Science and Public Policy, 2020, 1–15
doi: 10.1093/scipol/scaa044
Article

OXFORD

Threat of policy alienation: Exploring the implementation of Open Science policy in research practice

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Abstract

Many European countries have introduced Open Science (OS) policies to improve the quality and efficiency of science and to increase economic and societal growth. Researchers' perceptions and experiences of OS policies remain relatively under-investigated. This explorative study applies the policy alienation perspective to understand researchers' perceptions of OS policy implementation. Analysis of survey responses indicates that researchers have difficulties in coping with OS policy and that they feel policy alienation from OS policy. Hence, researchers may be less willing to try to support OS policy implementation despite the fact that OS policies are motivated by the desire to enhance the excellence and quality of research. The findings address how the incentive problems lie not only in the research evaluation and academic credit systems but also in the policy–practice divide. These problems need to be solved in terms of participation in policymaking and in the knowledge production of 'openness' itself.

Key words: Open Science; policy alienation; research policy; science policy; open access; principal–agent theory

1. Introduction

The Open Science (OS) movement has emerged as a champion of scientific progress and emphasised the ability to foster transparency, equality, and innovation (Levin and Leonelli 2017). In Europe, for example, OS is currently being promoted by the European Commission, Member State governments, European research funders, various research organisations, and learned societies. At the same time, when OS picks up momentum amongst policymakers and openness is seen as something that needs to be systematically promoted, the assumptions and values embedded in OS policies remain unclear.

Science has been based on open knowledge production and sharing of research findings for many centuries (Merton 1973; Dasgupta and David 1994; David 2008). OS today is based on the idea that scientific knowledge, which is shared and developed through collaborative networks, should be transparent and accessible (Vicente-Saez and Martinez-Fuentes 2018). OS policies—understood as the justification, management, prioritization, and funding of basic scientific research based on the advancement of OS—define some research outputs and practices more valuable than others and carry assumptions about what, who, when, and how openness should occur (Whyte and Pryor 2011). Whereas OS seems to encompass almost any discussions about the future of scientific knowledge production and scholarly communication (Fecher and Friesike 2013), OS policies aim at free accessibility of research outputs, increased transparency and participation in knowledge production, and resulting in efficient, higher quality science, and economic and societal growth.

However, as Mirowski (2018) points out, it is not always clear 'what sort of thing [it is] that Open Science proposes to fix about older science'. Mirowski's critical reading refers to the broad and abstract notion of OS: he links it to the ethos of 'radically collaborative science' and to the emergent structures of 'platform capitalism' rather than to an actual structural break in the nature of modern science and transformations of scientific practice at the micro level (Mirowski 2018). The idea behind this critique is the question of whether OS can be seen as an epochal break which 'should be visible, in some way, down at the microlevel of practice' (Mody 2011). The current emphasis of OS policies on infrastructure, on the other hand, suggests that these policies are adopting techno-utopian ideals reminiscent of the modernisation paradigms that posit a singular universal road to development (Albornoz et al. 2018).

Researchers' decisions related to openness are influenced by everyday institutional, policy, and technical issues, which not only provide opportunities (Levin et al. 2016) but also create unintended consequences for the growing enthusiasm for and plethora of OS initiatives have created fragmentation, confusion and complexity

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around policies (Chataway et al. 2017). In research practice, openness is inherently positional and relational and it comes in degrees and varieties of disclosure, dissemination, sharing, and reuse (Levin and Leonelli 2017). There is no consensus on OS, so researchers are often unsure about how to practice it (Borgman 2012; Wallis et al. 2013; Ferguson 2014; Grand et al. 2016). Not only do policies have various different terms and requirements for researchers (Corrall and Pinfield 2014), different organisations also have different infrastructures (e.g. repositories), and different scholarly communities have their own goals and commitments (Levin et al. 2016). Also, individual motivations (e.g. career benefits) have a significant effect, for example, on researchers' data sharing behaviours (Kim and Stanton 2016). Friesike et al. (2015), however, point out that current OS policies lack clear incentives at the individual level because only the system-level advantages are clearly communicated and the fragmented scientific contributions far from presenting a holistic picture of OS.

The findings of Lasthiotakis et al. (2015) on the evolving OS policy emphasise the obvious uncertainty of the success of OS policies. To deliver the goods of OS policies, OS should also be tangible at the micro level of everyday research practice. There is a growing amount of scholarly literature on OS analysed as micro-level practices. Despite this, researchers' experiences with OS policy implementation are still under-investigated. Therefore, the aim of this study is to focus on analysing these perceptions and experiences.

According to Levin and Leonelli (2017), researchers experience the 'dilemma of openness' when they need to interpret OS policies in a variety of different ways. These are also the sites where researchers perceive OS policies as fruitful, pointless, or threatening depending on their circumstances (Levin and Leonelli 2017). Studying the experiences and perceptions of researchers is important because there is a risk of creating disengagement and anomie (Merton 1963; Hackett 2005) and feelings of ambivalence if researchers view OS policies as risky and unrewarding (Levin and Leonelli 2017).

This study is explorative since it builds on the well-established principal–agent theory (PAT), but it is complementary as it uses a developing theory. By applying the policy alienation perspective, it is possible to deepen the understanding of the researchers' experiences with and perceptions about OS policy implementation. In this article, the following questions are answered: what kinds of conflicts and difficulties do researchers experience in coping with OS policies? How do these difficulties intertwine with feelings of policy alienation? The study is restricted to the governance of OS in Finland, one of the first countries to start investing in it in a highly coordinated manner (Forsström et al. 2019).

The structure of this article is as follows: in Section 2, I will briefly explicate the theoretical framework of this study. I continue by describing OS as the Finnish government's policy goal and the background for analysing researchers' perceptions in Section 3. In Section 4, I present the methodology of the study. In Section 5, I discuss the perceptions and experiences of researchers on the conflicts and difficulties in coping with OS policies. These difficulties are interpreted using the policy alienation perspective in Section 6. Finally, in Section 7, I answer the research questions and reflect on the implications of my findings for theory and practice.

2. Theoretical framework

Numerous ethnographic laboratory studies show the high degree of autonomy researchers have and that outside influences have to be processed by researchers (Knorr-Cetina 1981; Latour and Woolgar 1986[1979]; Fujimura 1987). Research also depends on the conditions constructed by governance and the opportunities of researchers to change the directions of their research or research practices are thus limited. According to Gläser and Laudel (2016), the orienting influence of material and intellectual resources accumulated in prior research makes radical change difficult and thus more unlikely but not impossible. Previous studies have recognised the role of research governance in promoting OS (David 2004; David and Spence 2008; Fry et al. 2009; Lasthiotakis et al. 2015; Levin and Leonelli 2017), and that researchers are able to cope with new science policies, such as 'new managerialism' or 'valorization' policies, by selectively complying or not complying (Morris 2002; De Jong et al. 2016).

Since the practical problems researchers face with openness are embedded in institutional settings, organisational conditions, and science governance, in this study, the PAT is used as a theoretical framework. However, as De Jong et al. (2016) have found, researchers may also struggle and not be able to cope—even symbolically—when the perception of the policies does not reflect their actual content. They suggest that, in addition to compliance, coping and negotiation, there seems to be another option: (policy) alienation (De Jong et al. 2016). The concept of policy alienation developed within public administration studies is used in the secondary analysis to complement PAT.

2.1 PAT

The PAT focuses on analysing a specific social relationship or delegation in which two actors exchange resources: government delegates the task of research to science and science receives financial support in exchange (Braun and Guston 2003). As Kivistö (2007) explicates, the relationship between government and science contains three elements: (1) tasks delegated to science by government, (2) resources allocated to science for accomplishing the tasks, and (3) government interest in governing the accomplishment of the delegated task. Governance in PAT refers to the government's purposeful efforts to guide, steer, control, or manage science before, during, or after the task is accomplished (Kooiman 1993; Kivistö 2007).

