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## WASP: Is open access publishing the way forward? A review of the different ways in which research papers can be published

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## ABSTRACT

Academics have a duty towards peers and scholars alike to engage in research work and to publish their findings. This also assists in establishing personal academic success as well as the attainment of research grants. In the past, authors used to publish their research articles for free but access to these articles was restricted to subscription users only. Recently, open access publishing has gained momentum, whereby such articles are made freely accessible online. However open access publishing comes with a price tag for the author through article processing charges. Open access may also question a journal's credibility within the academic world if improperly implemented. This is particularly so following the unsolicited bombardment of researchers' email accounts with invitations for submissions to predatory open access journals. For these reasons, authors needs to rigorously weigh the pros and cons of whether to choose a subscription based or an open access journal for publication.

### 1. Introduction

Academics have a duty towards peers and scholars alike to engage in research work and publish their findings. This also helps in establishing personal academic success as well as helps to obtain research grants. Different research metrics have been established to try to quantify the academic-researcher research output. An author's research output is typically calculated through citation counts and indices extrapolated from such citation are used, for example the *h*-index [1]. Therefore it is imperative for authors to publish their research regularly and in well-established, prominent and prestigious journals.

Up to a few decades ago, the publishing of research articles was a laborious task with limited global publishing prominence. Printed journals were only distributed directly to individual subscribers or to subscribing libraries. With the introduction of the World Wide Web, journals shifted from printed format to a paperless and online submission and access format, with printed articles becoming virtually redundant. Up till the 1990's, the publishing of research articles was free for the author but access to research articles was through a subscription fee or a pay-per-download fee. Hence, all research articles could only be accessed by those (institution or individuals) paying the subscription fee. This modality limits research prominence since it is not sustainable for an institution or an individual to pay subscription fees for all the journals available in a particular field.

In the 2000's, the pioneers BioMed Central and PLoS introduced a new publishing concept of Open Access (OA) with the potential for article processing charges (APCs). Journals opting for this publishing modality offered all published articles for free to anyone accessing the journal online while the research author paid the publishing fees. This has taken the publishing ecosystem by storm and academic-researchers strive for open access provided that funding for this is available.

The aim of this review is to compare and contrast the two publishing modalities and establish a good understanding of which publishing modality best suits the academic-researcher prior to embarking on the publishing journey.

### 2. Traditionally published journals

The traditional publishing modality offers free submission, peer-review and publication. However, full access to the article is through a subscription fee. The copyright of the research article is typically handed over to the publisher through a Copyright Transfer Agreement, which is usually signed as part of the submission process. This copyright transfer hinders the author's ability to re-use the published research [2].

The traditional publishing modality tends to have a long "paper wait" from the time of submission to the completion of the peer review process and publication (provided that the paper is accepted after the paper wait period).

Approximately 75% of published articles are not directly accessible unless the reader works in an institution which offers subscription access to these articles or is privileged to be able to pay the journal subscription or *pay on a per-article* basis (if such a mode is available). It is obvious that subscription to all peer-reviewed journals carries a hefty price tag. Consequently the research output potential is hindered, with negative effects on

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the individual researcher and funders [2,3]. A researcher's impact within the academic-research community is measured through citation counts and calculation of indices such as the *h*-index (based on citation counts). Therefore, readers having limited access to the full research text may hinder the citation count of that article and consequently affect the researcher's impact [1,4]. In spite of this, the most prestigious high impact journals tend to offer only the traditional publishing process. Nowadays, some traditional publishing journals offer a “hybrid” model where an open access option is being also offered [2,5]. Even though faced with both options, the hybrid option is only chosen by 1 to 2% of submitting authors to major publishers [6].

### 3. Open access (OA)

The main rationale of open access publishing is to facilitate widespread access of the research findings with a rapid publishing process [2]. There are two different OA modalities as described below.

#### 3.1. Green open access

This is a self-archive publishing model where the author publishes the research article in any journal and then archives it in an institutional repository. Such repositories could be a University's repository or else a central repository (e.g. PubMed Central) or an open access website. This article deposition will depend on the journal's publishing self-archiving policies and it is frequently bound by an embargo period [5]. However, certain funders may demand that publications are made immediately available on a repository. Indeed articles emerging from the National Institutes of Health (NIH) funded projects need to be submitted to PubMed Central upon publication [7].

