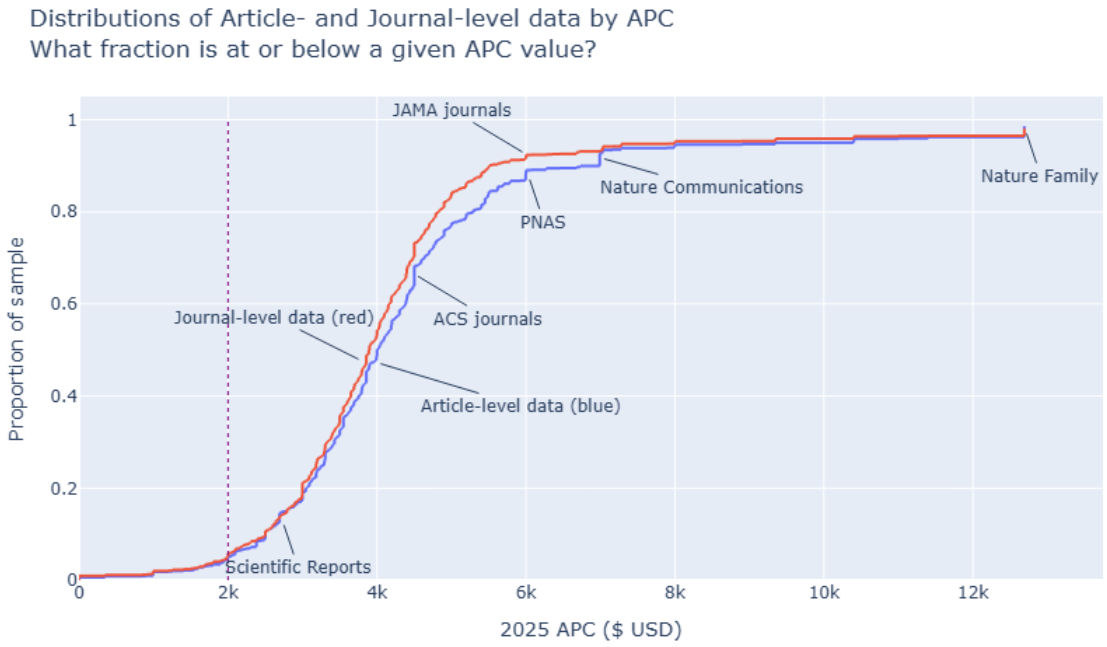

Figure 2. Distribution of journal and NIH-funded article APCs

A vertical dotted line is drawn at a proposed $2,000 cap to help demonstrate how to interpret the curves. At this hypothetical level, 5.76% of journals and 5.08% of articles would be fully covered. Interestingly, the only time the article-level curve reaches higher than the journal-level curve is around the APC value of $3,000. Relatively high-volume journals such as *PLOS ONE* ($2,382) and *Scientific Reports* ($2,690) contribute to more article-level distribution, and proportion of overall publishing by this range of APCs exceeds the proportion of journals offered in this range of APCs.

Where authors choose to publish their articles is represented in blue, while the journal-level data is shown in red. The effect of author choice compared to available journals can be seen in the divergence between the two curves in Figure 2. Between x-axis values of about $4,000 and $7,000, the red journal-level curve continues to increase with each new title, but the blue article-level curve does not track as closely. Article output does not appear in journals with these range of APC prices at the same frequency. This is perhaps a result of authors preferring to target their articles to the journals *PNAS* or *Nature Communications*, which show jumps in the percentages.

Figure 2 confirms prior research that shows the distribution of journals offered by a publisher do not always represent what authors actually choose [32]. In other words, a publisher may advertise their portfolio's average APC as being very low, but if few authors actually choose to publish in the low-APC journals and nearly all activity is in a single high-priced title, the

effective APC that is paid will be much higher. The lower-priced journals that are offered (and ignored) are less relevant to policy considerations and discussions. Author behavior shapes the impact of any proposed APC cap.

