Association of Learned and Professional Society Publishers

CASE STUDY

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The transition of ARVO journals to open access

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[Correction added on 16 October 2020 after first online publication: The Copyright line has been corrected and the abstract has been replaced by Key Points in this article.]

Key points

- In January 2016, the three journals of the Association for Research in Vision and Ophthalmology (ARVO) transitioned to gold open access.
- Increased author charges were introduced to partially offset the loss of subscription revenue.
- Submissions to the two established journals initially dropped by almost 15% but have now stabilized.
- The transition has not impacted acceptance rates and impact factors, and article pageviews and downloads may have increased as a result of open access.

INTRODUCTION

By the last decade of the 20th century, the reach and capacity of the internet was approaching a level that made online publication feasible. As a conservative estimate of accessibility, from 1996 to 2004, the proportion of internet users in the industrialized world among the general population increased from 11% to 54% (ITU World Telecommunication, n.d.). Over the same period, common connection speeds increased from a maximum of 56kbit/s with dial-in connections to several Mbps with broadband, which had reached over 55% of US homes by 2004. Without the substantial printing and distribution costs associated with standard paper publishing, there was virtually no limit to the number of copies of a scientific article that could be circulated electronically. This concept was demonstrated by the first public preprint archive, ArXiv, which was established in 1991 (arXiv.org, n.d.). The labour involved in collecting and analysing scientific data, writing a manuscript, and peer reviewing the manuscript is not free but is an integral part of the research process itself. By the early 21st century, there seemed to be no technical reason that the fruits of this process should not be freely and widely shared. With this in mind, the open access movement formally began in 2002, with the declaration of the Budapest Open Access Initiative (Chan *et al*., 2002). The two components of open access – free-to-read content and the right to reuse content with attribution – are well suited to scientific research in the modern age.

Open access is widely considered better suited to academic research than is subscription-based publication, with copyright transfer to the publisher and restricted reuse of content. Therefore, it was natural that the membership of the Association for Research in Vision and Ophthalmology (ARVO), as a professional body of researchers represented by their Board of Trustees, would be receptive to adopting this model. Even before the move to full open access was initiated, two of the three ARVO journals – *Journal of Vision* (*JOV*) and *Translational Vision Science & Technology* (*TVST*) – had been publicly available at no charge since their launches in 2001 and 2012, respectively. The ARVO Board of Trustees made the decision in 2014 for all ARVO journals to become fully open access in 2016. This meant ending subscriptions for its flagship journal, *Investigative Ophthalmology & Visual Science* (*IOVS*), and allowing authors to retain copyright to their work and publish with Creative Commons licences. (In the years leading up to this, *IOVS* was strictly hybrid in the sense that authors had an option to pay to make their work immediately freely available, but less than 1% did.)

This article describes how ARVO journals successfully transitioned to open access and are subsequently thriving. It also

includes a general discussion of the challenges and benefits of open access for association publishers.

BRIEF HISTORY OF THE ARVO JOURNALS

The ARVO journals have benefited ARVO members, and eye and vision scientists in general, since *Investigative Ophthalmology* (renamed *Investigative Ophthalmology & Visual Science* in 1977) was founded in 1962 (Colson, 2012). *IOVS* was published in partnership with commercial publishers until the 1990s when ARVO decided to self-publish. Since then, all ARVO journals have been self-published. ARVO's second journal – *JOV* – was launched in 2001 and was unusual at the time, being published online only and publicly available at no cost. For the founding Editor-in-Chief of *JOV*, it was "essential that the journal impose no barriers whatsoever between reader and material: no subscription fees, no membership requirements, no requests for passwords or other information (Watson, 2001)." ARVO's third journal – *TVST* – was first published in 2012 and also was published online only and made freely available to all.

The ARVO Board of Trustees began discussions around open access options for ARVO journals in 2012. Already, articles in *IOVS* were openly accessible on the journal website 12 months after publication, and articles funded by the US National Institutes of Health (NIH) or UK Wellcome Trust were being deposited in the PubMed Central archive of the NIH National Library of Medicine under corresponding embargoes (PMC Overview, n. d.). This was necessary as these funders required that the research they supported was made available to the public.

Over the ensuing couple of years, various pricing options were evaluated by the ARVO Board. Although the bulk of journal income was derived from author fees, a large portion came from subscriptions to *IOVS*. If subscriptions were to be eliminated, that support would need to be met to cover the costs of running, publishing, and hosting the journals. Submission fees were considered and rejected. After analysing total annual cost of the journals, a flat per-article fee was calculated that would cover the shortfall. That amount was lower than open access fees charged by most competitor journals. In order not to burden authors and because the function of the journals was not to generate revenue for ARVO, the ARVO Board agreed that author fees would not be raised unnecessarily. Open access options were debated, and in 2014, the ARVO Board voted to transition the journals to gold open access in 2016.