Information asymmetry is at the core of PAT, and it refers to the difficulties faced by the principal in its aim to control the agent. Because scientists may behave in an undesirable manner, deliver poor quality, or choose not to deliver at all (Guston 1996), the government must develop strategies to maximise the outcome (Van der Meulen 1998) by monitoring systems. However, since the general nature of research outputs is immeasurable to a large extent, the specialised nature of research work creates uncertainties, and because the tasks of research are not programmable, governance is likely to result in goal conflicts between government and research, which could create serious incentive problems (Kivistö 2007).

Goal conflicts refer to the extent to which the interests of the principal and the agent conflict with each other, and the conflicts grow primarily from the differences between cultural and utilitarian conceptions. If there are no goal conflicts, the agent will behave as the principal would like, regardless of the control imposed on the agent. As goal conflicts increase, the potential of agents fully pursuing their own goals by shirking or defecting also increases (Kivistö 2007). Leisyte (2007) describes the strategic options of the agent as compliance and symbolic compliance. Researchers also have the option to renegotiate and change the demands and the contract on

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which the government–science relationship is based (Guston 1996; Van der Meulen 1998; Leisyte 2007).

Intermediaries also play a significant role in PAT, and that is to ensure a balance between the goals of the government and the researchers (Van der Meulen 1998; Guston 2000). Research councils (Caswill 2003; Van der Meulen 2003), research assessment systems (Barker 2007), research programmes (Shove 2003; Wardenaar et al. 2014), and university departments (Morris 2002) are examples of intermediary organisations who translate government policies into academic practice, thus having a role in training and selecting researchers as well as in monitoring their research activities (Morris 2002; De Jong et al. 2016). These organisations are also accountable to the government for their actions and are obligated to demonstrate that operational expectations are being met (Trow 1996).

2.2 Policy alienation

Tummers et al. (2009) were the first to conceptualise policy alienation, which they define as 'a general cognitive state of psychological disconnection from the policy programme being implemented' (Tummers et al. 2012). Their concept originates from the alienation tradition, which has a long history in the sociology of work and organisation (Tummers 2012). However, it differs from the concept of work alienation in three key aspects: alienation is approached from the perspective of the policy being implemented rather than from the job to be done; it focuses on the public sector instead of the private sector; and it considers professionals, not manual workers (Tummers et al. 2009).

According to Tummers (2012), policy alienation looks at public professionals' experiences with policy. When professionals implement policy, many trade-offs occur, and they need to deal with professional norms and standards. In these situations, professionals might feel alienated from a policy if they do not find it beneficial. If professionals experience high policy alienation, they are less willing to make efforts to support policy implementation (Tummers 2012).

Policy powerlessness and policy meaninglessness are dimensions of policy alienation. Powerlessness refers to the degree of strategic, tactical, or operational influence that professionals have over shaping policy. In this study, powerlessness is analysed in the strategic and operational dimensions. Strategic powerlessness is the perceived influence of professionals on decisions concerning the content of a policy, and it can occur, for example, when a new policy is drafted without consulting professionals. Operational powerlessness, in turn, is related to the influence of professionals during the actual policy implementation, and it looks at the perceived influence one has while implementing the policy (Tummers 2012; Tummers et al. 2012). This type of powerlessness is typical, particularly amongst professionals whose expectations of autonomy contradict with bureaucratic control (Freidson 2001).

Policy meaninglessness includes two distinguishable types. On a societal level, meaninglessness refers to the perception of professionals concerning the added value of the policy to socially relevant goals. Meaninglessness can also reflect the perception of the value added for their own clients. On both levels, meaninglessness refers to a sense of understanding of the policy being engaged. If the goals of a new policy are perceived to be very meaningless, professionals are more likely to have a negative attitude towards policy implementation (Tummers 2012). In this study, meaninglessness is analysed from the perspective of not only societally but also scientifically relevant goals.

The policy alienation framework used in this study is drawn from Tummers (2012) and is shown in Fig. 1.

3. OS governance in Finland

In Finland, the Ministry of Education and Culture (MEC) is identified as the principal of OS governance. OS was introduced comprehensively in Finnish research policy, when the MEC initiated an Open Science and Research Initiative (ATT) in 2014, although the MEC had promoted the openness of research datasets already from 2011. The ATT aimed at promoting open scholarship and accessibility of knowledge based on the co-operation of many actors in order to make scholarship, science and research more reliable, to support the endorsement of open research practices and to increase the social impact of research by improving the management and use of scientific knowledge production. The main objective was to make Finland the leading country for openness in science and research by 2017. The government's vision was described as follows:

> Open research leads to surprising discoveries and creative insights. Research data and materials move freely throughout society: from one researcher or research group to another, between disciplines, to innovative businesses, and to decision-makers and citizens. Information flow is facilitated by clear policies and best practices, and by providing services to safeguard the availability of scientific and research results. ... Openness has given Finnish research an international competitive edge. (MEC 2014)

According to the MEC, it was essential to have parallel principles throughout the research and innovation system. Finnish research organisations were urged to introduce and mobilise a policy of openness in routine activities. Therefore, they agreed to develop their own OS policies and promote OS in performance agreements. Research-performing organisations (universities and state research institutes) are thus agents in relation to the government but also intermediaries in relation to researchers (agents).

OS governance in Finland also involves other intermediary organisations that exercise control on behalf of the MEC. The biggest national research funder, the Academy of Finland (AoF), funded by the MEC, acts as an intermediary in relation to researcher–agents. I also identify two academic associations as key intermediary organisations. Universities Finland (Unifi) is a co-operational organisation for Finnish universities that aims to influence the Finnish higher education and research policy. With special funding granted by the MEC, Unifi produced an OS and Data Operational Programme, which was published in May 2018. The programme recommended that national coordination of OS should be addressed to the Federation of Finnish Learned Societies (FFLS), another significant intermediary.

Accordingly, in 2019, the FFLS established a national coordination model based on the collaboration between a steering group, expert panels, and working groups. As expressed by the FFLS, the national coordination is supposed to be 'a joint effort of the entire research community in a heretofore unseen manner' and based on a strong collaboration between all members of the research community. The national coordination, with its aim 'to promote national dialogue on the objectives and means of open scholarship, to increase cooperation and to raise awareness of the opportunities, challenges and solutions of open scholarship', is supported with MEC funding (Avoin tiede 2019).

In the Open Science and Research (OSR) Roadmap 2014–7, OS was defined as 'a new kind of openness' that is enabled by the

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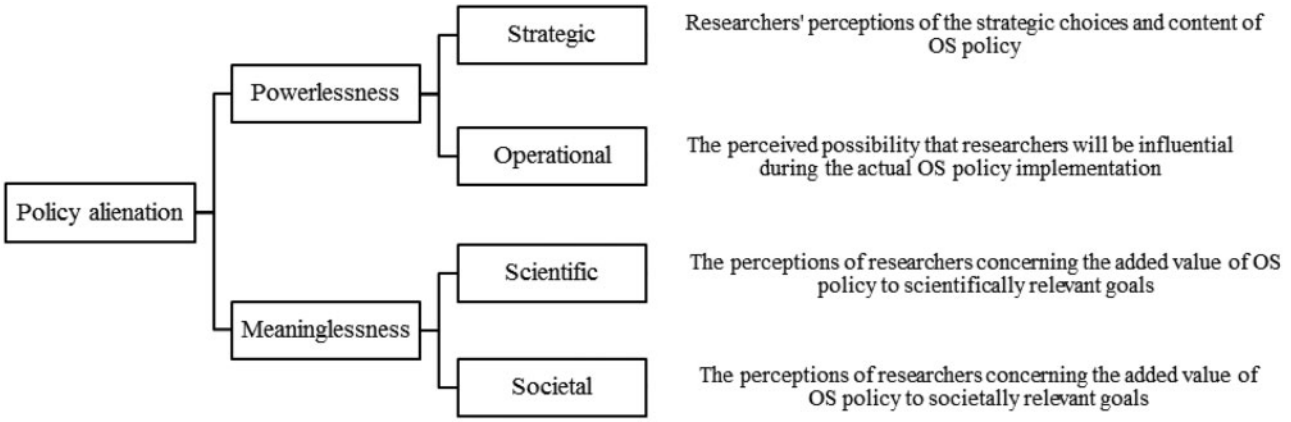

