

# Open access journal publishing in the Nordic countries

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## Abstract

The number of open access (OA) journals and their share of all scholarly journals are usually estimated based on indexing in the Directory of Open Access Journals (DOAJ). DOAJ's coverage of OA journals from different regions of the world is, however, far from complete, particularly of journals publishing in languages other than English. Using alternative data sources for identification and manual verification, 437 scholarly OA journals published in the five Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden) were identified, and some key characteristics were studied. Of these, only 184 were indexed in DOAJ. A vast majority of the journals was published by scholarly societies or universities. Social sciences and humanities dominated as topics, and few journals charge authors. National or university-specific OJS portals have played a major role in enabling OA publishing. Around a third of the Nordic scholarly journals are currently OA.

## INTRODUCTION

Much of the debate about the merits and disadvantages of open access (OA) journals has been focused on journals publishing in English and on journals that charge authors for publishing (so-called APCs). Such journals are typically either from major subscription publishers or credible start-up OA publishers like BMC or PLOS or from so-called predatory publishers that pretend to publish peer reviewed journals while only interested in collecting publishing charges. These latter journals have unfortunately, to some extent, tainted the reputation of serious OA journals. The size of OA publishing in the last few years for credibly peer reviewed journals has primarily been measured by the number of journals registered in the Directory of Open Access Journals (DOAJ). Journals from predatory publishers have been listed in controversial blacklists, first the now-ceased Beall's list (Beall, 2017) and currently Cabell's blacklist. DOAJ currently indexes some 12,000 journals and Cabell's Blacklist around 10,000 titles.

Even though the DOAJ has been an extremely useful resource, it still suffers from a structural bias towards journals

published by the bigger internationally operating publishers, as well as towards journals publishing in English. Behind the quite visible front of English-language OA journals with a global reach (i.e. *PLOS ONE*), there is, however, a varied landscape of OA journals published on a more regional basis, which usually are free for the authors to publish in. Many of these journals are established society or university journals with long histories, which have seized the opportunity of electronic publishing and OA to increase their impact. Such journals are particularly common in Latin America, where they are the mainstream for locally published scholarly journals (Packer, 2009), but they are also common in other countries where scholarly journals or the societies/universities publishing them tend to receive some public subsidies (for instance, Canada), thus not being overly dependent on APCs for funding OA publishing. Publishing articles on topics of local importance and/or in the local languages is, in such countries, seen as valuable mission for academics (Canadian Scholarly Publishing Working Group [CSPWG], 2017). Often, studies published in them would have difficulties in being accepted in international journals published by predominantly Anglo-Saxon publishers

### Key points

- A total of 437 open access (OA) Nordic journals were discovered in this study – approximately one-third of all scholarly journals published in the Nordic countries.
- Of the surveyed Nordic journals, only 42% are included in the Directory of Open Access Journals, and journals publishing in the local languages are poorly represented.
- A total of 39% of the Nordic journals surveyed were born OA; the rest had converted to OA at some point in time.
- The provision of non-profit portals, financial support from the government, and growing awareness of OA are helping to increase the number of OA journals in the Nordic countries

(Solovova, Santos, & Verissimo, 2018), and these channels offer alternative outlets. This is particularly important in the social sciences and humanities.

This article takes a closer look at one particular region of the world, the five Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden). Culturally, politically, and in terms of geography, the countries have much in common. They also have similar infrastructures of predominantly public funding for research and universities. It is also noteworthy that the Swedish, Norwegian, and Danish languages are so close that speakers of one of these three can relatively fluently read the others. Finnish and Icelandic scholars can also usually read literature written in these three languages. Authors from these countries produced 58,000 WoS-indexed articles in 2014, which was 4.5% of the global total (UNESCO, 2017). Although a large part of this publishing is currently in English and in international journals, there are, nevertheless, hundreds of locally published scholarly journals. For instance, 8% of the peer reviewed articles published by Finnish researchers are published in domestic scholarly journals (Ilva, 2018).

The creation of the DOAJ index was first discussed at a Nordic OA conference in 2002, and the website and personnel support of the index was, for the first decade, situated at the Lund University Library. For this reason, one would expect that awareness about the index and the benefits for local journals of applying for inclusion would have been particularly strong in these countries.