TYPES OF OPEN ACCESS

Before presenting the benefits and challenges associated with open access, and ARVO's perspective in particular, it is important to define open access and the different types or levels. Open access refers principally to articles being publicly available at no cost to the reader. Full open access also requires journal content to be reusable, typically under a Creative Commons licence, with the authors retaining the copyright.

There are three main types of open access: gold, green, and bronze. In gold open access, the version of record of an article is made available to journal readers by the publisher at no cost (i.e. without subscriptions) as soon as it is published (i.e. with no embargo period). Gold open access may be implemented in fully open access journals or in hybrid journals. Hybrid journals are those in which authors choose to pay if they wish their article to be openly accessible immediately. The journal still charges libraries or readers to access most content, so subscriptions are still viable as long as uptake of the gold open access option is relatively low. Fully open access journals provide all content immediately at no cost, making subscriptions redundant. In green open access, authors may self-archive aversion of their article in a publicly accessible repository. The version that is self-archived depends on the requirements of the publisher and authors' funding agency but is often the accepted manuscript. There may be an embargo period of 6–12 months placed on the public availability of the article. Green open access has been found to be compatible with journal subscriptions as researchers or libraries are prepared to pay to see the latest results immediately after publication. In bronze open access, the publisher makes the version of record freely available on its website after an embargo period that is usually 6–12 months.

ARGUMENTS FOR AND DEVELOPMENTS PROMOTING OPEN ACCESS

When the demand for open access was first formally expressed in the Budapest Open Access Initiative, over 83% of journals were available online (Chan *et al*., 2002; Johnson, Watkinson, & Mabe, 2018), making it convenient for most people to access content directly from their personal computer. Prior to this time, the high cost of publishing on paper and the large volume of scientific literature meant most researchers relied on library access to articles. Frustration related to a wider audience readily finding journal content of interest online, but needing to pay to access it beyond the title and abstract, was widely discussed, leading to the political will to make all publicly funded research open access. As highlighted in the media (Buranyi, 2017), most academic research is publicly funded, and as part of the research process, researchers write articles that are peer reviewed for free by other publicly funded researchers. This created a strong argument that the published output should be freely available to taxpayers, who for the most part funded the research.

There was also consternation expressed within the academic community and in the public arena at the high profit margins of the large commercial publishers, a lack of transparency in the pricing models for subscriptions, pressure for libraries to subscribe to large packages of journals, and – most of all – growth in subscription costs that appeared to exceed the growth rate of research funding (Belluz, 2016). Many researchers and funders found this rapid growth in subscription pricing difficult to reconcile with the assumed cost savings to publishers resulting from online submission, peer review, and publishing. Many acknowledged that some publishing costs would remain but felt that moving away from the

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subscription system and fully embracing open access would push the publishing industry to be more competitive.

Results of citation studies suggest that open access content is cited more often than non-open access content (Mckiernan *et al*., 2016; Piwowar *et al*., 2018). One study identified a citation advantage of 8% for open access articles, with the effect being more pronounced in top-ranked journals (Mccabe & Snyder, 2014). A European Commission report described a 40% citation advantage for open access articles (Archambault *et al*., 2013). Studies of article usage are more limited than those of citations due to the challenges of collecting usage data from publishers and repositories. The *Nature Communications* team discovered a small positive effect of open access on citations, and a larger effect on page views and downloads, in a 2014 study that they presented in a blog (Collins, 2014).

Funding agencies provided the biggest pressure and means for authors to publish their articles under an open access model. First, some funding agencies introduced mandates that researchers deposit all authored articles in publicly available repositories, such as PubMed Central, which would make a version available after a defined embargo period. The widely adopted embargo period by US and European funding agencies was initially set at 12 months and later reduced to 6 months. Publishers were, for the most part, forced to allow green open access whenever an author could show that a funding agency mandated it.

As the next stage in this process, many funding agencies, initially those based in the UK, required those researchers whom they funded to publish their work gold open access.. This led to expansion of gold open access articles in hybrid journals and in the number of fully open access journals. Clearly, there might be a tipping point, at which a hybrid journal has more than a certain percentage of its content published as open access, and libraries would no longer subscribe for the remaining content.

A consortium of European funding agencies recently announced a mechanism to promote uptake of open access, known as Plan S (About Plan S, n.d.). This involves mandating researchers to publish in only journals that are fully open access and meet several other criteria designed to promote this form of open access. These agencies are motivated by the perceived slow rate of uptake of open access and want to trigger a move to complete public availability of work in as many journals as possible. Plan S is due to be implemented in 2021.

The uptake of open access to date has been significant but not overwhelming. The proportion of fully open access journals rose to 15.2% in 2016, up from 12.4% in 2012, and in 2016, just 37.7% of journals were subscription only (Johnson *et al*., 2018). Gold open access articles are reported to have risen from about 5% in 2006 to 15–20% in 2016 (Johnson *et al*., 2018).