Figure 1. Policy alienation concept and dimensions drawn and modified from Tummers (2012).

digitalisation of the research process, a globally significant way to promote not only societal impact and solving major societal challenges but also science. OS referred to

> efforts to promote open procedures in scientific research activities. The key objective is, in the context set by research ethics and legal frameworks, to publish research outputs . . . so they can be examined and used by any interested party. Open Science and research involves practices such as promoting open access to research publications, open availability of research data, harnessing open source software and open standards and open documentation of the research process. (MEC 2014)

During the initiative, guidelines for promoting OS were developed in cooperation between ministries, universities, research institutes, and research funders in order to facilitate agents in their task accomplishment.

For researchers, openness was said to conserve resources, improve the quality of research, and potentially offer credits and opportunities for cooperation. New open operating models were connected with making science more democratic, and OS was further defined as a human rights issue. As in the EU's research and innovation policy, the future economy in Finland was also cited as a reason for promoting OS. OS was seen as having a decisive role in research, innovation, and expertise and as a prerequisite for 'rational decision-making'. Citizens were also mentioned as beneficiaries because of their increased transparency, participation, and increasing trust in science (MEC 2014). The principal's goals and the expected OS policy benefits are summarised in Table 1.

To ensure shared intent with regard to openness, the MEC wanted to verify these during 2014–9 using behaviour-based indicators for benchmarking national performance in OS. The results of the final evaluation show that the Finnish higher education institutions, research institutes, and public research funders have achieved impressive results (Forsström et al. 2019), but a new output-based approach to govern OS was introduced in January 2018, when the Council of State approved the new funding model for Finnish universities for the years 2021–4.

The new funding model introduced an extra coefficient of 1.2 for open scholarly publications. The decision to use output-based monitoring was part of the implementation work of the MEC's Vision for Higher Education and Research in 2030, which takes open international and globally responsible universities as a goal and emphasises using shared approaches and legislative means to strengthen open research and innovation (MEC 2019). Since 2015, the national Publication Forum (JUFO) classification has been used as an indicator, and for 2017–20, scientific publications account for 13 per cent of the basic funding to universities. In the model, refereed publications are given coefficients according to JUFO levels. The classification includes major foreign and domestic academic journals, book series, conferences, and book publishers of all disciplines, which are rated by a three-level classification: 1 = basic level, 2 = leading level, and 3 = highest level.

Today, most research-performing organisations in Finland have a publication policy recommending or requiring open access (OA) publishing, a data policy encouraging OA to research data, and a policy for research methods recommending openness in the publication and development of research methods (e.g. algorithms and code). Also, AoF requires publishing in OA channels, urges research data to be published openly, and recommends the openness of research methods (Forsström et al. 2019).

4. Data and methodology

OS—the Researchers' Perspective Survey was designed to collect the responses of researchers and to find out the importance of OS practices to researchers from the perspective of their own research and field of study. The university and state research institutes' management (e.g. Rectors and Vice-Rectors) were asked to send the survey to researchers affiliated with their organisation. Altogether, 680 researchers responded to the survey in April 2019.

Qualitative content analysis was used as a method to analyse the textual responses from the survey data. The survey had a comment field after each multiple-choice question and two open-ended questions at the end of the survey (Q28 and Q29). All were optional. The multiple-choice questions, which were not analysed in this study, concerned the importance of OS practices to one's research, the familiarity of the organisational-level policies, and one's motivations and experienced barriers to openness, for instance. Field of science, specification of research area, home organisation, career stage, and main research funder amongst others needed to be specified as the background information. The open-ended questions analysed in this study were formulated based on the general-level OS policy goals as follows:

Q28: *From the perspective of your research area and regarding the promoting of the openness of research, what kind of change/s in research culture/s would be needed? How should this change in research culture be facilitated?*

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Table 1. Principal's goals for OS policy and the expected OS policy benefits

Principal's OS goals and benefits
Main goals
1. promote open scholarship and accessibility of knowledge
2. make scholarship, science, and research more reliable
3. support the endorsement of open research practices in the research community
4. increase the social impact of research
5. give Finnish research an international competitive edge
In the context set by research ethics and legal frameworks, to publish research outputs so they can be examined and used *by any interested party*. OS promotes
1. OA to research publications
2. open availability of research data
3. harnessing open source software and open standards
4. open documentation of the research process
For science, researchers, and research groups, OS conserves resources
1. improves the quality of research
2. potentially offers increased credits and opportunities for cooperation
3. increases transparency, participation, and trust in science
For society, OS
1. promotes the societal and economical impact of research
2. tackles major societal challenges
3. has a decisive role in innovation and expertise
4. is a prerequisite for rational decision-making
5. makes science more democratic

Table 2. The category definition and level of abstraction used in the content analysis

Category definition	Perceptions and experiences of conflicts and challenges in OS policies indicating difficulties in coping with OS policy implementation
Level of abstraction	Concrete conflicting and challenging factors indicating difficulties in coping with OS policy implementation
Policy alienation	Having feelings or experiences of ambivalence, pointlessness, or disengagement when dealing with the OS policy implementation. Not having a certainty of being able to cope with OS policies

Q29: *From the perspective of your research, how could openness increase or increases the impact of academic research? Impact refers to societal impact, economic impact, and academic impact.*

Of the survey respondents, 449 wrote 1215 comments and answers. Many of the answers related to the conflicts and difficulties in OS policy implementation, even though these were not directly asked about. The analysis was performed after Mayring's methodology for qualitative content analysis using the systematic inductive category formation procedure (Mayring 2014) in NVivo. Because the scope of the analysis was explorative, established and preformulated categories could not be used. Instead, within the logic of inductive content analysis, two deductive elements, the category definition and the level of abstraction, were established based on earlier theoretical considerations and on the research questions. The elements used as selection criteria to determine the relevant material for further analysis are disclosed in Table 2. The analysis was deepened using coding for policy alienation drawn from Tummers (2012), shown in Fig. 1. Frequency analysis (Mayring 2014) was used to represent the most imminent difficulties and the prevalence of the dimensions of policy alienation. For this, descriptive statistics (frequencies) in SPSS Statistics were used.

Since researchers were able to answer the survey in either English or Finnish, some of the quotes used in this article have been translated into English. Online Appendix 1 lists the number and share of analysed responses per research organisation, main research field, and career stage.

This study has limitations. A different picture could emerge if some other country had been chosen as the case study. Another limitation is that the survey respondents might include only researchers who are familiar with OS policies. Additionally, researchers' analysed comments included reflective responses on difficulties (they were not specifically asked for), and the questions were formulated based on the premise that it is valuable to pursue OS policy goals. Even though the respondents effectively questioned these premises in their answers, these findings may give a far too positive picture; the results might be biased, so one has to be careful in generalising the findings.