This study had three major research objectives: first, to comprehensively identify existing active OA journals in the Nordic countries, going beyond the journals currently indexed in DOAJ; second, to provide descriptive statistics of some key features of these journals; and third, to measure the proportion of all peer reviewed scholarly journals in these countries that are OA.

## LITERATURE REVIEW

There has been a steady succession of studies of OA journal publishing and its development during the past 15 years. A part of

these studies has focused exclusively on OA journals, while other studies have looked at the overall availability of the scholarly journal literature in both OA journals and as self-archived OA copies in web repositories. Most of the studies have relied on the DOAJ index for identifying OA journals, and automated studies have usually used either articles indexed in Web of Science (WoS) or Scopus as the basis.

The first reliable study of the number of OA journals was carried out by McVeigh (2004). She identified 239 OA journals among the approximately 9,000 titles indexed in the 2003 Journal Citation reports (a 2.6% share). Since then, the number of journals indexed in DOAJ has served as a proxy for the growth of the number of OA journals. Laakso and Björk (2012) backtracked from journals indexed in DOAJ in 2011 and found a steady progression in numbers from 744 in 2000 to 6,713 in 2011. During the same time period, the number of articles published in these journals had progressed from an estimated 20,000 to 340,000. In a later study, Crawford (2018) found that 10,293 DOAJ journals published 563,146 articles in 2017.

The first automated study using web crawling software was conducted by Hajjem, Harnad, and Gingras (2006). Later studies include those by Archambault *et al.* (2014) and Piwowar *et al.* (2018). The studies estimate the share of all articles indexed in WoS or Scopus that can be found openly accessible, either directly in OA, delayed OA, or hybrid OA journals, or as manuscript copies uploaded to subject or institutional repositories ('green OA'). In some studies, copies stored in academic social networks such as Research Gate are also included but not in others. These studies demonstrate a steady progression of OA availability from the 6 to 15% (depending on subject field, etc.) found for the years 1992–2003 by Hajjem *et al.* to the overall of 45% reported by Piwowar *et al.* (2018) for 2015.

In a nutshell, the studies based on DOAJ as the indicator of a journal being OA indicate a steady progression over the past 15 years in the share of Scopus or WoS journals that are OA. Based on the most recent studies, the current figure is around 17–18%. The share of articles that, in some legal form, is available OA, either the published version or a manuscript, is around 50% (Piwowar *et al.*, 2018).

In addition to the number of OA journals and articles in them, additional topics for studies have included the use of APCs to fund OA publishing and the proportion of journals that, from the start, have been OA ('born OA') versus subscription journals that have started to change to the electronic version of OA ('converted OA'). Morrison, Salhab, Calvé-Genest, and Horava (2015) reported that only 26% of the journals listed in DOAJ in 2014 charged authors for publishing, and these charged an average APC of 964 USD. Crawford (2018) reported a 30% share of APC-charging journals for 2017 but also that these journals published 56% of all articles. Solomon, Laakso, and Björk (2013), in a study of Scopus-indexed OA journals, found that, in biomedicine, 44% charged APCs, but in other sciences, it was only 24%.

Solomon *et al.* (2013) also found that 53% of the OA journals indexed in Scopus in 2011 had converted, and 47% were born OA. But in splitting up the data into two groups according to the

country of the publisher, they found a highly skewed distribution; 79% of the OA journals from globally dominating publishing countries (USA, UK, Netherlands, and Germany) were born OA, but this rate was only 32% for the rest of the world.

A number of studies of regional OA journals indicate that the rate of inclusion of all scholarly OA journals in DOAJ varies a lot. Björk (2017) found that only 18% of 6,509 scholarly journals hosted in 15 regional OA portals are indexed in DOAJ. The highest shares were for European (39%) and Latin American portals (29%), while the shares were notably low for journals published in Asia (3%). Navas (2016) found that 37% of the OA journals listed in the Spanish Dulcinea service were also in DOAJ. Suchá and Steinerev (2015) estimated that 51% of 612 Czech scholarly journals were OA. As only 78 of those were registered in DOAJ, that represents a 25% share of all OA Czech journals. A study by Shen (2017), in contrast, showed that only 1% of 595 Chinese-language journals included in the China Open Access Journals (COAJ) were included in DOAJ at the time of the study.

