

Ethical, Political and Societal Implications of the Open Access Journal Movement in the Era of Economic Crisis, with Emphasis on Public Health Pharmacogenomics

Nicola Luigi Bragazzi*

School of Public Health, Department of Health Sciences (DISSAL), University of Genoa, 16132 Genoa, Italy

Abstract: Publication of the research outputs is a vital step of the research processes and a gateway between the laboratory and the global society. Open Access is revolutionizing the dissemination of scientific ideas, particularly in the field of public health pharmacogenomics that examines the ways in which pharmacogenomics impacts health systems and services at a societal level, rather than a narrow bench to bedside model of translation science. This manuscript argues that despite some limitations and drawbacks, open access has profound ethical, political and societal implications especially on underdeveloped and developing countries, and that it provides opportunities for science to grow in these resource-limited countries, particularly in the era of a severe economic and financial crisis that is imposing cuts and restrictions to research.

Keywords: Economic and financial crisis, gold open access, green open access, open access, public health pharmacogenomics.

1. INTRODUCTION

Publication is one of the main tasks of a researcher. It is the final step of the performed research, which enables a researcher to describe, discuss, disclose and share the results and outcome of the research with the scientific community. It is not the final step *per se*, but a preliminary exploration of a topic which is worthy of further studies, and anyway needs to be significantly replicated by other researchers and laboratories, leading to more research and collection of scientific evidences. Publication, being in the crossroad between past and future research, is of crucial importance. Publication is very important for career building and reputation of the scientists and for the growth of the academic body of knowledge.

There are substantially two major ways of publishing the research material: Subscription (or access-charge)-based publishing, and Open Access (OA) publishing. In this manuscript, I will argue that OA has profound ethical, political and societal implications especially on underdeveloped and developing countries, and that it provides a big opportunity to these countries, particularly in an era when a severe economic and financial crisis is imposing austerity and restriction to research budgets and funding.

Subscription-based publishing has been established and developed up to its current form during the last 300-400 years [1, 2]. However, the revolutionary invention of Internet introduced several other forms of publishing [2, 3]. Over the past few years, OA and OA Journals (OAJs) movement have made substantial progress. According to the Budapest OA

Initiative (BOAI), there are different kinds of OA policies: the gold OA, and the green OA. Green OA allows the depositing and/or self-archiving of articles published in traditional toll-based journals in repositories, such as PubMed Central (PMC, which is funded by the National Institutes of Health [NIH], and hosts all NIH-funded articles), ArXiv, RePEc and other subject-based repositories or on university/institutional or personal sites, like Research Gate, Academia.edu, or on other available platforms. However, there are some restrictions to this green route in OA: some journals do not allow the deposition and/or self-archiving of the final published text because the articles uploaded in this manner may differ from the final approved, formatted, copy-edited and fully referenced version. For these reasons, Green OA is less popular among the authors [1]. On the other hand, in gold OA route to publication, payment is taken from the authors for the processing of article. The fee involved here is known as article-processing charge (APC).

Another form of OA is the delayed OA, which is essentially an embargo policy that enables the availability of the free full-text of the article only after one or more years. The idea of launching electronic-only journals has fostered the OAJs movement as well as the new forms of publication, such as the dual OA, in which the digital version of the text is free for the readers, while the print version is sold in exchange of a fee [2]. The scholarly market is complex, heterogeneous and varied [1]. In the beginning leading publishers refused to enter the OA world. But today, there are publishers which are publishing OAJs as well as hybrid journals, offering OA as an option. A survey carried out by Kurata [4] and collaborators has shown that OA publishing trend is substantially increasing and that the most contribution to OA is made by the OAJs. Gold OA is believed to be the prominent vehicle for providing OA to articles and is likely to replace green OA in the future.

*Address correspondence to this author at the School of Public Health, Department of Health Sciences (DISSAL), University of Genoa, 16132 Genoa, Italy; Tel: (0039)0103537664; Fax: (0039)0103537669; E-mail: robertobragazzi@gmail.com

There are different theoretical reasons to support OA: scientific products are different from other commodities and are not competitive goods and for this reason their market is usually inefficient. OA can act as good and effective regulatory mechanism. Moreover, the quick and easy publishing make the OA quite attractive for the authors. In fact, an article submitted and accepted for publication in OAJs is usually published quicker than a manuscript submitted to a traditional toll-based journal. This not only has academic implications but also the scientific impact. This can accelerate the uptake of translational and bed-to-benchside research and perhaps fill or bridge the gap between research and clinical practice.

Another argument in favor of OA is that, in order to write a scholarly article, the authors need the relevant literature and this calls up for access to journals and to the latest international information.