5. Coping difficulties

Researchers affiliated with Finnish universities and state research institutes have positive experiences and perceptions of OS policy implementation. However, many conflicts and challenges emerged

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Table 3. Main category frequencies of experienced difficulties in OS policy

Main category	No. of P[a]	Percentage of P[b]
Difficulties in coping	287	63
OA to scholarly publications	182	41
OA to data and methods	143	32
Research evaluation and academic credit systems	109	24
Competition and commercialisation in funding research	36	8
∑	449	

[a]Number of respondents in which the category is coded.
[b]Percentage of respondents whose answers were analysed ($N = 449$).

from the analysed survey answers. Of the 449 respondents whose answers were analysed for this study, 287 (63 per cent) expressed difficulties in coping with OS policies. The concrete perceptions and experiences of conflicts and challenges were inductively derived and coded into four main categories. The main category frequencies of experienced and perceived difficulties in OS policy implementation are presented in Table 3. Next, they are explained in detail. Examples of coping difficulties in relation to the principal's OS policy goals are presented in Table 5 at the end of Section 6.

5.1 Open access to scholarly publications

One of the main OS policy goals of the principal is to promote open scholarship and accessibility of knowledge. Open access to research publications is thus required by the Finnish intermediary organisations. Many respondents, however, experienced coping difficulties related to OA to scholarly publications. Even though the goal of changing the business logic of the big international scientific publishers was a goal shared by many, the timeline of the Plan S initiative, an OA initiative supported by leading European research funders, seems too optimistic. Researchers also hoped for a united international front for promoting open scholarly publishing. Some saw that the negative consequences of OS policies are divided unequally and most affect those who are already in the weakest position (e.g. grant researchers, junior scholars).

One of the researchers' biggest worries was related to the OA publishing costs, which many argued should not be left for individual researchers to cover. This worry also stems from the fact that the current OS policies of the Finnish universities do not usually reserve and allocate university-level funding to cover the costs of OA publishing, even though OA publishing is required. Researchers from different research fields shared this coping difficulty. OA publishing costs, however, seem to create challenges particularly in the fields of medical and health sciences.

> I cannot even begin … it feels like an enormous task. I think there is reflexivity among researchers on the benefits on a theoretical level, but when push comes to shove, people just fall back into their own sedimented ways, if not pushed into them.… The universities/ministry would need to normalize the fact that costs do not befall the individual researcher – today we are 'free' to buy out our research … if we pay for it from our own meagre salaries. So, there should be steering that does not give this option of 'responsibilizing' the researcher for the institutions. (Respondent 660, Social sciences)

One goal set for publishing was contradictory, especially with the most recent developments in OS governance. In the Finnish national-level policy for scholarly publishing and in Plan S, Golden OA channels (the publisher of an online open-access journal makes an article immediately and freely available) based on article processing charges (APCs) are accepted as preferred channels. However, many researchers saw this as a very disturbing goal since it allows—and might even encourage—publishers' exploitation of the scholarly community by the for-profit international publishers to continue, therefore, decreasing the quality of the research.

> Researchers, universities and other relevant actors should first of all understand how unhealthy the operation of scholarly publishing system is nowadays. The acceptance of APC payments as part of 'the new normal' is a striking example of the fact that this is not understood yet. (Respondent 254, Social sciences)

Changing the scholarly publishing system was further seen as a difficult goal to be achieved without creating proper competition by establishing new high-quality OA publishing channels and valuing the existing traditional ones. The call for this was also due to the lack of OA channels. Especially researchers from the fields of engineering and technology but also from social sciences and humanities seem to perceive challenges related to the quality and reputation of the OA channels. Domestic OA journals were used as an example of high-quality and free OA publishing channels that have the potential to become internationally recognised. In fields of study, such as physics, in which researchers experienced being at the forefront of OA publishing, the question of valuing existing traditional OA publication channels emerged: instead of accepting publications from Cornell University's OA e-print archive ArXiV.org as a valid channel for open publishing, the OS policies encourage commercialised Golden OA publishing models as solutions, and they only transfer one for-profit business logic to another, leaving the basic problem unattached.

> Open scholarly publishing must be defined carefully as a concept. The Internet archive www.arxiv.org is routinely used by all the physicists. … Open publishing should not be defined as publishing in so-called open access journals; it is a totally restricted view. (Respondent 80, Natural sciences)

Green OA (depositing an article or a version of it into a freely accessible institutional or another online repository) was seen as the best channel for OA publishing when the quality or reputation of OA journals in a specific field of study was questionable. Ensuring the high quality of publication channels was connected with a need to secure high-standard peer review systems in publishing.

In general, based on the responses, it seems that researchers experienced difficulties in coping with the OA publishing policies regardless of their home organisation, main research funder, whether their home organisation had a policy for OA publishing (of which they were also aware of) or not, and whether they were conducting research in a research group or not. However, the responses indicate that leading career stage researchers (e.g. professors, university research fellows) might experience slightly more coping difficulties when implementing OA publishing policies. First stage researchers, on the other hand, seem to experience slightly less coping difficulties when it comes to OA to scholarly publications.

5.2 Open access to research data and methods

Principal's goals related to the open availability of research data, harnessing open source software and open standards, and open

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documentation of the research process are linked to the broader aims to make scholarship, science and research more reliable, to conserve resources, and improve the quality of research, for instance. These OS policy goals of open data and methods were seen challenging by many of the respondents. The coping difficulties related to open research data were seen as more complex to solve, and they required fundamental (re)considerations. Many researchers expressed frustration and confusion since they felt that the definition of data is very unclear in OS policies.

In some fields of study (e.g. science and technology studies, information science, environmental studies, management accounting), especially when qualitative data were in question, researchers perceived the goal of open research data as completely impossible. OS policies were seen as having negative consequences for researchers' relationships with research participants and private-sector partners. For example, research conducted in collaboration with private companies and research utilising sensitive interview data rely on relationships based on mutual trust between the researcher and the company or the research participant. According to researchers, losing control over research data makes it possible for others to use data in ways that might cause harm not only to research participants but also to the researcher and the entire scholarly community if trust in science is weakened. In data sharing, anonymisation was seen as an unreliable practice for protecting participants' personal information and making research data useless for reuse by others.

> The biggest problem is, in my opinion, the fact that open access to research data is always talked about as if it is always a similar process. … Often, when speaking about open data, the challenges and characteristics of the qualitative study are passed … as if all data would be similar. (Respondent 221, Humanities)
> … openness must go hand in hand with ethics, not just for the privacy of the subjects of the research but also for the potential application of a new technology or discovery. (Respondent 664, Medical and health sciences)

In Finland, one of the principal's OS policy goals is that in the context set by research ethics and legal frameworks, researchers publish research outputs so that they can be examined and used by any interested party. Researchers, however, presented data as contextual and relational in character, and therefore the reuse *by any interested party* of open data was seen as extremely challenging. These challenges were related to the emphasis of *publicly* open data and of prioritising *public interest* in OS policies. Instead of public sharing, researchers approached data sharing based on the scientific benefit and current data sharing practices, and they thought that, at best, data sharing would be possible and beneficial for other researchers.

> I don't think that sharing of data is a very good idea. I am using qualitative data collected based on interviews that I or my colleagues do. Sharing these while anonymizing information related to the case companies and participants in interviews doesn't quite make sense to me. A new user of this data would be unable to understand the context in which the data were collected. Interview protocols are normally designed so that a research question will be answered. Using interviews for purposes other than answering the research questions I had in mind when conducting interviews is simply not fortunate. (Respondent 592, Social sciences)

Researchers also emphasised that the quality of research data and transparency of the research process are a crucial factor in data sharing, reuse, and reproducible research. In some fields of study (e.g. biochemistry, neurosciences, digital humanities) in which data sharing is already an established practice, researchers thought that data reuse would benefit from the openness of data analysis and methods such as detailed scripts and information about the measuring equipment. Some even stated that the reuse of data and methods (e.g. code, algorithm) requires that their quality be validated by peer review processes.