There have been no previous comprehensive studies about OA journals in the Nordic countries. Most of what has been reported has been in the form of case studies of individual journals or situation reports about the individual countries (Frantsvg, 2008; Hagerlid, 2011; Ilva & Lilja, 2014; Sivertsen & Larsen, 2012; Watson & Þorisson, 2013).

## METHODOLOGY

The primary initial data sources used for identifying candidate OA journals were:

- The Directory of Open Access Journals (DOAJ)
- ROAD: The Directory of Open Access Resources
- The Scopus index
- The Publication Forum journal list (JUFO, Finland)
- The Norwegian Register for Scientific Journals, Series and Publishers (NSD)
- Bibliometric Research Indicator list of series (BFI, Denmark)
- A list of potential OA journals provided by the Swedish Royal Library
- A web list of Icelandic OA journals (<http://openaccess.is/oa-icelandic-journals/>)

All data from the sources were extracted in October to November 2018. The data from DOAJ were downloaded as an Excel file (12,135 journals). The file was sorted according to the country of the publisher, and the data for journals from the Nordic countries were extracted (184 journals). The full dataset from the ROAD directory was provided by Nathalie Cornic from the ISSN International Centre. The Excel file contained data on 18,243 scholarly publication series that are OA. The file was sorted according to the country of the publisher, and the data for publications from the five Nordic countries were extracted (308 items). The ROAD directory also contains some monograph

and conference series and the rest, and these were filtered out, leaving 271 Nordic journals that meet the directory's OA criteria.

The free Scimago site was searched for information about journals indexed in Scopus. Scimago currently has data about 24,385 scholarly journals, of which 4,485 are OA. The criterion for a journal being tagged as OA is that it is indexed in either DOAJ or ROAD or both (Steinganga & Evans, 2015). The site offers possibilities of searching for only OA journals and to further filter down to only journals indexed by the WoS. Data for journals published in the five countries were retrieved separately and downloaded (58 journals). Of these 58 journals, 34 were also indexed in WoS. It should be noted that OA journals in WoS are not a direct subset of the ones in Scopus, so there could be some OA journals in WoS in addition to these 34.

First, the data about OA journals from the DOAJ and ROAD databases were merged and sorted alphabetically according to the journal title, and duplicates were removed. In addition to these global indexes, several national lists of peer review journals provide a very useful basis for identifying candidate journals. In three of the Scandinavian countries (Norway, Denmark, and Finland), the ministries of education have produced extensive lists of scholarly journals, which are counted in the detailed measurements of the publishing output of different universities (Sivertsen, 2016). These measurements are part of algorithms for awarding funding to different universities. The lists include more than 20,000 peer reviewed journals, chosen by panels of academics from different disciplines, and all viable national journals are also included, usually on the lowest quality level (Pölonen, 2015).

All journals of a sufficiently high-quality ranking from the above JUFO, NSD, and BFI lists were included in the initial list of candidate journals, as well as journals in the list provided by the Swedish Royal Library and journals in the Icelandic list. In addition, the Nordic Open Journal Systems (OJS) servers mentioned in a study from 2015 (Thestrup, 2016), as well as other servers found in the course of the study, were checked for potentially more journals. A list of Icelandic OA journals posted on the web could directly be used to identify journals.

All other candidate journals except the DOAJ-registered ones were manually investigated through their websites to see if they fulfilled a number of criteria (the assumption was that DOAJ nowadays applies quite strict conditions for inclusion). A journal was viewed as OA if explicit statements to that effect were found on the home pages but also if the latest articles *de facto* were freely accessible even without such a mention. The journal was considered OA as long as a reader had access to the full content (Free OA), and explicit licensing, such as Creative Commons (Libre OA), was not required. Journals that publish a mix of professional and peer reviewed research articles were included provided that the articles were free to read. One problem is that most indexes and lists bundle peer reviewed serials and journals together. The decision was to also view peer reviewed 'yearbooks', which are openly available on the net as OA journals. Such yearbooks are quite common in the social sciences and humanities.

The following were reasons for disqualifying candidate OA journals:

- Website could not be found
- Registration was needed to view full content
- No papers had been published in either 2018 or 2017
- Delayed OA
- Hybrid OA
- Authors only from the publishing organization
- Only publishing student papers
- A serial for working papers or preprints
- Professional journal with no peer reviewed articles

In compiling the lists, several mistakes were also found, for instance, the publishing country had changed from one Nordic country to another. In the indexes, some journals are listed as being published in one of the Nordic countries but are, in fact, currently published in other countries. Thus, several journals 'migrated' when the Swedish commercial OA publisher Co-Action was acquired in 2016 by the big international publisher Taylor & Francis.