In science, dissemination and exchange of ideas and achievements is very important which undoubtedly plays a role in expanding and improving the body of knowledge.

Moreover, the increasing number of disciplines, branches of science and sub-specialization trigger the need of having highly specialized journals. On the other hand, academic competition and university requirements urge the authors to write more and more, under the threat of “publish or perish”. As a result, the number of academic and scholarly journals has reached to an unprecedented figure. While in the past, universities or research institutions used to subscribe to a bundle of (relatively) few journals, but nowadays this practice has become unsustainable. Libraries do not have enough funds and budget to subscribe to the journals, the prices of which have increased substantially [3]. Tamber *et al.* have stressed that toll-based publishing does not favor an interdisciplinary approach since the high costs of subscription restrict the access to journals of other disciplines and specialized fields [3]. Considering the serendipitous nature of most scientific discoveries, it is not good for scholarly advancements to restrict the cross-talks among disciplines. Contrary to this argument, Crawford maintains that the very serendipitous nature of science (abrupt and unpredictable genial breakthroughs) is a point which goes against OA. We don't need to know all the published data since science is not a mere quantitative accumulation of facts [5]. However, Crawford fails to recognize the double nature of scientific knowledge: according to the eminent philosopher Thomas Kuhn science is both “normal” and “revolutionary” (characterized by genuine “paradigm shifts”). Both these scientific strains get benefit from OA, the first from the systematic mining of all evidences, the second from a multidisciplinary approach. By the way, collection and critical revision of all the available evidences are done on the basis of systematic reviews and meta-analyses, which have a great political value, since they lead to an Evidence-Based Medicine (EBM) and provide the policymakers with the ideas to take proper decisions.

Some scholars, like Varian and Crawford [5], claim that articles published in OAJs may be of less value in terms of quality and scientific merit than those published in toll-based journals. While non-OAJs may be characterized by an “access divide” or an “access gap”, OA can lead to a publication

bias, favoring a system in which only those who can afford the publishing fees can publish. Moreover, effective publishing filters disappear, thus resulting in the publication of papers of dubious significance. I claim, instead, that from an economical perspective, the publishing fee or APC acts as a price ceiling, limiting the journal to the publication of non-productive research. Some journals make the authors pay not only for the publication but also for the organization of each round of peer-review. While, on the contrary to Crawford's argument, if an article is freely accessible and thus more visible, it becomes easy to be evaluated and assessed. If an OAJ publishes a poor quality article, it is the credibility of the publisher itself which can be damaged. And in science, trust and reliability matter a lot.

A thorough peer-review is essential in order to ensure the high quality of papers. Some OAJs make peer review reports publicly available and transparent for the readers, sometimes disclosing also the names of the referees and/or the scholarly editor who managed the article. This enhances the credibility of the paper and makes the different steps of pre-publication and manuscript processing clearer (the so-called “open peer-review”). Moreover, OA movement, fully recognizing the developments and modifications in research due to the new technologies, has – at least, partially – accepted the challenge of incorporating the steps subsequent to the publication of the manuscript in the process of managing an article. Readers can comment on the manuscript, which undergoes a “second public peer review”. The O of OA is fully becoming a synonym of a more open, transparent, and interactive process.

Another argument in favor of OA is that research is (at least partially) publicly funded and therefore researchers have to account the society for their achieved results. It is a matter of transparency. Butler states the example of a patient recently diagnosed with a malignant disease, who wants to keep him updated with the latest advancements in the field. If there are few journals that allow patients and stakeholders to access the journals freely, it is undeniable that the fictitious patients should pay for having the required information. PubMed is indeed surfed also by non-academic users since there is a great interest for the lay public to the latest scientific achievements [6]. The current conceptual framework of bio-medicine is the P5 Model Mode 2 [7] or the P6 Model [8, 9]: scientific discoveries in the field are now more and more predictive, preventive, personalized, psychocognitive, public and participatory, open, socially distributed and locally situated.