However, researchers also stated that data sharing comes with costs and skills that were not included in the education or disciplinary traditions of researchers. Some also stated that, as a research group member, they are not always in the position to make decisions on data sharing. These kinds of power asymmetries in decision-making may lead to the exploitation or rejection of the objectives of junior researchers (e.g. not being credited for or not opening the data they have collected). In some cases, data reuse is prevented because of high costs or ineffective services. Enabling the efficient use of register data (e.g. information from national health registers, national registrations of population data) in research, for example, was seen as an important development target. Researchers also experienced challenges in data sharing because of the very strict interpretations of the university legal advisors on other policies such as the General Data Protection Regulation, a regulation on data protection and privacy in the European Union.

> Open data and open source code should be valued as much as published papers in any computational science field. IMO, the quality of a paper whose main focus is data analysis can't be truly assessed without access to the code. Peer-review shouldn't be solely based on the content and quality of the paper but on the code. It's not only a matter of Open Science but also reproducible research. (Respondent 573, Natural sciences)

Researchers from all career stages seem to have difficulties in coping with the policies of open data and methods. The responses did not vary by researchers' awareness of their home organisation's data policy. Respondents from the fields of natural sciences and medical and health sciences, however, seem to experience slightly more difficulties, whereas researchers representing the fields of humanities and engineering and technology expressed less coping challenges related to open data and methods. The results also indicate that these coping difficulties might be more common amongst researchers conducting their research in a research group and researchers whose research is funded by an external researcher funder who has a data policy (EU framework programme, AoF).

5.3 Research evaluation and academic credit systems

Even though one of the principal's expected policy benefits states that OS potentially offers increased credits and opportunities for co-operation for researchers, researchers called for new incentives for OS to be developed in international cooperation. Researchers emphasised that current research evaluation and academic credit systems affect their possibilities and willingness to implement OS policies in practice and stated that they could change their research practices only if the criteria for evaluations (e.g. in recruitment, tenure, promotion) are renewed. The current academic evaluation culture was thought to overvalue publishing in prestigious journals and to restrict OS policy implementation. Researchers mentioned publication metrics such as Impact Factor, h-Index, and citation counts, not only framing the evaluations but also guiding their decisions about where to publish. The prioritising of publishing in traditional journals seems to create coping difficulties in all research fields;

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however, researchers from social sciences and humanities might perceive this situation slightly more challenging.

> In my field, academic credits are based on the impact and significance of research. The significance is monitored based on the quality of the publications, and with a citation index and H-index. Therefore, the Impact Factor is an important factor when a scientific journal is being chosen. The majority of the good journals are not open access, or the price to change the article to open access is high. Furthermore, universities … demand free open access publishing. There is a bad conflict here: if you publish in a free open access journal, the significance and impact will weaken, even if the quality is high. This must be taken into consideration; otherwise, Finnish researchers fall in a worse position than others. (Respondent 106, Natural sciences)

The current research evaluation systems also create tension between emphasising one's own career and acting on behalf of either the scholarly community or the society; the focus on the evaluation systems is based on the individual researcher. Suggestions for new merits included not only accessibility to research data, methods, and the openness and quality of the whole process, but it also highlighted the importance of valuing interdisciplinary research, various scientific activities (e.g. acting as a reviewer or editor), teaching, laboratory work, and other professional activities related, for example, to societal interaction. The need for the recognition of negative research results was also pointed out.

> As we work with very complex and large setups generating massive amounts of research data, setting up open access to that data will require a lot of effort, especially at the start, when defining the protocols/codes … to define and compile the metadata. Very few are willing to put time and effort into this as it doesn't contribute to scientific merits and thus does not help or even hinders e.g. career advancement. (Respondent 598, Natural sciences)

One national context-specific feature was seen to distort the discussions on OA publishing in Finland. Many researchers perceived that the national JUFO classification and its use in the funding model for Finnish universities constrain the OS policy implementation and create conflicting demands. Some researchers saw that the goals set for OA publishing should be considered not only in the JUFO classification but also directly in the funding model for universities (e.g. stronger coefficients for OA publications). Opposite to this solution, some researchers even stated that the JUFO classification affects the decisions of researchers on where to publish in an undesirable manner, and they suggested that the use of JUFO be ceased.

> From the point of view of the openness of publications, the situation is simple: the MEC finances universities according to the JUFO classification, and we are requested to publish in categories 2 and 3: in practice, these journals are always behind the paywall. Before the financing principle changes, it is useless to suppose that researchers publish elsewhere because this is an economic problem of the unit. Finnish science policy is shortsighted and conflicting. (Respondent 41, Social sciences)

In general, there seem to be very little differences in research evaluation-related coping difficulties by research fields and career stages, for instance. However, these coping difficulties might be slightly more common experiences for researchers representing especially the fields of natural sciences but also for the fields of social sciences and for researchers funded by an external research funder (EU framework programme, AoF).

5.4 Competition and commercialisation in funding research

Principal's goal is to support the endorsement of open research practices in the research community and offer opportunities for cooperation. Researchers' responses related to competition nevertheless show that these goals contradict with the current emphasis of competition in funding research and create coping difficulties. If open research practices require more time and effort, which makes acquiring research funding or being promoted even more difficult, researchers feel that they will only do what is mandatory and would not or could not share their research outputs. Competition was related to a move towards evaluations where the focus is on the advancement of science and on the benefits for society rather than on personal gains. Currently, when publication metrics are used to evaluate research funding applicants, and when success in acquiring research funding is used as a merit in recruitment and promotion, the effect of competition accumulates. Competition was furthermore related to scooping, and research results seemed easier than outputs to share openly.

> My point is that, in such a competitive world where you 'publish or perish' and you depend on 3–5 years of project money, openness won't come in the slow evolutionary way. A paradigm shift is needed, but changing parts of the machine won't facilitate an easy change. (Respondent 553, Natural sciences)
> … research communities are not ready for the full openness within all disciplines yet (for example medicine, medicine development, technical field innovations). In my opinion, the reason is the fierce personal competition in the aforementioned fields and a so-called individualistic cult and the over-emphasis of the eminence of the individual in researcher and funding application evaluations … it should be possible to evaluate research communities, research groups, researcher consortiums and especially the achievements and outputs of these communities rather than individuals. (Respondent 395, Engineering and technology)

Also, the traditional practices of collaboration in research with commercial companies create contradictions and place constraints on implementing OS policies. For example, researchers stated that they need to secure research data and methods with patents because the commercial use of research is being emphasised. Projects with industrial partners as funders follow the rules of the companies involved, and usually, the research outputs and materials are considered the property of the companies. Therefore, the exchange of knowledge and resources is restricted because commercial partners require closed research and use, for example, confidentiality agreements.

> I study businesses, and businesses would (currently) never allow me to publish my data. The situation is so bad, that companies not only demand confidentiality and anonymity, they even sometimes want to approve my papers/conclusions. (Respondent 627, Social sciences)

Based on the responses, it seems that the experienced difficulties related to competition are more common within the fields of natural sciences, medical and health sciences, and engineering and technology, amongst researchers conducting their research in a research group, and amongst first career stage researchers. Leading researchers, such as professors, and researchers whose research is funded by university's basic funding seem not to experience as much competition-related coping difficulties.

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6. Policy alienation

The difficulties perceived by researchers are related to their coping with OS policies. Of the 449 respondents whose answers were analysed for this study, 238 (53 per cent) expressed feelings or had experiences of ambivalence, pointlessness, or disengagement towards the OS policy implementation. The analysis of these experiences was deepened using coding for policy alienation drawn from Tummers (2012) and shown in Fig. 1. The category frequencies of policy alienation dimensions are presented in Table 4 and show the most imminent tendencies of policy alienation from OS policy.

Almost half of the respondents seem to be facing *policy powerlessness* and some feel also *policy meaninglessness*, so they are therefore in a situation where they should be implementing a policy that does not reflect their own interests and needs, nor their research in practice.