Pan-Nordic journals were also of interest. Such journals are often published by Nordic scholarly societies and have names starting in: 'Nordic', 'Scandinavian', 'Nordisk', or 'Scandinavisk'. Journals with names starting with any of these four words were extracted from Scopus, as well as the three Nordic quality registers. Overall, 181 journals were found (subscription or OA), and 39 of these are published by major international commercial publishers outside of the Nordic countries. It is quite common nowadays that society publishers in different countries outsource their publishing operations to the big commercial publishers. Typically, the scientific control of the journals is nevertheless handled by Scandinavian editors and editorial boards.

## RESULTS

### Number of Nordic OA journals

Overall, 437 Nordic OA journals could be identified. The distribution across countries and the numbers included in the above

**TABLE 1** Number of OA journals in the Nordic countries.

	This study	ROAD	DOAJ	Scopus	WoS
Denmark	76	61	27	7	5
Finland	106	49	24	12	10
Iceland	15	5	6	2	2
Norway	128	53	88	16	5
Sweden	112	103	39	20	12
Sum Nordic	437	271	184	58	34
Nordic OA journals published by international publishers	7	3	6	3	4
All world countries		15,857	12,135	4,485	2,786

The WoS column contains the subset of WoS OA journals, which are also included in Scopus.

indexes are shown in Table 1. The 'Pan-Nordic' journals published by commercial publishers outside the Nordic countries are listed in a separate row and are not included in the totals. Note in particular that several of the 271 candidate journals listed in ROAD were, on closer manual inspection, discarded for not meeting all the criteria. The table 1 below nevertheless contains the numbers that ROAD considers OA journals, and all of these are thus not included in this study's final results. The DOAJ-, Scopus-, and WoS-indexed journals are, on the other hand, all subsets of the study's list of 437 journals. In addition, DOAJ is not a direct subset of ROAD, and there are thus DOAJ journals that are not found in ROAD and vice versa. In addition, seven OA journals published by the big international publishers but with a clear Nordic identity were identified.

These numbers are lower bounds for the current situation. There could be more journals that were not found with these methods. The situation is also rapidly changing; some journals could be ceasing to publish, but other journals could be converting to OA. Nevertheless, this author believes the big picture is correct.

### Publisher type

The biggest group (53% of journals) consists of journals where the publishing organization, according to DOAJ or the journal's website, is a full university, a university department, or the university press of the university in question. Journals published by government institutes, foundations and the rest have also been included in this category. The second group consists of journals published by a scholarly society, irrespective of whether the journal is technically published on the society's website, on a non-commercial portal, or by a commercial publisher (39%). Purely commercial journals were very rare (4%). A few journals (4%), apparently managed by independent academics and not directly linked to universities or societies, could also be found on the non-profit portals or on sites of their own.

### Location of the journal websites

Manual checking of the journal websites soon demonstrated how dominating OJS (Edgar & Willinsky, 2010) is as the software used

for publishing. Because a few journal publishers (usually scholarly societies or university departments) have the expertise and resources to set up OJS servers themselves, they have eagerly seized on the possibility to use the few centralized portals available. These and the journals hosted by them could be identified in a cascading way. The portals studied in 2015 by Thestrup (2016) provided a basis. In addition, the lists of DOAJ- and ROAD-indexed journals were also sorted by the web address of the journals to see if additional portals could be identified by multiple journals with similar addresses. After this, the journal lists on the portals themselves were studied, and a few additional OA journals were found. In Denmark, the Royal Library offers a portal for journals (30), and in Finland, the Federation of Finnish Learned Societies offers a similar portal with national reach (30). In Norway, the privately owned Universitetsforlaget has a popular OA portal called Idunn (27). In addition, many of the leading universities have established portals of their own.

Table 2 shows the portals that hosted five or more journals.

Including the portals hosting 2–4 OA journals, the total count is 220, which means that half of the Nordic journals are hosted on such sites. No dominant Pan-Nordic portal along the lines of Latin American ScieLo has emerged, but around 20 of these

portals have helped significantly in the publishing of electronic OA versions of old printed journals or in the establishment of new born-OA journals.