ADDITIONAL ARGUMENTS FOR GOLD OPEN ACCESS OF ARVO JOURNALS

In addition to the general arguments for open access, several considerations are specific to ARVO journals. Compared with some other USA-based research societies, ARVO has an international membership, and therefore, the reach of the ARVO journals is necessarily global. The open access movement is perhaps the strongest in Europe, and the European ARVO membership is particularly supportive of open access. The research published in ARVO journals is focused on vision and ophthalmology, but works are also read by persons who are outside these fields. Without ready access through research libraries, readers such as non-ophthalmic scientists and clinicians and patients most clearly benefit from the move to open access. While ARVO is an association of researchers, its membership is motivated to make the research available beyond their immediate research community.

ARVO journals continue to be relatively well placed financially for open access. The journals programme was never intended to generate substantial profits or to subsidize the annual meeting of the association. ARVO only ever collected subscription revenue from *IOVS* as *JOV* and *TVST* had always been online only and publicly available without a subscription. Access to *IOVS* had long been free to ARVO members, who make up a bulk of its readership.

ARVO journals introduced page charges and excess page fees in 2000, with little effect on submissions, and these remained in place while full open access was being contemplated. This was unusual as many other publishers were removing page charges and increasing subscription fees around this time. Increases in author charges that would be necessary to offset subscription revenue would be more readily accepted by authors than introducing a new fee. Details of the per-article charges after open access and the average page charges per article in the years leading up to open access are shown by journal in Table 1.

ARVO journal costs are relatively low. Dedicated editorial board members and reviewers work on a voluntary basis, and the peer review process is administered by a staff of two people. The association continues to explore options for reducing journal production costs by increased automation, and the journals are online only, which eliminates the costs of printing and distributing paper versions. In contrast, many other publishers pay their editorial boards and have a large peer review support staff. Some publishers who publish online also offer print copies, albeit only on demand.

These factors favoured the early adoption of open access by ARVO for its journals, and author charges were carefully calculated to cover costs. However, much depended on the support of the authors, who had the choice of submitting to other journals in order to avoid the publication charges.

CHALLENGES FOR ARVO JOURNALS IN THE TRANSITION TO OPEN ACCESS

Notwithstanding ARVO's sound financial situation, the loss of subscription revenue was substantial and posed a significant financial challenge. In addition, the interest in open access was not universal across the association. There are geographic differences in attitudes towards open access, and while the ARVO membership seeks to maintain geographic diversity, selectively

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Table 1 Characteristics of ARVO journals before and after the move to open access in 2016

Characteristic	Before open access			After open access
(A) *IOVS*				
Free accessibility of version of record	6 months after publication (ARVO members had immediate access)			Immediate
Copyright holder	ARVO			Authors, who choose between CC BY and CC BY-NC-ND licences
Subscription revenue	Yes			No
Charge per article to author (prior to OA these are averages as authors were charged per page)	2013	2014	2015	$1,500 (member), $1850 (non-member)
	$915	$1,044	$1,125	
Royalty revenue	For all content			For pre-2016 content only
(B) *JOV*				
Free accessibility of version of record	Immediate			Immediate
Copyright holder	ARVO			Authors, who choose between CC BY and CC BY-NC-ND licences
Subscription revenue	No			No
Charge per article to author (prior to OA these are averages as authors were charged per page)	2013	2014	2015	$1,500 (member), $1850 (non-member)
	$1,284	$1,625	$1900	
Royalty revenue	For all content			For pre-2016 content only
(C) *TVST*				
Free accessibility of version of record	Immediate			Immediate
Copyright holder	ARVO			Authors, who choose between CC BY and CC BY-NC-ND licences
Subscription revenue	No			No
Charge per article to author (prior to OA these are averages as authors were charged per page)	2013	2014	2015	$1,500 (member), $1850 (non-member)
	$1,320	$1,320	$1,375	
Royalty revenue	For all content			For pre-2016 content only

discouraging authors with fewer financial resources from some parts of the world was a concern.

Another concern was the perception held by some that open access journals were of lower quality than non-open access journals. This perception may have stemmed from the practice of some publishers to launch open access journals for the express purpose of accommodating articles rejected from their subscription journals. Furthermore, predatory journals emerged, claiming to be open access but also charging authors without providing peer review or production services or, worse, without ultimately publishing an article. This negative perception may be more of an obstacle for launching a new journal without an existing reputation than transitioning established journals such as those of ARVO. Nevertheless, ARVO would not know how many potential new authors might perceive the open access status negatively and elect to publish their work elsewhere for that reason.

The increase in author charges may have been a disincentive for some authors. It should be noted that an increase in author charges was phased in over the 3 years prior to open access to be less disruptive. A 2017 survey of ARVO members and recent ARVO journal authors indicated that authors prioritized open access over cost to publish but that the reverse was true for ARVO members who were not recent authors. While the ARVO journals represent good value for authors who want to publish open access, it remains possible to publish in high-impact competitor journals at no charge. Some authors do not have the funding necessary to pay the charges; a Publication Financial Assistance Program (PFAP) funded by the ARVO Foundation was introduced to cover charges for authors with limited access to funding according to defined criteria. Uptake of this program has increased each year since the transition to open access.