The perceived gap between OS policy and research practice is associated with *strategic policy powerlessness* since the influence of researchers on the goals and content of OS policy either cannot be perceived or their perceptions on the OS policies do not reflect the actual content of the policies. The latter is the case, especially when OA to research data is in question. Researchers' responses show that, for example, the lack of good-quality OA publishing channels and the lack of understanding about the contextual and relational character of research data are not understood in the OS policies from the perspective of micro-level everyday research practices. This kind of powerlessness is also evident in the worry over OA publishing costs. Some researchers even felt that they were left alone to deal with their cost-related worries and asked why they should be responsible for the costs of the same scholarly publications that the university will eventually collect basic funding from. Therefore, some researchers think they are currently being directed from an OS bubble that is detached from the reality of scientific knowledge production and that lacks the influence of researchers.

> The public policies do not motivate at all in practice. Those projects are a big word mongering from which I have not got any concreteness or such which would motivate me …. (Respondent 15, Social sciences)
> It is difficult to find context-specific information about how one could promote openness in the first place. … The discussions and sharing of information take place in their own bubble of Open Science …. (Respondent 305, Social sciences)
> Open Science is a progressive illusion …. (Respondent 570, Social sciences)

Operational powerlessness, the perceived possibility of the researcher to influence during the actual OS policy implementation, relates to the conflicts over the current research evaluation systems and academic credit systems, career structures, use of publication metrics, and the emphasis of competition and commercialisation in funding research. Since the possibility of researchers to influence these system-level conflicts is very limited or seemingly non-existent, half of the researchers who are having difficulties in coping with the OS policies seem to be experiencing operational powerlessness.

> My discipline is extremely competitive for early career scholars, so publications in top journals are sought after. The top journals are not open access by default (save for one; that one has a 0,4% acceptance rate). Gold open access is an option, but it's an option that is more readily available for people in wealthier organizations, which increases the prestige bias inherent in my discipline's job market. For early career scholars to enthusiastically adopt open access publishing in deed, not just in thought (the latter is already there), policies should be devised to help researchers combat prestige bias and get hired by publishing open access. (Respondent 572, Humanities)

Table 4. Category frequencies of policy alienation dimensions

Category	No. of P[a]	Percentage of P[b]
Policy alienation	238	53
Policy powerlessness	217	48
Strategic	141	31
Operational	140	31
Policy meaninglessness	77	17
Scientific	61	14
Societal	25	6
Σ	449	

[a]Number of persons in which the alienation dimension category is coded.
[b]Percentage of respondents whose answers were analysed ($N = 449$).

Researchers also experience policy meaninglessness. Their perceptions concerning the added value of OS policy to scientifically relevant goals and the added value to their own scholarly practice are closely related to the strategic policy powerlessness and gaps between OS policy and research practice. *Scientific policy meaninglessness* especially concerned the added value of sharing research data. Some researchers even saw that OS policy has negative effects, either on science or on their own research practice and career. Less seem to be experiencing *societal meaninglessness*. Researchers, for example, saw that it is not enough to make research outputs publicly open to all, for special expertise or facilitation is also needed in between the repositories and archives and the utilisation of openly accessible knowledge resources. Instead of openness, many thought that the societal impact of research is a result of communication and involves encounter and interaction, which also need to be valued in research evaluation systems.

> As I'm involved in very fundamental research, I do not think open access to either articles or data would have much of a societal impact as it would not be understandable to the general public. It does have a large academic impact as it makes finding literature/methods/… easier and faster/cheaper. (Respondent 598, Natural sciences)

The responses point towards a very careful estimation of the differences in the experiences of policy alienation between research fields and career stages. It seems that amongst researchers from the fields of social sciences, policy powerlessness is a little more common tendency and that researchers from the fields of natural sciences and medical and health sciences, on the other hand, experience slightly more policy meaninglessness. Leading researchers (e.g. professors) seem to feel slightly more policy powerlessness as well as policy meaninglessness, whereas first career stage researchers expressed less feelings of policy alienation in both of these alienation dimensions.

The analysed policy alienation dimensions of OS policy implementation are generalised in Fig. 2 and presented in relation to the principal's goals and examples of the perceived conflicts and experienced coping difficulties in Table 5.

7. Discussion and conclusions

7.1 Threat of policy alienation

The aim of this study was to analyse the perceptions and experiences of researchers on the conflicts and challenges they face with OS

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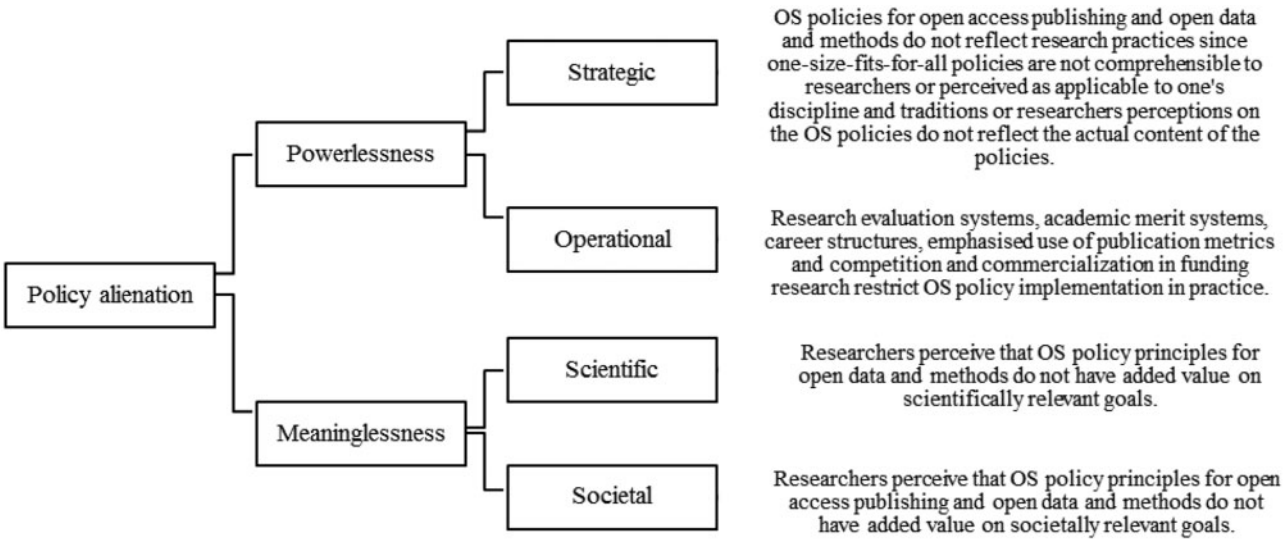

Figure 2. Policy alienation dimensions in OS policy implementation.

policy implementation. By applying the policy alienation perspective, the study tried to find out how coping difficulties intertwine with feelings of policy alienation if they do so at all.

The findings show that despite researchers welcome OS activities, gaps between OS policy and research practice exist and researchers have difficulties in coping with OS policy implementation. These gaps were manifested in the conflicts and challenges expressed by researchers described in Section 5. The experienced coping difficulties were interpreted as tendencies towards different policy alienation dimensions in Section 6. Researchers expressed feelings and perceptions of ambivalence, pointlessness, and disengagement when dealing with OS policy implementation. Many researchers should actually be implementing a policy that does not reflect their own interests and needs, nor their research in practice. Since researchers are very limited or unable to influence the current research evaluation systems and academic credit systems, the publication metrics used in researcher evaluations, and the competitive culture in funding research, many researchers experienced operational powerlessness. Their perceptions of the added value of OS policy to scientifically relevant goals indicate that researchers also feel scientific meaninglessness.