## Subjects covered

The journals were classified into four categories using a very broad classification (based on a classification used in the Norwegian NSD journal list); 13.7% were in the Natural Sciences and Technology, 9.7% in Medicine and Health, 43.1% in the Social Sciences, and 33.5% in the Humanities. There are a few rather broad-scope journals (*Danish Medical Journal*, *Historisk Tidsskrift för Finland*, *Historical Journal, Finland*), but numerous journals with extremely narrow scope (*Nordic Wittgenstein Review*, *Futhark: International Journal of Runic Studies*). Many journals contain articles on very local or Nordic phenomena (*Gränslös: tidskrift för studier av Öresundsregionens historia, kultur och samhällsliv*, *Borderless: Journal for Studies of the History, Culture and Society of the Öresund Region*), while others offer platforms for studies of global interest (*Game studies: the International Journal of Computer Game Studies*).

## Publication language

The journals in medicine or the natural sciences predominantly publish in English only, but in the other subject areas, the language used varies. Some journals publish only in the local languages, and some accept articles both in the Nordic languages and English. Often, English abstracts are added for non-English articles. A scan of the journal names of all the 437 journals identified in this study showed that 54% of the journals had English titles, and 46% titles were in one of the Nordic languages.

For the 184 DOAJ journals, it was possible to study the publishing language self-reported to the index by the journals. Many journals report several Nordic languages and, in the case of Norwegian journals, even the two official languages of the country (Bokmål and Nynorsk). The full-text language allowed in each journal was classified into three exclusive groups: English only (77), local language or a range of Nordic languages with English as an option (68), and local languages only (39). The language meta-data in, for instance, DOAJ is, however, not very reliable, and finding out the exact situation would require browsing through the latest volumes of all the journals in order to see which languages *de facto* are used most in the journals that offer English as an option.

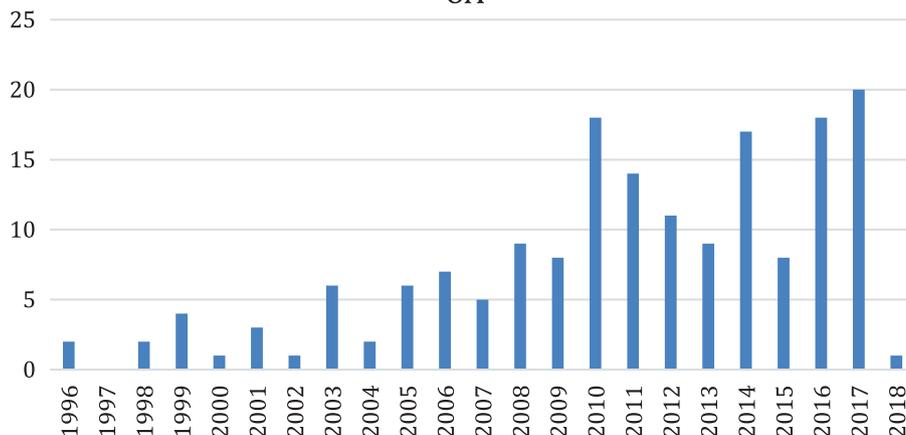
## Start year of OA publishing

It is difficult to find when the journals started offering OA to their content by just looking at their websites as many journals have retroactively posted back-file issues. DOAJ contains data about the 'First calendar year journal provided on-line Open Access content'. For journals that have reported a year prior to 1993, the information provided is likely to be about the founding year of the journal, and 12 journals were excluded from the analysis.

**TABLE 2** Nordic portals with at least five OA journals.

Country	Host	Journals
Denmark	Royal Library (Tidskrift.dk)	30
	Aalborg University	7
	Copenhagen Business School	7
Finland	Federation of Finnish Learned Societies (Journal.fi)	30
	Jyväskylä University	6
	Åbo Academy University	5
Iceland	University of Iceland	6
Norway	Universitetsforlaget (Idunn)	27
	University of Oslo	11
	Oslo Metropolitan University	7
	Norwegian University of Science and Technology	7
	Bergen University	5
	Tromsø University	5
	Novus forlag	5
Sweden	Cappelen Damm Akademisk	5
	Lund University	18
	Linköping University	9
	Stockholm University	6
	Gothenburg University	5
	Portals with 2–4 journals	24
	All portals	220

## Year Nordic DOAJ-journals started providing OA



**FIGURE 1** Start year of providing OA for 172 Nordic DOAJ-registered journals.

The OA launch year for 172 DOAJ-indexed journals is shown in Fig. 1. The median was 2011.