However, the OA is not exempted from the possible degeneration and frauds, like new journals where you can submit a paper but no editorial board has been yet appointed (I term these journals as “editorially orphan”) and there are serious doubts whether the editorial handling and the peer review process are sound. Other phenomena, such as the “vanity press” market, massive spamming for inviting scholars to send their contributions, and the mistakes made by a highly automated process can contribute in developing distrust in OAJs. Undoubtedly, some of them are “predatory” [10], *i.e.* interested in making money and profit. Moreover, other criticisms concern the economic aspect of OAJs: why publisher should charge the authors for recovering the costs

of peer-review, if this is conducted on voluntary basis (*i.e.*, the referee can decline the review request, for many reasons: not properly qualified, lack of expertise, lack of time and so on)? On the other hand, the claim of affordability and sustainability of OA is valid only for those researchers or institutions with research groups which are not too productive: Frank simulated the total cost that the University of Harvard would have paid if all the articles had been published under OA and concluded that this amount would have been 4 times higher than the cost of subscription for the entire bundle of journals [11]. These criticisms are indeed pertinent, and can be resolved by customizing the OA policies: for example, in the first case the answer could be to offer an APC discount to a reviewer who has carefully and timely reviewed the manuscript. In the second case, APCs could be reduced taking into account the efforts and productivity of the authors, or anyway reduced to encourage more submissions and make the OA more affordable. Some scholars, like Haspelmath [12, 13], have stressed that the OAJs should be run only by non-profit organizations and that establishing well-defined rules for OA publishing besides the already extant guidelines for research funding could at least partially help to resolve the affordability issue of OA.

2. THE CASE OF UNDERDEVELOPED COUNTRIES

APCs for OAJs are (completely or partially) waived for researchers coming from underdeveloped countries. OA is growing especially in underdeveloped countries and developing nations [14], since for them it provides a great opportunity. The service offered to scholars in these countries is undoubtedly valuable: they can freely access scientific content and distribute and communicate with other scholars. Crucial topics, such as public health (and its branches, ranging from environmental and occupational hygiene to public health genomics and pharmacogenomics), personalized medicine, require public inputs and opinions. This “opening up” of the hitherto cloistered scientific design space produces scientific knowledge that is closely embedded with

societal values, the public interest and end-user priorities and thus, becomes socially robust and sustainable” [15]. Science is inherently political [16] and particularly scientific knowledge co-production and collaborations have ethical and societal facets. Researchers from India [17] or from Africa [18] can now make their voices heard and make endeavors to try to curb the inequities that are present in global health. OA opens new avenues for drug discovery and treatments for rare [19] and neglected diseases, such as tropical infections [20, 21].

3. THE CASE OF GREECE

The importance of OA can be further underlined from the perspective of the current financial and economic crisis. While the USA has chosen an expansive and generous financial policy to overcome the recession, Europe on the contrary has opted for an austerity policy. One of the consequences of this choice is that “austerity is killing science”, as the Greek researcher Varvara Trachana maintains [22]. Greek scholars are experiencing lack of funding, scaling back of recruitment/hiring plans and turnover freezes, and have lost access to prestigious journals such as “Bioinformatics”, and other major publishers, such as Elsevier, Springer and Taylor and Francis have raised the possibility to suspend access unless the Greek government pays for the requested fees. This is leading to a brain-drain and paving the way for the decline of Greek science. If OA did not exist, Greece would be completely cut out from the academic world.

4. CONCLUSION

OA can blur the geographical boundaries and barriers to spread and disseminate the knowledge. OA is of particular importance for low and middle income countries and above all nowadays, in the era of a financial and economic crisis, which is creating dramatic restrictions on research funding and subscription-based publishing access. While toll-based publishing is well established among the scientific communities, OA is a relatively recent way of publishing. It brings

Table 1. Arguments in favor of OA publishing (advantages of OAJs) and arguments against OA publishing (disadvantages and limitations of OAJs).

PRO OPEN ACCESS ARGUMENTS	AGAINST OPEN ACCESS ARGUMENTS
Articles are particular products that differ from the other goods, being the scholarly market not particularly efficient.	There is no need for researchers to access all the published articles: if the distinction between “normal” and “revolutionary” science is true, most discoveries are serendipitous and don't rely on previous knowledge.
It is an economically sustainable model of publishing and doing research, especially for underdeveloped and developing countries.	It has not been proven that OA is economically sustainable and moreover, OA leads to inflation in the number of published articles, most of time unnecessary.
It gives higher impact and visibility to research. Publication is usually faster than in traditional publishing, thus enabling ideas to circulate more and disseminate.	Some publishers (termed as “predatory”) are exploiting OA movement only for money purposes, thus ruining and spoiling the essence of OA.
If research is publicly funded, it is ethical to share the results to the society and to the different stakeholders.	Some publishers don't really select manuscripts on the basis of quality and/or don't offer the valuable service of peer-review.

some advantages and benefits, from the acceleration of the uptake of bed-to-benchside research, copyright transfer to making the contributions of scholars from emerging countries freely distributed. However, it has also some limitations that could hinder its embracement by the scholars (the pros and cons are listed and summarized in Table 1). If these issues were solved, offering APCs discounts to reviewers who have contributed to raise the reputation and the quality of the OAJs or reducing the APCs in order to make OA more affordable to the entire scientific community, OA would provide an excellent platform for delivering and sharing scholarly data and results.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

ACKNOWLEDGEMENTS

I thank the anonymous peer reviewers for constructive critiques and comments that improved the discussion in the manuscript. The author made a significant contribution to conception and design, acquisition of data, or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and approved the final version to be published. The views expressed herein are the personal opinion of the author.