One final concern with financing a journal almost exclusively from author processing charges is that revenue is completely dependent on the number of published articles. This could pressure editors to increase the acceptance rate, which likely would compromise the quality of published works. Such short-term financial gains would occur at the expense of the reputation of the ARVO journals and would ultimately

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undermine the willingness of authors to submit their best research to ARVO journals.

ARVO JOURNALS IMMEDIATELY BEFORE AND AFTER THE TRANSITION TO OPEN ACCESS

Table 1 summarizes the major changes in ARVO journals before and after the transition to full open access in 2016. It should be noted that articles published in *JOV* and *TVST* were always immediately freely accessible. For these journals, the major changes for the author were a higher processing charge and retention of copyright. ARVO lost all annual journal subscription revenue as a result of the transition and raised page charges in the 2 years preceding the move to open access in preparation for this predicted loss, as shown in the table. Differences in average per-article page charges between the journals were due to the different average article lengths. Additionally, in 2013, the rates per page were not the same across the journals. Royalty revenue comes from fees paid to ARVO for reuse of figures published before 2016, for which ARVO owns the copyright.

COMPARISON BETWEEN ARVO JOURNALS AND COMPETITOR JOURNALS

Table 2 shows the publication models and the cost of publishing an article gold open access in journals with a similar focus to the ARVO journals. These journals were identified at the time of the transition to open access because of their relatively high citation rates of articles published in ARVO journals. In 2016, ARVO journals were the only fully open access journals among this group of specialized journals, with the exception of the mega-journals *PLOS One* and *Scientific Reports*. The cost of publishing open access in ARVO journals was competitive at that time, and this situation has not changed in the 3 years since the ARVO journals transitioned to full open access.

TRENDS IN METRICS OF ARVO JOURNALS THROUGH THEIR TRANSITION TO OPEN ACCESS

One of the main concerns when transitioning a journal to full open access is the potential for reduced submissions due to the increase in cost to authors. Figure 1 shows that the number of articles submitted to *IOVS* dropped following the move to open access in 2016 but quickly stabilized. An exponential fit to submissions between 2001 and 2015 indicates an annualized compound growth rate of 4.6% over that period. Fluctuation around this trend may be gauged from the standard deviation from the fit, which, at 65, is higher than the Poisson level of ± 45 for purely random year-to-year fluctuations. Submissions in 2016 decreased by 12.6% (or 315) from the extrapolated growth trend, which is 4.5 times the year-to-year standard deviation from that trend. This strongly suggests a significant event, which is most likely the increase in author charges for publication that came with open access, as detailed in Table 1.

In 2016, *JOV* experienced a similar decrease in submissions as *IOVS* (Fig. 1). Submissions to *JOV* had grown through 2009 and subsequently plateaued, as shown by the fit between 2009 and 2015. The standard deviation from the trendline is 15, which is smaller than the Poisson level of ± 20 for random fluctuations. The decrease in submissions by 14.0% (or 74) in 2016 from the growth trendline, equating to 4.9 standard deviations, again suggests that a significant event impacted submissions in 2016. It is more difficult to attribute the change to increased author charges for *JOV* since the average charge to authors (Table 1) actually decreased from 2015 to 2016. However, many regular *JOV* authors were accustomed to the significantly lower average charges in 2013 ($1,284), and news spread quickly of the per-article

Table 2 Impact factor, open access status, and charges for open access publication of other ophthalmic and vision journals in 2016

Journal	Impact factor	Model	Cost per article of publishing open access
Progress in Retinal and Eye Research	11.587	Hybrid	$3,550
Ophthalmology	8.204	Hybrid	$3,000
JAMA Ophthalmology	5.625	Hybrid	$4,500–$5,000
American Journal of Ophthalmology	5.052	Hybrid	$3,300
Experimental Eye Research	3.332	Hybrid	$2,600
Acta Ophthalmologica	3.157	Hybrid	$3,000 ($1,500 for members)
PLOS ONE	2.806	Open access	$1,495
Retina	3.7	Hybrid	$3,100
Scientific Reports	4.259	Open access	$1,675
Current Eye Research	2.238	Hybrid	$2,950

The cost of publishing in ARVO journals was the same in 2016 as it is in 2020: $1,500 if the corresponding author is an ARVO member at the time the article is accepted for publication and $1850 if they are not an ARVO member.