### Born OA or converted?

A related question is whether journals were electronic OA journals from the start (Born OA) or subscription journals that started to offer an electronic OA version, usually in parallel to the printed version (converted OA journal). Finding this out from the journal web pages, editorials, and the rest is quite cumbersome. In a separate ongoing study of OA journals indexed in Scopus (by Mikael Laakso and Bo-Christer Björk, Hanken School of Economics), it was found that, of the Nordic journals in the index, 61% were converted, and 39% Born OA.

### How many journals charge APCs?

DOAJ meta-data was used to search for journals charging authors. Only 19 journals were found to use APCs. The amounts were quite evenly spread in the range 300–1,950 Euros, with a median of 1,000. Eleven of these journals were on medicine or biology, and 10 journals are published by commercial publishers. Some of the journals used waivers; thus, for instance, the Norwegian journal *Prismet* asks for an APC of 7,000 Norwegian Crowns (=728 Euros) but only if the author has access to institutional funds to pay it.

### Share of scholarly journals that are OA

Researchers have, in the past, found it somewhat difficult to measure the share of journals that are OA. This has mainly been because of the underrepresentation of OA journals in the major indexing services, such as Scopus and particularly in WoS. While the DOAJ has offered a reasonable way of measuring overall numbers of, in particular, English-language scholarly journals, there has been no similar index of journals in general, also including subscription ones, to compare with.

So far, the best available approximations have used Scopus as a basis, for instance, comparing the numbers of DOAJ journals found in Scopus to the total number. Currently, Scopus tags any journal that is registered either in DOAJ or ROAD as OA, and the Scimago database can be used for extracting and sorting the information. The OA share for all Scopus journals was 18%. For the five Nordic countries, the shares ranged between Denmark's 20% and Iceland's 67%, with an overall average counted over all Nordic journals of 35%. Looking at other major countries, the countries with big English-language publishing industries (US, UK, Germany, and Netherlands) had low shares in the range of 7–13%. At the other extreme end was Brazil with 82%, clearly an influence of the popular ScieLo portal. Many non-English-speaking countries had shares in the range of 30–50% (Spain, Austria, and Poland), and the Nordic countries would seem to belong to this category. China (9%) and Japan (12%) had surprisingly low figures.

In addition to Scopus, the OA shares can also be counted for all journals indexed in WoS and for journals included in Ullrich's directory of serials. It is possible to search for explicitly OA journals in Ullrich's directory. Thus, a search for Nordic active academic journals using peer review yielded 569 journals, of which 161 were classified as OA (an average of 28.3%).

For this particular study, the Finnish and Norwegian national lists provide a particularly reliable basis for studying the OA share as the included journals in these two lists could be sorted according to the country of publication so that the lowest quality tier, containing many non-peer reviewed journals, could be excluded. In the case of Finland, the number of national journals on a sufficient quality level (1–3) in the JUFO list was 334, which can be compared to a total of only 49 Finnish Scopus-indexed journals. Thus, a good measurement of the OA penetration in Finland could be produced by checking which of those 334 journals are OA. The result was 97 journals resulting in an OA share of 30%. For Norway, the result was 132 of 286, equalling a 46% OA share. For the other three countries, such calculations could not be made. The calculations for Finland and Norway using this method were nevertheless reasonably in line with the Scopus and Ullrich's directory-based calculations.

**TABLE 3** Share of OA journals of all peer reviewed journals.

	WoS	Scopus	Ullrich's	National lists
Denmark	38.5	20.0	14.2	
Finland	55.6	24.5	16.7	29.9 (JUFO)
Iceland	66.7	66.7	66.7	
Norway	55.6	53.3	45.2	46.0 (NSD)
Sweden	60.0	44.4	29.3	
All Nordic journals	54.0	35.2	28.3	

Table 3 shows the OA percentages calculated using different methods.

The overall OA share of the 181 Pan-Nordic journals with titles like 'Nordic journal of...' was 27%, but this was skewed so that only 18% of the journals published by the international publishers were OA, whereas 32% of the journals published in one of the Nordic countries were currently OA.