Table 1 extracts values from the plot and summarizes the three APC cap levels proposed in the NIH RFI, showing what fraction of journals and articles would be fully covered at each level. Even a generous $6,000 APC cap would leave 7.7% of journals and 11% of articles in this analysis partially uncovered. *PNAS* ($5,995) and *JAMA* ($6,000) would just fit under this cap, and most of the uncovered articles are the result of large publication activity in *Nature Communications* ($6,990), the rest of the *Nature* family of journals ($12,690), and *Cell* ($11,400).

APC cap ($)	% journals at or below	% articles at or below
2000	5.76	5.08
4000	54.3	50.0
6000	92.3	89.0

Table 1. Summary of journal and article coverage at proposed APC cap levels

To investigate journal-level effects further, Figure 3 shows a scatter plot of a journal's 2025 NIH-funded article volume vs. its APC. Open Access status of the journal is included in the color and symbol coding, showing Fully OA and Hybrid journals along with Subscribe to Open (S2O). Some notable journals that stand out in terms of volume or APC price have their titles displayed on the plot.

As previously mentioned, *Nature Communications* is the journal in this dataset with the highest number of articles acknowledging NIH funding, at 2,473, and has an APC of $6,990. As a Fully OA journal, all articles in *Nature Communications* are made OA through payment of an APC; this means the journal took in 2473 * $6990 = $17.29M from NIH-funded papers in 2025. This simple estimate does not include the additional 2025 volume of 10,000 other papers in this journal that did not acknowledge NIH funding but still paid an APC and produced revenue. Other high volume Fully OA journals include *Scientific Reports* with 1,530 NIH articles and an APC of $2,690, and *PLOS ONE* with 1,024 articles and an APC of $2,382.

The highest volume Hybrid journal is *PNAS*, with 1,212 articles and an APC of $5,995. Hybrid journals publish a mixture of OA and paywalled articles, so some proportion of the 1,200 articles were made open due to payment of an APC, but we cannot say with certainty how much. A detailed DOI-level examination of each article's license would be required to arrive at this figure.

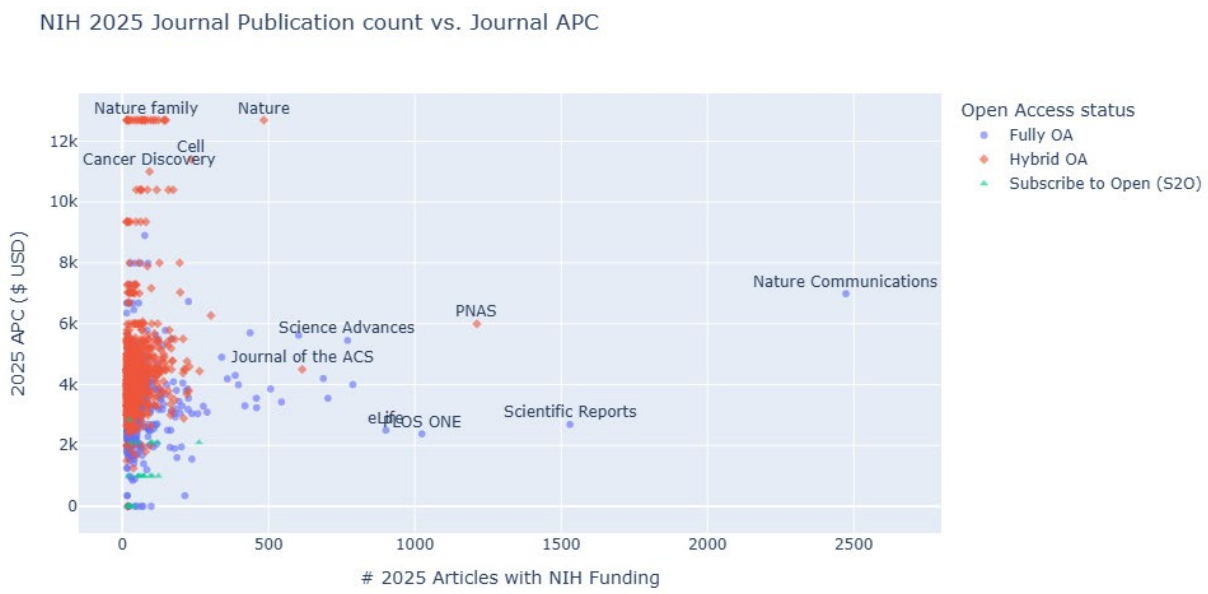

Figure 3. Journal-level scatter plot of 2025 NIH publication volume vs. APC

The highest APCs in this dataset come from nineteen journals in the *Nature* family, all set to $12,690. Elsevier's *Cell* family of journals are next with titles at $11,400 and $10,400, and *Cancer Discovery* ($11,000) is in between. The highest priced Fully OA journals are *Cell Genomics* ($8,900) and four titles from Springer Nature's *EMBO* family ($7,990).