Regarding research data, researchers' responses show that they are unable to grasp the task given to them by the principal and mediated by the intermediary organisations, and therefore they cannot even construct a 'doable' problem (Fujimura 1987) of open data. This makes it impossible for researchers to comply or even cope with the principal's OS policy. Researchers' responses denote that the very abstract OS guidelines are not easy to understand in relation to one's own research, traditions and skills, and therefore they create confusion and even anxiety amongst researchers. Research in practice is guided by contextual, situational, relational, contingent, and practice-based ethical approaches (Mauthner and Parry 2013) such as the 'ethic of care' (Gilligan 1982) rather than the abstract principles and guidelines. In ethics of care, one focuses on considering the contextual factors, such as the nature of the relationships between those involved in research, for example, as participants or beneficiaries, and preserve these relationships and engage with their emotional registers.

Because of the OS policies' failure to recognise the contextual and relational nature of the research data, there is a genuine risk created by the current principal's OS governance, as stated by Mauthner and Parry (2013), that data sharing goals give an impression of researchers as 'interchangeable data collectors', obscuring the uneven politics and power relations. This gap between the principal's OS policy and research practice also affects researchers' tendencies towards policy powerlessness and perceptions about the added value of these policies, in other words policy meaninglessness, and may explain why many researchers do not think that publicly open data sharing brings any scientifically relevant benefits.

The current OS policies risk losing ties to specific individuals and contexts, and openness ceases to be governed by the localised principles of trust and gifting, and instead is governed through generalised principles of economic value (Levin and Leonelli 2017). For researchers, value lies not only in what is shared and in the final products or commodities of research but also in labour-intensive processes and in things that may not be made tangible, visible, and accountable in OS policies (Levin et al. 2016; see also Leonelli 2016). This study points out a significant goal conflict between the utilitarian arguments and economic valuation of the principal and research practices. Viewing qualitative data as 'a public good' might even restrict the circulation of knowledge and resources.

Researchers seem to resist the 'imperative to share' (Lezaun and Montgomery 2015) when this imperative concerns 'things that are most valuable to them, feeling that it compromises the integrity or future capacity of their research' (Levin et al. 2016). The care expressed over research participants as well as over the scholarly community and other researchers means that researchers are truly worried about the effects of the principal's OS policies on the quality of research and trust in science and that the ethics of care goes beyond data sharing: even though principal's main goals included improving the quality of research and increasing trust in science, the quality of the peer review systems in OA publishing channels and public openness in data sharing and prioritising public interest in OS policies, for instance, seemed to arouse anxiety and tendency towards scientific policy meaninglessness.

Since the current research evaluation systems and academic credit systems cannot recognise and value open research practices, principal's OS policies in Finland create a likelihood towards operational powerlessness for these policies stress scholarly altruism and

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Table 5. Policy alienation dimensions and coping difficulties in OS policy implementation

Principal's goals and expected policy benefits	Policy alienation dimension	Examples of the perceived and experienced goal conflicts and coping difficulties creating tendencies towards OS policy alienation	Implications of the differences and similarities of difficulties in coping with OS policies
OA to research publications	Strategic powerlessness	Not covering the costs of OA publishing (universities) or covering the costs in a way that does not reflect research practice (research funders). Accepting APC-based Golden OA channels as preferred publishing channels; allowing the exploitation of the scholarly community by the for-profit international publishers to continue. Not creating proper competition in the current scholarly publishing system by establishing new high-quality OA publication channels and valuing the existing traditional ones.	Established and leading career stage researchers might experience slightly more coping difficulties. OA publishing costs seem to create challenges particularly in the fields of medical and health sciences. First stage researchers seem to experience slightly less coping difficulties. Researchers experience coping difficulties regardless of their home organisation and its OA policy, main research funder, and whether they were conducting research in a research group or not.
Open availability of research data Harnessing open source software, open standards, open documentation of the research process	Strategic powerlessness	Failing to recognise and appreciate the contextual and relational nature of research data. Outlining one-size-fits-all policies that are applicable to all disciplines and traditions. Overlooking the fact that guidelines cannot solve ethical dilemmas of openness in a vacuum. Research depends on the ethical conduct of individual researchers, and their judgements need to be informed by shared values and experiences of data sharing. These do not even exist yet in some fields of study. Outlining unreasonable requirements for researchers. Good-quality sharing comes with efforts, costs, and skills that have not been included in the education or disciplinary traditions of researchers, nor accounted for in the credit systems and career structures of academic research.	Researchers from the fields of natural sciences and medical and health sciences seem to experience slightly more difficulties and researchers representing the fields of humanities and engineering and technology seem to experience less coping challenges. Researchers from all career stages seem to have difficulties. Coping difficulties might be more common amongst researchers conducting their research in a research group and researchers whose research is funded by an external researcher funder who has a data policy. Researchers experience coping difficulties regardless of their awareness of their home organisation's data policy.
Improves the quality of research	Scientific meaninglessness	Accepting APC-based Golden OA channels as preferred publishing channels; potentially encouraging publishers' predatory actions and decreasing the quality of the research. Not concentrating on ensuring high-quality peer review systems in publishing channels, be they OA or not. Emphasising public openness in data sharing and prioritising public interest in OS policies have potential effects on the scientific findings for the relationships and conditions of trust in research change. The reuse of data and methods (e.g. code, algorithm) requires that their quality be validated by peer review processes. The accessibility of the whole process is needed to improve the quality and reproducibility of research.	Researchers from the fields of natural sciences and medical and health sciences seem to experience slightly more policy meaninglessness. This is linked to their experienced coping difficulties with regards to open research data.
Potentially offers increased credits and opportunities for cooperation	Operational powerlessness	The current research evaluation and academic credit systems (e.g. in recruitment, tenure, promotion) overvalue publishing in prestigious journals and restrict OS policy implementation in practice. The current research evaluation systems and academic credit systems create tension, for they emphasise one's own career and individual merits instead of on acting on behalf of either the scholarly community or the society.	There seem to be very little differences in research evaluation-related coping difficulties by research fields and career stages. Coping difficulties might be slightly more common experiences for researchers representing especially the fields of natural sciences but also for researchers from the fields of social sciences. The prioritising of publishing in traditional journals seems to create coping difficulties in all research fields; however,

(continued)

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Table 5. (continued)

Principal's goals and expected policy benefits	Policy alienation dimension	Examples of the perceived and experienced goal conflicts and coping difficulties creating tendencies towards OS policy alienation	Implications of the differences and similarities of difficulties in coping with OS policies
		The national JUFO classification and its use in the funding model for Finnish universities restricts OS policy implementation in practice and creates conflicting demands for researchers. The competitive culture in funding research creates conflicting and confusing demands on researchers (e.g. required time and effort for openness makes acquiring research funding more difficult). Commercialisation goals set for research and traditional collaboration practices with industrial partners constrain OS policy implementation (e.g. companies restrict openness with non-disclosure agreements) and create conflicting demands.	researchers from social sciences and humanities might perceive this situation slightly more challenging. Researchers funded by an external research funder might experience slightly more difficulties. The experienced difficulties related to competition are more common within the fields of natural sciences, medical and health sciences, and engineering and technology, amongst researchers conducting their research in a research group, and amongst first career stage researchers. Leading researchers, such as professors, and researchers whose research is funded by university's basic funding seem not to experience as much competition-related coping difficulties.
Increases transparency, participation, and trust in science Promotes the societal and economic impact of research Makes science more democratic	Societal meaninglessness	Emphasising public openness in data sharing and prioritising public interest in OS policies have potential effects on the scientific findings for the relationships and conditions of trust in research change. OS policy has negative effects on science. It is not enough to make research outputs publicly open to all, for special expertise or facilitation is also needed in between the repositories and archives and the utilisation of openly accessible knowledge resources. The traditional practices of collaboration in research with commercial companies create contradictions and place constraints on implementing OS policies in research practice. The exchange of knowledge and resources is restricted because commercial partners require closed research and use, for example, confidentiality agreements.	Leading researchers (e.g. professors) seem to feel slightly more policy meaninglessness, whereas first career stage researchers expressed less policy meaninglessness.