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$1850 non-member rate (85% of *JOV* authors are not ARVO members) when open access was marketed in 2016. Following the launch of *TVST* in 2012, there was a 5-year plateau in the number of annual submissions, but since 2016, this number has increased substantially (Fig. 1). In June 2017, *TVST* received its first impact factor (the 2016 IF), which is likely to have made the journal more attractive to authors. In particular, rapid growth occurred in 2017 submissions from Asia following the release of the 2016 IF. Furthermore, in 2018, the number of manuscripts transferred from *IOVS* to *TVST* increased substantially as the new *IOVS* Editor-in-Chief increased efforts to delineate the scopes of *IOVS* and *TVST*. These two events may have compensated for any potential loss of submissions related to the move to open access. It is worth noting that there have been some trends in the geographic distribution of submitted manuscripts for all three journals, which can be seen in the tables included as supplemental material to this article (Appendix S1, Supporting information). Looking specifically at the percentages of submissions before open access in 2015 and after in 2017, there were shifts away from Europe and the USA and towards China.

Figure 2 shows that the number of articles published annually in *IOVS* dropped following the decline in submissions, although this decline was likely also related to a decrease in the acceptance rate (see below). The number decreased to 531 articles in 2019, down from the peak of 1,189 articles in 2011. The number of articles published by *JOV* increased in

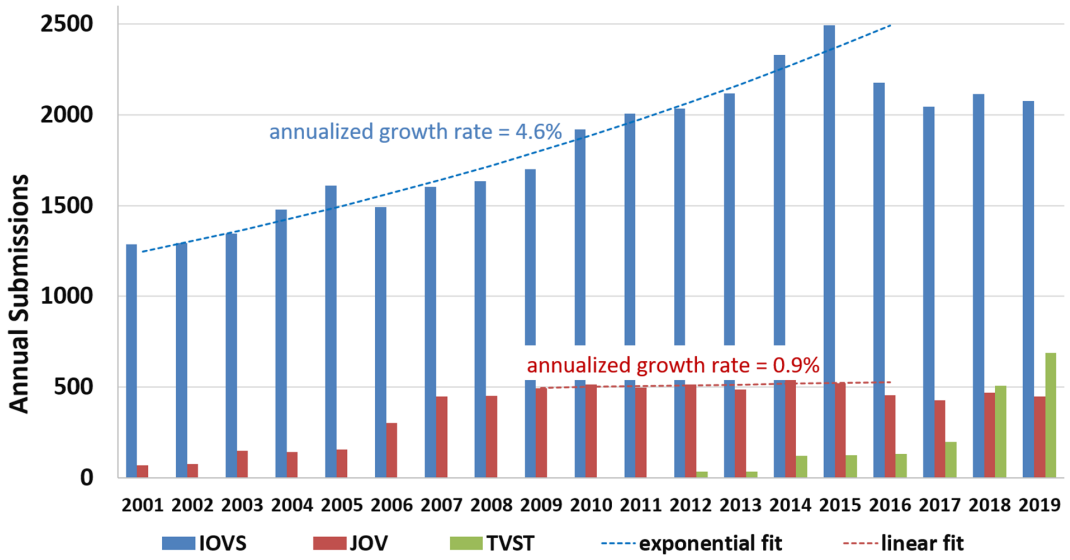

Figure 1 Total annual submissions to ARVO journals from 2001 to 2019.

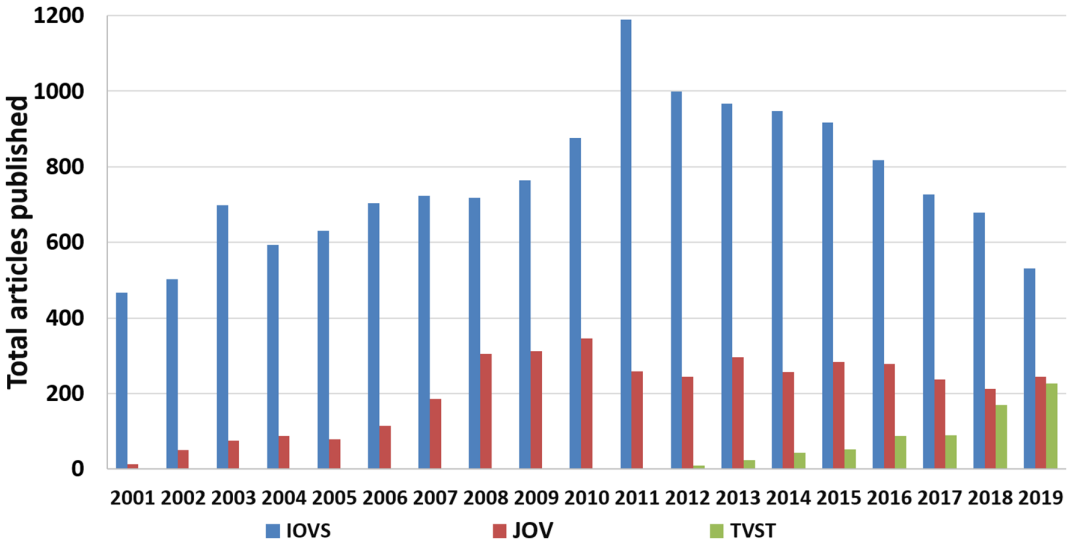

Figure 2 Total number of articles published annually in ARVO journals from 2001 to 2019.