Figure 4 looks at APC prices by OA status for the journals in this dataset, with horizontal jitter added to reduce overlaid data points. Hybrid prices extend further to reach higher values, and their mean APCs are 1.41x higher ($4,569 to $3,228). These findings are consistent with the previously observed phenomenon that Hybrid APCs are higher on average than Fully OA APCs, generally by a factor between 1.4-1.6x [32]. This is counterintuitive since Hybrid journals receive consistent revenue from subscriptions in addition to variable APC income. APC prices are set on perceived prestige which incorporates the age of the journal, and Hybrid titles have existed longer than Fully OA [33], [34] since they began as fully closed or subscription journals.

Some Subscribe to Open (S2O) journals in the data have an APC value listed since it is not guaranteed whether the entire journal-year will flip to OA or not. The journal's access status depends on the number of pledging institutions and whether there is sufficient subscription support to open that year's article content. As such, it is possible that authors would need to pay an APC to make their individual article open in a year when the rest of the journal is closed.

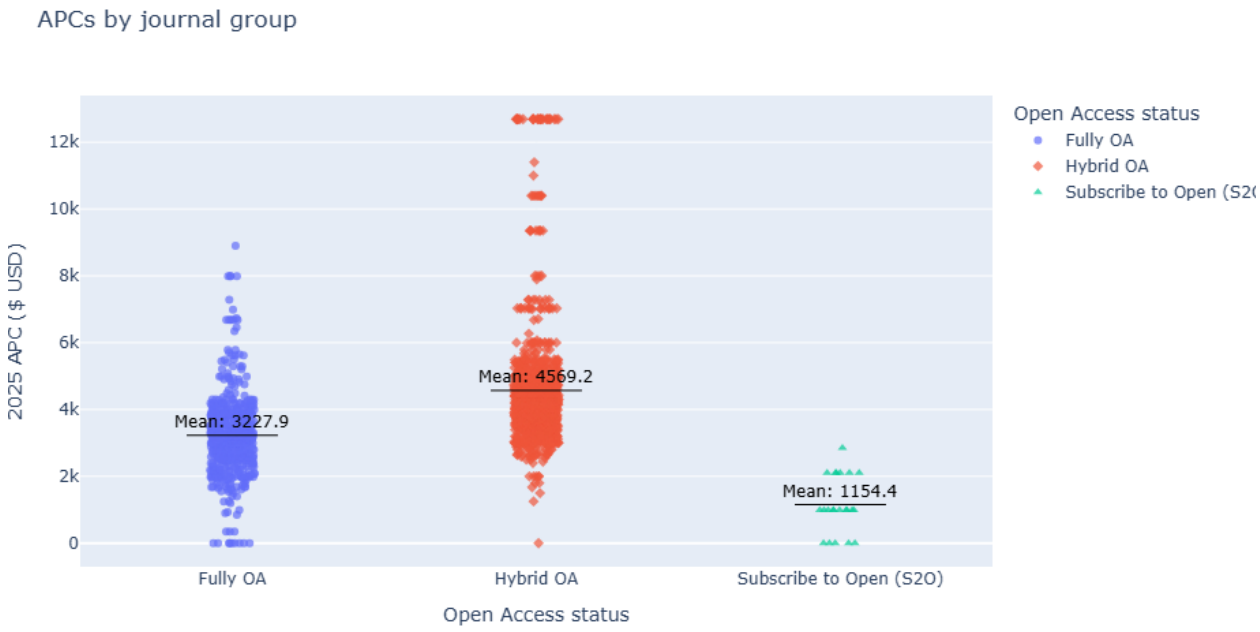

Figure 4. APC prices by Journal status.