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researchers as morally bound to share their research outputs so that resources produced in publicly funded research can benefit society. Scholarly altruism has been found to have been a significant intrinsic motivator in researchers' data sharing behaviours (Cho et al. 2010, Hung et al. 2011a,b; Kim and Stanton 2016). The results, however, indicate that researchers are more willing to share their data with other researchers and to use their data for the benefit of society via contributions to scientific development and knowledge production, but they do so only if they feel that the interests of research participants and science are protected.

Gaps between the principal's OS policy and research practice are an unintended consequence, however, and they might be due to the lack of researchers' influence on policy decisions that affect them. OS policies do not imply that the intention is the construction of an 'altruistic researcher' but rather the contrary. These policies effectively state that researchers should be rewarded and credited for publishing in non-traditional publication channels and when sharing their data and methods (such as code, software). The disadvantage, however, does not require intent (McMillan Cottom 2017).

Based on the findings of this study, and if there is a desire to move beyond economic valuation and prevent alienation from OS policy, policy alienation needs to be investigated further: since researchers have difficulties in coping with the principal's OS policy goals and because there seems to be a likelihood towards policy alienation, negative attitudes towards OS policy implementation are more likely to grow and researchers may be less willing to make efforts to support OS policy implementation. Future studies on operational powerlessness created by the principal's OS policy emphasis of the altruistic researcher, or more specific analysis of strategic powerlessness and scientific meaninglessness linked to the current one-size-fits-for-all guidelines for open research data, could prove to be very important in enhancing research excellence, ensuring researchers' accessibility to knowledge resources, promoting collaborating, and improving the quality of research—all motivations and goals in current OS policies.

7.2 Theoretical implications and further research

The findings of this study confirm the recent findings of De Jong et al. (2016), who found that the agent's reactions to policies are more diverse than previously suggested in the PAT and suggested a fourth option, (policy) alienation, to be included in the theory in addition to compliance, coping and negotiation (Morris 2003). In this study, the policy alienation concept developed by Tummers et al. (2012) was explored in the analysis. The policy alienation dimensions were drawn from the still-developing theory. Scientific meaninglessness was added to the policy alienation dimension categories based on the OS policy goal of promoting a more efficient and higher quality science. By applying the policy alienation perspective, it was possible to further analyse why researchers have difficulties in coping with science policy.

In the future, the coping difficulties researchers face with OS policies could be studied both quantitatively and qualitatively from the policy alienation perspective. Following the steps of Tummers (2012), the next stage in the quantitative analysis of policy alienation from OS policy would be to further explore the possibilities and insights of the policy alienation scale and developed a specific pool of items for each policy alienation dimension, which then can be used in survey research in the form of Likert scales.

The findings of this study should also be deepened with a series of in-depth interviews in order to draw more specific and reliable conclusions on the coping difficulties and policy alienation faced by researchers. Interview studies on OS policy alienation and coping strategies could be designed to find out what kind of policy alienation and identification difficulties researchers have with a specific organisational or national OS policy they are expected to implement by the principal and intermediaries (e.g. their home organisations or external research funders). Another interesting topic would be to find out what kind of coping strategies researchers have when they face difficulties with the implementation of a specific OS policy.

Researchers appear to have coping difficulties with science policies (Morris 2002; Morris, 2004; De Jong et al. 2016) with new public management (NPM) characteristics (Whitley 2011) influenced by neoliberal universalising values (Olssen and Peters 2005), economical valuation and academic capitalism (Münch 2014), and moral economy (Harvey and Salter 2012), for instance. These coping difficulties with (Morris 2004) other science policies could also be studied from the policy alienation perspective.

7.3 Recommendations for practice

This study has important implications for OS policy since it highlights the challenges in the implementation of OS policies in Finland and provides insights that may also inform OS policies elsewhere. The incentive problems in OS policies lie not only in the research evaluation and academic credit systems but also in the gaps between OS policy and research practice; they need to be solved in terms of participation in policymaking and in knowledge production of 'openness' itself. The findings strongly support the enforcement of situated openness and case-by-case OS guidelines in order to critically consider the cultural connotations contrary to the current utilitarian connotations of the government. Whereas it is most important that governments provide the financial means and clear legal frameworks to regulate openness in science, an equitable system of scholarly communication, at the same time, should resist academic capitalism (Lawson 2019).

Secondly, there is a need to discuss how to create proper competition in the scholarly publishing system. Another important question to solve is how to cover OA publishing costs in such a way that no researcher is placed in an unequal position. Ideally, new funding models and mechanisms and OA channels are developed in collaboration with the governments, intermediaries, and European and international-level actors; however, these discussions need to be tightly engaged with the critique of OA policy as a neocolonialist agenda (Beasley 2016; Mboa 2017; Piron 2018).

There is also a need to discuss what is meant by quality in OS governance contexts. Good quality, for example, can be understood simply as a 'fitness for purpose' (van Vught 1995), judged in terms of the extent to which they meet the principals' goals (Kivistö 2007) of OS. It should be considered whether more emphasis is needed and whether related measures should be taken towards the actual quality of research assured by high-standard peer review systems, starting from research design (e.g. preregistrations) and covering not only publishing but also the transparency and management of the research process.

Fourthly, the new monitoring of OA publications reflects the Finnish government's broad objectives, characteristic of NPM (Whitley 2011), and it can affect the promotion of OA publishing; however, operational policy powerlessness was evident amongst researchers because of the use of the national JUFO classification in the Finnish funding model for universities. This implicates a need to have a proper discussion on how to combine the goals of openness

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to the emphasis of competition in funding research, especially since complementary funding will be even more emphasised in the Finnish funding model for the years 2021–4.

Finally, the emphasis of OS introduces more inclusive and broader ways of measuring scholarly reputation (Jamali et al. 2016). Although data citations and data publications are possible solutions, new metrics should not account for the openness as such but the quality of data and code, since openness can also be of low quality and, therefore, useless for reuse. The findings also question whether pursuing prestige is a socially worthwhile goal in a research policy environment where the focus is on collaboration and sharing. Does prestige, which does not automatically mean high quality (Kivistö 2007), really encourage researchers to collaborate on the most socially worthwhile research activities and provide transparent access to their research work?

Supplementary data

Supplementary data is available at *Science and Public Policy* online.

Acknowledgements

I would like to thank the researchers, who answered the survey, for their time and openness, and the university and state research institutes' management for sending the survey to researchers affiliated with their organisation. My inspiring supervisors, Reetta Muhonen and Jussi Kivistö, are thanked for valuable comments on earlier versions of this article, and my superiors, Mari Riipinen and Riitta Mustonen, for blessing this research project. Two anonymous reviewers are thanked for their valuable time, comments on the earlier version of this article, and cheer.

Funding

This work was supported by The Finnish Cultural Foundation, Pirkanmaa Regional Fund.

Conflict of interest statement. The author declares that there are no conflicts of interest regarding the publication of this paper. The author has been employed at the University of Turku since 2010 and in her position at the University she has acted as an Open science advisor and an expert also on the national level working groups co-ordinating Open science in Finland. Her position at the University included also consulting in the final evaluation of the openness of Finnish research organisations, research-funding organisations, Finnish academic and cultural institutes abroad and learned societies and academies commissioned by the Ministry of Education and Culture in 2019 but she has not received any personal fees from the Ministry or any other organisation or party. Currently, the author participates in the working groups of the Expert panel in Culture for Open Scholarship and works as a Project Manager responsible for developing research impact operations at the INVEST Research Flagship Center.

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