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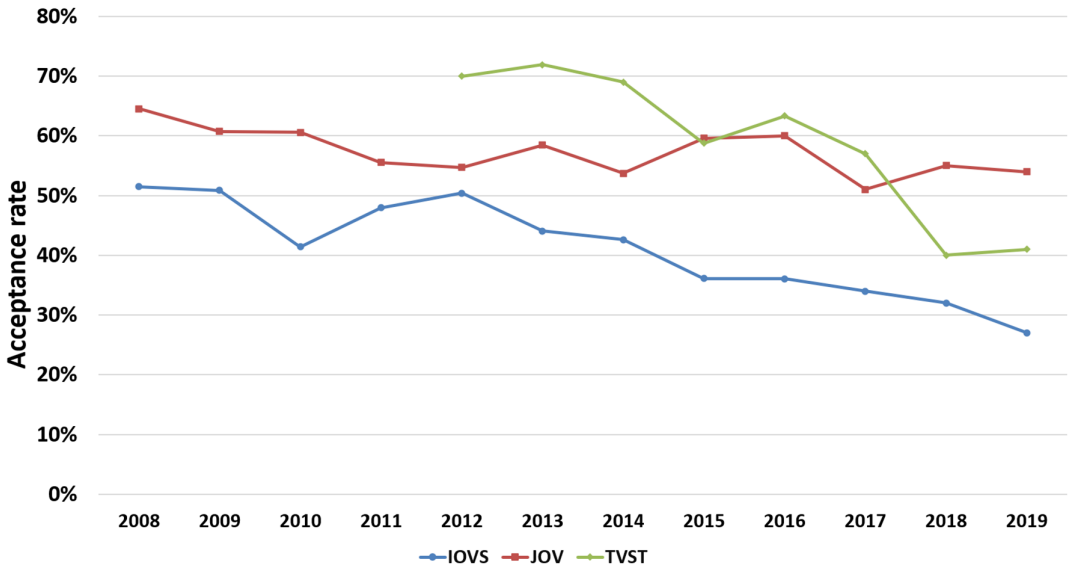

Figure 3 Annual acceptance rates for articles submitted to ARVO journals between 2008 and 2019.

2019 to 244, following a recovery in submissions. Volatility in the number of articles published is greater than for the submissions due to fluctuations in journal acceptance rate. There has been recent rapid growth in the number of articles published in *TVST*. This follows the rapid growth in submissions, with a lag related to processing time. *TVST* published 227 articles in 2019.

Acceptance rates, shown in Fig. 3, are declining for *IOVS* and for *TVST* and are stable within expected fluctuations for *JOV*. Declining acceptance rates may negatively impact generation of revenue in the short term since this comes almost exclusively from author charges for published articles. However, high-quality publications are important for reputation and thus long-term viability of the journal. The recent change in acceptance rate for *IOVS* is also due in part to adjustment in scope.

Impact factors for the three ARVO journals from 2008 through 2019 are presented in Fig. 4. The impact factor is calculated by Clarivate Analytics as the average citations in the year to all articles published in the previous 2 years (Garfield, n.d.). Measuring citations of articles published over the previous 2 years rather than in the same year (as for immediacy index) allows time for the citation rate to build significantly. For example, articles in

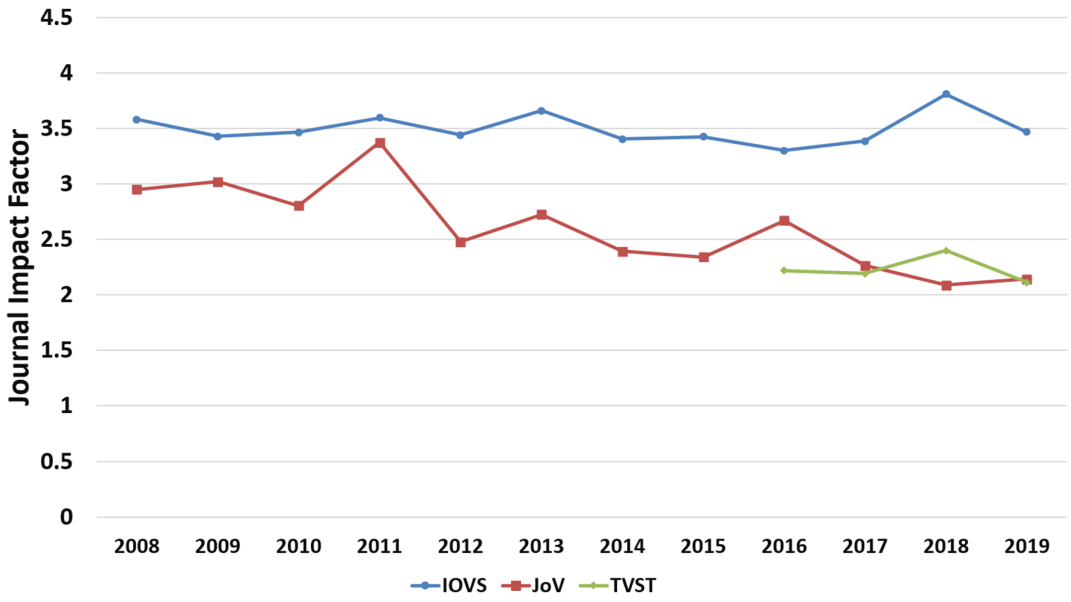

Figure 4 Impact factors of the ARVO journals between 2008 and 2019.