ETHICS STATEMENT

Not applicable

ABBREVIATIONS

APC	=	Article Processing Charge
OA	=	Open Access
OAJ	=	Open Access Journal

REFERENCES

- [1] Liesegang TJ. The continued movement for open access to peer-reviewed literature. *Am J Ophthalmol* 2013; 156(3): 423-32.
- [2] Willinsky J. The nine flavours of open access scholarly publishing. *J Postgrad Med* 2003; 49(3): 263-7.
- [3] Tamber PS, Godlee F, Newmark P. Open access to peer-reviewed research: making it happen. *Lancet* 2003; 362(9395): 1575-7.
- [4] Kurata K, Morioka T, Yokoi K, *et al.* Remarkable growth of open access in the biomedical field: analysis of PubMed articles from 2006 to 2010. *PLoS One* 2013; 8(5): e60925.
- [5] Crawford BD. Open-access publishing: where is the value? *Lancet* 2003; 362(9395): 1578-80.
- [6] Kaiser J. Free journals grow amid ongoing debate. *Science* 2010; 329(5994): 896-8.
- [7] Ozdemir V, Fisher E, Dove ES, *et al.* End of the beginning and public health pharmacogenomics: knowledge in 'Mode 2' and P5 medicine. *Curr Pharmacogenomics Person Med* 2012; 10(1): 1-6.
- [8] Bragazzi NL. From P0 to P6 medicine, a model of highly participatory, narrative, interactive, and "augmented" medicine: some considerations on Salvatore Iaconesi's clinical story. *Patient Prefer Adherence* 2013; 7: 353-9.
- [9] Bragazzi NL. Children, adolescents, and young adults participatory medicine: involving them in the health care process as a strategy for facing the infertility issue. *Am J Bioeth* 2013; 13(3): 43-4.
- [10] Beall J. Predatory publishers are corrupting open access. *Nature* 2012; 489: 179.
- [11] Frank M. Open but not free—publishing in the 21st century. *N Engl J Med* 2013; 368(9): 787-9.
- [12] Haspelmath M. Why open-access publication should be nonprofit—a view from the field of theoretical language science. *Front Behav Neurosci* 2013; 7: 57.
- [13] Bragazzi NL. The importance of open access publishing in the field of linguistics for spreading scholarly knowledge and preserving languages diversity in the era of the economic financial crisis. *Front Behav Neurosci*. 2013; 7: 91.
- [14] Bayry J. Journals: Open-access boom in developing nations. *Nature* 2013; 497(7447): 40.
- [15] Ozdemir V, Borda-Rodriguez A, Dove ES, *et al.* Public health pharmacogenomics and the design principles for global public goods - moving genomics to responsible innovation. *Curr Pharmacogenomics Person Med* 2013; 11(1): 1-4.
- [16] Dove ES, Ozdemir V. 'Regular science' is inherently political. *EMBO Rep* 2013; 14(2): 113.
- [17] Reddy PJ, Jain R, Paik YK, *et al.* Personalized medicine in the age of pharmacoproteomics: a close up on India and need for social science engagement for responsible innovation in post-proteomic biology. *Curr Pharmacogenomics Person Med* 2011; 9(1): 67-75.
- [18] Kamal SM, Warnich L, Ferguson LR, *et al.* Forward look: tenth anniversary of the human genome sequence and 21 century postgenomics global health - a close up on Africa and women's health. *Curr Pharmacogenomics Person Med* 2011; 9(3): 148-55.
- [19] Ozdemir V, Rosenblatt DS, Warnich L, *et al.* Towards an ecology of collective innovation: human variome project (HVP), rare disease consortium for autosomal loci (RaDiCAL) and data-enabled life sciences alliance (DELSA). *Curr Pharmacogenomics Person Med* 2011; 9(4): 243-51.
- [20] Årdal C, Røttingen JA. Open source drug discovery in practice: a case study. *PLoS Negl Trop Dis* 2012; 6(9): e1827.
- [21] Moyes CL, Temperley WH, Henry AJ, *et al.* Providing open access data online to advance malaria research and control. *Malar J* 2013; 12: 161.
- [22] Trachana V. Austerity-led brain drain is killing Greek science. *Nature* 2013; 496(7445): 271.