## SOME JOURNAL EXAMPLES

In order to provide a bit more insight into what kind of journals these OA journals are, five example journals, one per country, are briefly presented below. The journals were selected to represent different subject areas, both converted and born-OA journals and journals publishing in both English and the Nordic languages.

*Danish Medical Journal*, founded in 1954, is an example of an old established journal that has converted to OA. It publishes monthly issues and is indexed in the WoS. Publishing in the journal is free if one of the authors is a member of the Danish medical association; otherwise, an APC of 1,000 Euros is charged.

*Elore* is the oldest OA journal in Finland and has been published electronically and openly from the start in 1994. It publishes articles about folklore in the two national languages Finnish and Swedish and also publishes types of content other than just peer reviewed research articles. The journal has been receiving financial support from the Ministry of Education since 2006, which has ensured its longevity. In 2018, the journal has started using the Journal.fi portal.

*Íslenska þjóðfélagið (Icelandic Society)* publishes studies on Icelandic society from a sociological viewpoint. The journal was launched by the Sociological Association of Iceland in 2010 and is published using OJS. The articles are predominantly in Icelandic, although submissions in English are also accepted.

*Norsk lingvistisk tidsskrift (Norwegian Linguistic Journal)* is a journal established in 1983 and published by the leading academic publisher Novus forlag. The journal was added to DOAJ in 2018, but the archive of old articles suggests that the conversion to OA took place earlier.

*Nordic Journal of Studies in Educational Policy* was established by a research group from several Swedish Universities in 2002 under the title *Studies in Educational Policy and Educational*

*Philosophy* and was published as one of the early electronic OA journals until 2008. In the first years, most of the articles were in the Nordic languages. In 2013, researchers in the area decided to revive the journal in partnership with Co-Action, a Swedish start-up OA publisher, and to rename it using the current 'Nordic' name. Taylor & Francis acquired Co-action and integrated the journals with its own portfolio in 2016. The journal does not charge authors APCs due to financial support from the University of Gävle. Nowadays, all articles are in English.

## Nordic predatory journals

There are also a few examples of predatory publishers to be found in the Nordic countries. Currently, Cabell's blacklist includes 11 predatory journals published by three publishers. Swedish Scientific Publishers has a portfolio of eight journals, and the Finnish-registered WFL Publisher publishes *the Journal of Food, Agriculture and Environment*. Linköping University in Sweden has initiated investigations about the ethical conduct of the owner and editor of the two journals of Linköping-based VBRI press (Falklöf, 2017). There is also the strange case of a reputable WoS-indexed Icelandic journal (*Jökull - Icelandic Journal of Earth Sciences*) having been 'hijacked' by a fraudulent predatory publisher using the same journal name but with a slightly different web address (Tin *et al.*, 2014). Fortunately, such predatory journals have nowadays been purged from DOAJ via stricter quality control (Marchitelli, Galimberti, Bollini, & Mitchell, 2017), and are they not included in the national lists of quality-assured journals mentioned earlier in this article.

## DISCUSSION

The results show that, although DOAJ provides very useful information about the OA journals published in the five Nordic countries, only 42% of the total number found in this study are included in the index. There may be a number of reasons for this, for instance, that many journals have only recently converted to OA, that editors have found the application procedure cumbersome, or that they have felt that indexing has not been important. Lack of knowledge about DOAJ may be another explanation: the editors are usually subject specialists, with limited knowledge of the OA terminology and services. ROAD indexes more items, but closer scrutiny demonstrated that many of those are conference series, institution-specific publications, professional journals and the rest, which do not really qualify.

It is, of course, difficult to generalize these results to other parts of the world, but it is likely that the number of scholarly OA journals is much greater than the current approximately 12,300 indexed in DOAJ. Estimates of the global number of articles published in OA journals, which use DOAJ as a basis, are likely to be much closer to the real situation as the journals not indexed (at least in this Nordic study) are mostly journals publishing few articles *per annum*, in many cases just one issue per year.