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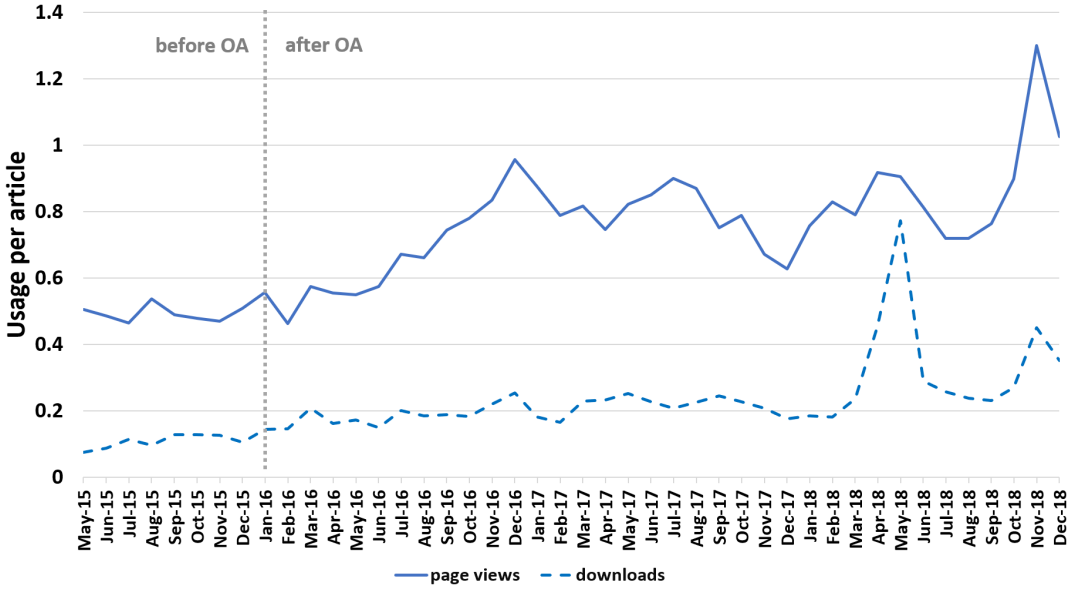

Figure 5 Average number of page views and downloads per article in *IOVS* by month over the period of transition to open access.

IOVS reach a maximum citation rate after 2–3 years but are cited at approximately 75% of this rate after 1 year. Expected year-to-year random fluctuations in the impact factor may be estimated from the standard deviation of article citation distributions and the number of published articles: ±0.1 for *IOVS*, ±0.12 for *JOV*, and ±0.18 for *TVST*. Overall, the transition to open access has not yet resulted in any obvious changes in the impact factors of the journals. Significant changes in the quality or impact of articles published after open access, from 2016, 2017, and 2018, would likely have resulted in significant differences in impact factors for 2017, 2018, and 2019 compared with earlier impact factors, which was not the case. Any changes in average citations due to increased accessibility should have manifest in 2016 impact factors onwards. However, it should be noted that *TVST* and *JOV* content was already fully accessible before 2016, and as ARVO members, many eye and vision researchers likely to cite the articles already had access to all *IOVS* content prior to open access. The main beneficiaries of improved access outside