Sample size of journal and articles by OA status is provided in Table 2. Hybrid journals are represented in this sample at nearly twice the frequency as Fully OA journals, 996 to 539. However, the two status modes are responsible for about the same number of overall articles. This suggests that Fully OA journals tend to publish higher numbers of NIH-supported articles in each journal. Hybrid journals are more plentiful but publish fewer NIH articles apiece. Of the top 10 journals by NIH volume, eight are Fully OA and two are Hybrid (numbers 3 and 10).

A handful of journals are Subscribe to Open or Subscription/Closed. As the OSTP Nelson memo takes effect in 2025 and 2026 [2], all federally funded research will be required to be made openly available. NIH-supported authors may still publish results in completely closed journals, provided they also make a version immediately freely available in a repository (so-called “green” OA).

OA Status	N Journals	% Journals	N Articles	% Articles
Fully OA	539	34.07	40,307	44.1
Hybrid	996	63.0	48,410	53.0
S2O	23	1.45	1,569	1.72
N/A (Subscription)	24	1.52	1,181	1.29
Total	**1582**	**100**	**91,467**	**100**

Table 2. Sample sizes of journals and articles for each access mode

Figure 5 breaks down APCs in this sample by price bucket. Each grouping is $1,000 wide, and the bars are color-coded by journal's OA status. Here we again see that Hybrid APCs are set higher on average than Fully OA APCs. The most common APC level offered by Hybrid journals is between $4,000 and $4,999, with 418 journals in this category (42% of Hybrid). For Fully OA journals, the most common price band is $3,000 to $3,999, with 227 journals (42% of Fully OA). Hybrid prices extend to higher price values (>$12,000), while Fully OA is more concentrated at lower values and reaches a maximum with one journal in the $8000 - $8,999 category.

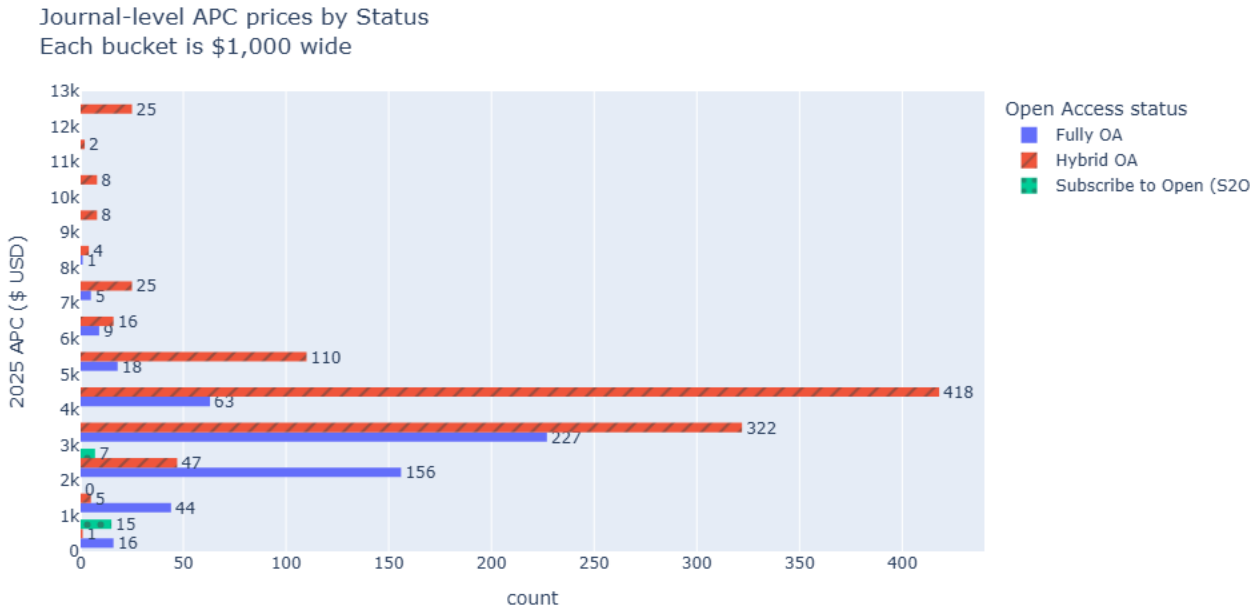

Figure 5. Distribution of APCs by price range and access mode

Discussion

Will APC caps have the desired effect of controlling publication costs? Depending on the dollar amount cap that is chosen, some articles and journals will necessarily remain uncovered. It is unrealistic, and indeed undesirable, to set a cap level that achieves 100% full coverage when some journals charge over $12,500 to publish a single article OA. Caps are not an upper limit on what publishers can charge, but simply a limit on how much NIH funding can be used to pay the charges. If a $2,000 cap were implemented, NIH-funded authors could still publish in *Nature* provided they can come up with the remaining balance of $10k themselves.