#### 3.2. Gold open access

##### 3.2.1. Is open access (OA) publishing reliable?

Over the years this type of publishing (open access) was faced by scepticism and doubts about the reliability, sustainability and peer review quality of such OA journals. Initially such journals were not indexed and lacked the scientific prestige that academic-researchers thrived to achieve [8]. Furthermore, such publishing was criticized as being all about the money, with publishers accepting articles irrespective of their scientific quality. Their prime goal was to maintain financial sustainability since their income was linearly dependent on the number of papers they published [9]. Academics publishing in such journals were considered scavengers for academic promotions and job opportunities. However, over the years, major reliable publishers such as PLoS and BioMed Central have taken up this type of publishing modality and OA publishing has slowly gained a reputation and began to be indexed in quality databases. In fact it was reported that biomedicine OA journals indexed in Web of Science and/or Scopus have gained an almost equivalent scientific impact and quality as traditionally published journals [10]. Discovering an OA journal impact factor and where the journal is indexed will provide an indication of the reliability of that journal. Conversely some concerns were reported about the validity of the impact factor in relation to the scientific quality of an individual article [11]. This has brought about the creation of “Journal selection” websites that aid researchers identify prestigious, high research output journals [12].

The quality of the peer review of OA journals is still of some concern in the academic world. However, reports have shown that the reliability and quality of the peer reviewing of OA journals are on the mend and some journals exhibit more rigorous peer review than traditional publishing journals. In fact, Bohannon stated that it was only an OA journal that raised ethical concerns about his submitted work [13]. Indeed, in 2014, it was reported that over a 100 traditionally published articles were retracted from publication due to the inferior quality of the peer review process [14].

##### 3.2.2. Publishing in an open access journal

When an article is accepted and published in an OA journal, readers gain immediate access to the full article on the publisher's website. The definition of OA can be considered as equivalent to the Creative Commons Attribution license (CC-BY) [15]. The authors retain the authorship of the published research and publishers are granted non-exclusive rights to publish.

Publishing in a reputable OA journal provides versatility and visibility, and in return the academic-researcher receives a higher research impact through citation counts [16]. There is concrete evidence that OA publishing is associated with higher citation rates [16]. Increased access to research outputs may introduce or enhance a culture of scientific education and literacy. Consequently this has a direct impact on public policy [17,18]. Moreover, a higher visibility and accessibility of a research article is more likely to be shared on social media including Twitter, Facebook and Mendeley. Indeed, it was reported that OA articles receive nearly double the number of Tweets and Mendeley reads when compared to subscription articles [19–21].

##### 3.2.3. Article processing charges (APCs)

The publishing of articles is associated with a number of costs including article processing charges (editing, proofreading, typesetting etc.) as well as management and investment costs. It has been reported that the average production cost for one research article is approximately around \$3500 - \$4000 (€2957 - €3379), although these costs are highly variable depending on the publisher [22]. In fact, there are journals where the production cost of one research article is only between \$6.50 and \$10 (€5.49–€8.45) [2]. This discrepancy depends on a number of factors. Importantly among these is the aspect of monetary profitability of the publishing house. The traditional publishing journals cover these costs through subscription fees whereas in OA journals, the submitting research author covers these fees.

In OA journals the APCs need to be paid post-article acceptance but prior to publishing of the paper. In fact OA publishing has adopted the “pay-to-publish” adage. The APCs are covered either personally by the author or through a research grant or institution. A number of OA publishers offer APCs waivers to low- and middle-income countries, while other journals offer a discount [8,23]. However, there are OA journals that do not charge the author. A list of such journals can be found on [Eigenfactor.org](http://Eigenfactor.org) [24]. A researcher can also utilise the Cofactor Journal Selector tool to identify no-cost OA journals [12].

#### 3.3. Predatory open access journals

The increasing demand on academic-researchers to publish or else perish, has led to the development of a number of open access “predatory

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