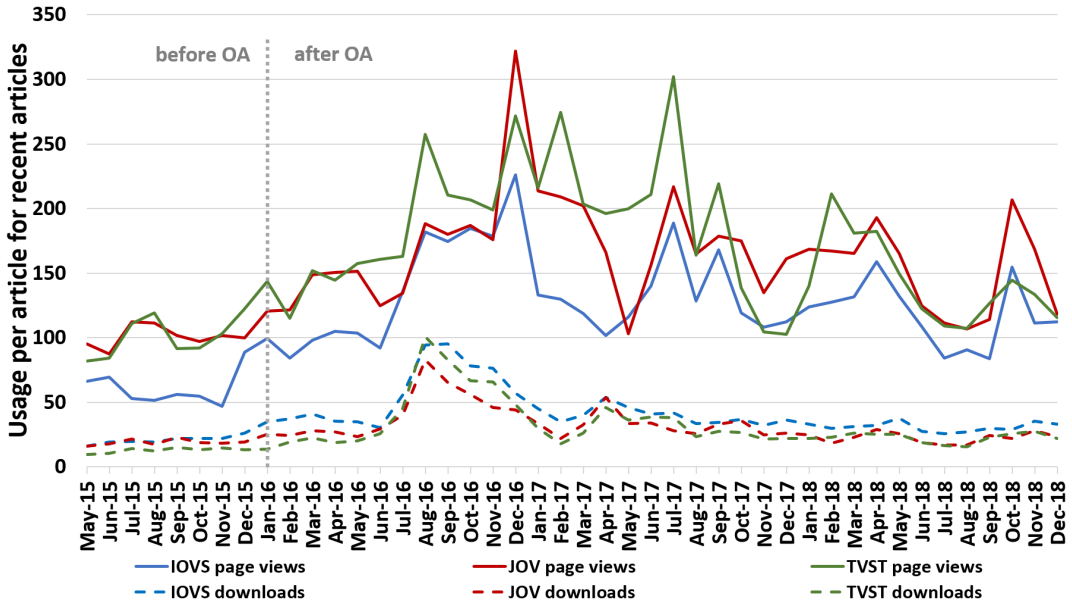

Figure 6 Average number of page views and downloads per article in ARVO journals over the period of transition to open access for those articles published in the 6 months prior to the months indicated on the *x*-axis.

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institutional subscriptions, such as practice-based clinicians and patients, generally do not cite the articles.

Figure 5 shows the number of page views and downloads per month for *IOVS* articles over the time this information has been tracked (i.e. May 2015 through 2018). Data are from the journals' current platform (Silverchair), to which all three journals moved in April 2015. The average download rate increased gradually from early 2016 and remained approximately constant through 2017. In addition, the number of page views increased around March 2016 through the end of that year, remaining at this higher level in 2017 and 2018 but with considerable month-to-month variation. It should be noted that these data reflect all *IOVS* content, the vast majority of which was older than 6 months and therefore already free to read before the time of transition. This makes it difficult to gauge the effect of the improved accessibility of new content on page views and downloads.

Figure 6 shows the page views and downloads per month for those articles that were published in the 6 months prior to the month presented. These recent articles were only accessible in *IOVS* by subscription before 2016 but became accessible to all after that date. There was a peak of increased download activity for these recently published articles that began in mid-2016 and ended in early 2017. However, this peak occurred for all three journals, even though access to recent articles had never been restricted by subscriptions for *JOV* and *TVST*. Carefully comparing usage data from 2015 with 2017 through 2018, despite the high degree of volatility, there is a trend to increasing page views and downloads for all ARVO journals. It is tempting to speculate that this peak and subsequent sustained increased activity across the journals was related to heightened awareness of the ARVO publications following the publicity campaign around the move to open access.

CONCLUSIONS: THE FUTURE OF OPEN ACCESS AT ARVO

The global trend to open access of scientific publications is well underway, with up to 20% of new content now published as gold open access. Embargo periods for green open access content allowed by funding agencies have shrunk from 12 to 6 months in most cases, and archived preprint versions are often available for free, even when the published article is protected by subscription barriers. Funding agencies and research institutions continue to push for more complete adoption of gold open access. Meanwhile, the subscription models used by large publishing companies are coming under increasing pressure. For example, Elsevier recently faced disputes with universities in Germany and California over its subscription contracts (Kwon, 2019; Taylor, 2018).

ARVO journals have successfully made the transition to gold open access. Journal content is now freely accessible anywhere in the world via the internet, and authors retain copyright to their work, with reuse licensed by Creative Commons licences. ARVO journals offer authors a choice of two licences: CC BY and CC-BY-NC-ND. The number of submissions to the two mature ARVO journals, *IOVS* and *JOV*, dipped during the transition but has stabilized, and submissions to *TVST* continue to grow. For ARVO, editorial decisions are not compromised by a need to meet a quota of published articles for profit, and therefore, quality continues to be maintained by a rigorous peer review process. Credit is due to the ARVO membership, who expressed early support for full open access, despite already having individual access. The membership recognized the importance of broad access to eye and vision research, even if external revenue related to journal subscriptions was lost.

ARVO remains ahead of the anticipated progress towards universal gold open access across the sector. In particular, it has adjusted financially by reducing the reliance of the society on journal revenue. Since the transition to open access, the ARVO journals have retained reputations as reliable and prestigious journals in the field of eye and vision research, and author processing charges are competitive.

Like other society-based journals, ARVO journals will compete directly with larger publishing companies if and when those companies transition to full open access. Unlike the traditional subscription-based model, which does not involve direct financial competition for authors, open access journals compete more strongly for authors based on their pricing structure. After more than 3 years of being open access, the ARVO journals remain in a strong position, and there is reason to hope they will maintain their standing even as more journals make the transition to open access.

Open access will not be the end of the road for improving communication of science. Having fully embraced open access, ARVO will be seeking future enhancements that might include open data sharing and contextual data searching enabled with artificial intelligence.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article:

Appendix S1 Supplemental geographic information – number and percentage of submissions by country of corresponding author for countries contributing more than 1%.

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