It is more likely that authors will move to using institutional Read & Publish (R&P) agreements to get around any set cap level. This means that any effort to restrict the use of agency funds for publication costs is apt to affect researchers at universities without an R&P agreement the most. Authors who publish under R&P agreements negotiated by their institution's library will not see any difference after the implementation of a cap. Likewise, authors who enjoy APC discounts

negotiated by their university libraries will experience a different article charge, moving the APC left in the cumulative distribution plot in their local experience.

As mentioned by several commentors in response to the NIH RFI [5], price caps will effectively become floors as publishers will not leave possible funds on the table. A cap will likely have the effect of raising any APC prices below the limit to be at least equal to the cap, which would change the shape of the distribution plot in Figure 2. In particular, it would move the lower left corner to the right (higher APC price) and cause a steeper climb as more journals come online at the $2,000 level.

Rather than offering evidence that any proposed APC cap needs to be high, the data provided here demonstrates how the high levels of APC prices affect NIH-funded authors. Even a generous $6,000 cap would leave more than 1 in 10 articles partially uncovered. APCs have grown at a rate exceeding inflation and are set based on prestige, not on the actual costs needed to produce an article [35]. Funder support for such fees will continue to further entrench the pay-to-publish model, moving the paywall from reader to author and pricing out researchers from institutions which cannot or will not negotiate Read & Publish agreements with academic publishers.

In this author's view, the NIH should instead clearly communicate that OA compliance can be achieved without paying an APC. This would work best in tandem with strengthening the current PubMed Central infrastructure, enforcing deposit of accepted manuscripts that result from federal funding, and exercising the US government's existing license rights to federally funded research.

Limitations and future work

This work assumes that publication patterns for 2025 are representative, but the trends shown may not generalize to future years. As current US support for science is threatened and funding cuts are proposed, the number of articles funded by the NIH may decrease in 2026 and beyond [36]. This would in turn change the numbers and percentages of articles that could be covered by any level of hypothetical publication cap.

If the NIH chooses to apply a new cap on publication charges, it is possible that other US federal funders such as the NSF or USDA would follow suit and enact similar restrictions. It is unclear whether the trends shown here would hold for publications supported by other funders. Indeed, there is a wide variation when looking at APCs by discipline [37]. Future work could expand upon this analysis and look at characteristics and APC spread of other US federal funders or any international funder of interest.

Most APCs were listed in USD, but some were given in another currency and then converted to US dollars. All Frontiers and MDPI titles are listed in Swiss Francs, and some OUP titles were shown in GBP. Currency conversions to USD were done in August 2025, but fluctuations in the relative strength of the US dollar will affect where these journals land in the distribution.

Depending on how close a journal's APC is to any given cap, a journal may cross the threshold and no longer be covered or come down and begin to be covered by a cap. Likewise, the publicly available APC list prices were collected July 23, 2025. If publishers updated APC prices after this date, it would further affect where in the distribution those journals land. It is currently unknown exactly when publishers adjust their publicly available APC price lists, and future work could investigate this.

Finally, this analysis is unable to determine potential impacts of the proposed "percentage of funding" based caps as included in the NIH RFI. Data that tracks grants, award numbers, and total spend is not readily available, and it is therefore not possible to determine what 0.8% of a total grant award would be and how it could apply to each resulting journal article.

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The code underlying this analysis was written using Python version 3.13.2, pandas 2.2.3, Plotly Express 6.0.1, and Jupyter Lab 4.4.5.

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The author used Google Gemini to assist in fine-tuning plot layout characteristics in Python.

Data availability statement

The data and code to reproduce this analysis are publicly available at https://github.com/eschares/ASEE-NIH-caps.

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