There are a number of factors that have supported journals in their conversion to OA or the founding of new OA journals. First, the availability of free open-source software for the technical publication of the journals has been very important. In contrast to the early years of OA journals, hardly any journals develop publishing systems or even set up their own websites any more. For journals from the Nordic countries, the choice today is essentially between using OJS on your own, joining a portal using OJS, or outsourcing the publishing to a commercial publisher. Strong portals run by national libraries and scholarly society federations, or alternatively by universities, have emerged in the last few years. An additional benefit of such strong portals is that it is easier to ensure the long-term preservation of the articles, for instance, in cooperation with the national libraries.

Second, increasingly strong university or funder mandates to make journal articles available as OA, either in gold or hybrid journals or via green manuscript copies, have had an effect on the general awareness about OA and its benefits.

Third, the way ministries of education and other governmental agencies in many countries financially support scholarly journals are changing. In the past, such funding schemes have often been tied to a journal having explicit monetary revenue and limiting grants to a maximum percentage of that revenue. That has put OA journals that do not charge the authors and mostly operate with in-kind budgets in a disadvantaged situation compared to subscription journals or OA journals charging APCs. This has, for instance, been the situation in Finland. Currently, there are ongoing discussions in Finland about setting up a consortial funding model including the universities and other research organizations where the authors come from to replace traditional subscription income. This would help in converting journals to OA and also in securing the monetary income to match government grants (Ilva, 2018).

A different type of funding, which could be termed 'business model neutral', has been used in Canada for a number of years. In that scheme, the aid to scholarly journals in the social sciences and humanities has been a fixed maximum sum per article published, irrespective of the costs or revenues of the journal. This has meant that the grants support the management of the peer review and copy editing of articles, not activities like printing and distribution of paper copies. The rules are currently being changed to require either full OA or at least OA with a delay of not more than 12 months (Social Sciences and Humanities Research Council [SSHRC], 2018). An interesting detail is that journals which publish on national non-profit OA portals hosting at least 20 journals can receive additional support for the costs this entails.

The Research Council of Norway, which finances the publication of 40 journals in the social sciences and humanities, has also started to make OA a direct requirement for the journals to be qualified for support after a 3-year transition period (Lund & Lie, 2014). As the council covers up to 50% of the operating costs of the journals, this could be a possible factor explaining the high number of OA journals, particularly the DOAJ-indexed one, found for Norway in this study.

## CONCLUSIONS

The overall conclusion of this study is that around a third of the scholarly journals published in the Nordic countries are currently OA. Due to national policies as well as OA initiatives like Plan S (Else, 2018), in which the Nordic countries are strongly engaged, the share is likely to grow rapidly in the near future, particularly in the social sciences and humanities.

It is clear that measures to support OA publishing and conversion of existing journals to OA need to be adapted to the situation in each country. For instance, in Korea, scholarly journals (also subscription ones) have traditionally charged authors publishing fees (Joung & Rowley, 2017), and thus, requiring APCs in OA journals should not be considered a problem. The role of local commercial publishers has also been stronger than in the Nordic countries. In Canada, scholarly journals have already, for a longer time, had regular financial support from a number of public sources, and the context is closer to the Nordic countries (CSPWG, 2017).

This study just scratches the surface in painting a picture of OA publishing in a non-English language region of the world. Obviously, carrying out similar studies in other regions of the world would, in combination with the results from this study, provide more generalizable results. There would also be several opportunities for follow-up research concerning the Nordic countries. Crawford (2018) has reported the article numbers for DOAJ-indexed journals on a country level. Using his figures, 151 Nordic journals published 3,867 articles in 2017, an average of 25 per journal and year. It would be possible but labour intensive to extend such an analysis to all 437 journals. An interesting direction would also be to study the views and motivations of the editors of the journals using surveys and interviews.

The DOAJ, published by a non-profit organization and relying, to a large extent, on voluntary work, has become a very valuable resource for academics and librarians around the world. This is particularly so after the DOAJ tightened its inclusions criteria and has been able to exclude journals from so-called predatory publishers. Nevertheless, this study has highlighted the fact that its coverage of OA journals from different regions of the world and journals published in other languages than English is far from complete.

## ACKNOWLEDGEMENTS

The following persons provided help with the data collection: Nathalie Cornic, ISSN centre; Jonas Nordin, Royal Swedish Library; Jesper Boserup Thestrup, Royal Danish Library; Sigurgeir Finnsson, National and University Library of Iceland; and Thor Hovden, Norwegian Centre for Research Data.

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