Disentangling the local context – imagined communities and researchers' sense of belonging

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Abstract

It is generally agreed that researchers' 'local context' matters to the successful implementation of research integrity policies. However, it often remains unclear what the relevant local context is. Is it the institutions and immediate working surroundings of researchers? Or do we need to pay more attention to researchers' epistemic communities if we want to understand their 'local context'? In this paper, we examine this question by using the International Research Integrity Survey (IRIS) with more than 60,000 respondents. Survey responses indicate that academics identify with both their geographical local units ('polis') and their more transnational epistemic or scholarly communities ('cosmos'). Identification with scholarly communities tends to be strongest. We embed the survey results in the academic literature by proposing a theoretical understanding of academics' 'local context' based on Beck's notion of cosmopolitanism and Durkheim's concept of solidarity. We conclude with considerations on how to successfully implement research integrity policies.

Keywords

Research integrity; Policy implementation; Research community; Academic solidarity; Academic identity

Acknowledgement

The authors would like to express their gratitude to the IRIS survey respondents, who took the time to share their knowledge and opinions with us. The authors would further like to express their gratitude to participants of the ECPR 2021 conference session 'Research integrity – practices and policies', the EASST conference 2022, and the 7th WCRI for valuable feedback to earlier versions of this paper. This study was funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 824481 (SOPs4RI).

Introduction

Science is in crisis! At least this is what a popular discourse tells us (Fanelli, 2018). Worldwide, different stakeholders have raised the alarm over scientific claims not living up to both internal and external quality expectations. The main points of concern centre on issues of reliability and trust (Bouter, Tijdink, Axelsen, Martinson, & ter Riet, 2016; Edwards & Roy, 2017; Mody, Sibum, & Roberts, 2020). With regard to the former, commentators have pointed at false claims emerging and persisting in the academic literature, declaring science to be in a 'reproducibility crisis' (Baker, 2016; Ioannidis, 2005; Shamoo & Resnik, 2009). Subsequently, the lack of internal validity, consistency and truthfulness in science might impact public trust in it (Anvari & Lakens, 2018). Especially in a time where society's dependence on science has never been more important – as the Covid-19 pandemic has recently demonstrated – societal distrust and lack of support for science would be highly problematic.

To tackle issues of reliability and trust in science, multiple approaches have been suggested. These include looking at ways to better guide individual scientists and make sure their daily research practices live up to standard, demanding that organisational units take more responsibility, and addressing systemic aspects such as the idea of 'publish-or-perish'. Despite this diversity in approaches, a common denominator can be identified in the omnipresent tendency to implement novel rules, regulations, codes of conduct, guidelines, or other forms of policies to nudge, steer and shape values, norms and practices among researchers. For example, this is reflected in the emergence and updating of codes of conduct at various levels – international and national (e.g. ALLEA, 2017; KNAW et al., 2018) – as well as in the focus on organisational policy changes in the aftermath of misconduct cases (Horbach, Breit, & Mamelund, 2018). In general, various stakeholders aim to foster research integrity and prevent scientific misconduct via such new guidelines and regulations.

Accordingly, many communities and organisations within science have been struggling with the question of how to effectively implement those guidelines. Here, one of the main challenges is that new policies must adhere to the existing framework or 'local context' to which they are implemented to be effective. We know from previous studies in STS, organisational studies, and other fields that compliance to regulations is strongly affected by the regulations' alignment with existing (research) practices, local norms and values, and the practicalities shaping the local environment (Gray & Silbey, 2014; Huising & Silbey, 2017). Without such alignment, guidelines lose their legitimacy and support among the regulated, which might subsequently lead to non-adherence, hypocrisy, or blunt ignorance. Even more problematic, non-alignment of integrity guidelines with local practices has been suggested to lead to cynicism among researchers, which may ultimately have adverse effects (Clair, 2015).

While the importance of the 'local' context is generally agreed upon, the precise understanding of what constitutes this context has received far less attention. The question of what comprises the relevant 'local' in relation to research integrity and responsible conduct of research generally remains unclear and undiscussed. Implicitly, many actors seem to adhere to a spatial understanding of locality, referring to a physical or geographical locale. They understand the relevant context to be formed by the organisational unit in which researchers spend most of their time, or perhaps the national setting and legislative framework that mark the conditions under which researchers work. However, we argue that there are other relevant aspects of the academic community that ought to be taken into consideration when defining researchers' local context. Most notably, these include elements of a researcher's epistemic community, communities of practice, the relevant infrastructural elements, and aspects that have come to be referred to as the 'invisible college'

(Wagner, 2009). Ultimately, we are interested in the question of what type of community researchers feel connected with and, consequently, which community's internal rules they are likely to follow in their daily research practices.

It is important to note that the question of how researchers self-identify as members of diverse academic communities is, of course, of interest not just to research integrity scholars and policy makers, but more broadly to all who are interested in policy implementation in Academia. The daily life of academics depends on an interplay between individual and peer considerations. This includes choices of what and where to publish (Warlick & Vaughan, 2007), how and with whom to collaborate (Brodin & Avery, 2020), and expectations of academic mobility (Grilli & Allesina, 2017), to name but a few. All of these decisions are based, at least to some extent, on the perceptions of internal norms and expectations within diverse research communities. A host of studies have shown that such norms vary considerably across academic communities (Hessels, Franssen, Scholten, & de Rijcke, 2019; Rostan & Antonio Ceravolo, 2015; Wenger, 1998), making the extent to which an individual self-identifies with these communities clearly salient.

In this paper, we address this question in a two-fold manner. First, we use an international survey on research integrity issues among researchers in Europe and a selection of OECD countries. As part of the survey, we asked respondents about what academic groups they identify with and whose opinions about their research, especially related to matters of research integrity, they value most. Building on the results of this survey, we subsequently develop a conceptual understanding of researchers' identity in relation to notions and regulations of research integrity. While our empirical findings originate from a survey in the context of research integrity, we aim to discuss identity and community formation in more general terms. Nevertheless, as such processes are contextual and situated, we mostly embed our discussions within the research integrity context. We firmly base this model in the literature by initially approaching it through a geographical and institutional lens on the local, before presenting the concepts of epistemic communities and other concepts that might help us understand what the relevant local context is when it comes to research integrity. Inspired by Ulrich Beck's way of thinking about cosmopolitanism, we hereafter develop a concept of the cosmopolitan academic, who is situated in cosmos (i.e. the discipline, epistemic community, or "invisible college") as well as polis (i.e. the institution, geographical locality, or "visible college"). *Cosmos* refers to a transnational network of researchers sharing similar research objects, methodologies, or research infrastructures such as publication outlets or conferences. While *polis* refers to the geographical location of a researcher, including daily working environments, organisational set ups, and the institutional frameworks. The paper continues by discussing recent developments within academia that seem to have pulled researchers more towards cosmos than polis. Based on the observations from the survey and the model developed, we conclude by discussing what the way towards a more realistic regulatory framework for research integrity might look like.

A plurality of communities

In this section we will explore some concepts that closely relate to the notion of a 'local context', thereby introducing several key elements of communities relevant to a researcher's locality. In our empirical work, introduced in the next section, we use the notion of 'researcher identity'. This notion has a long tradition in the field of higher education and science studies. Previous work on this phenomenon has shown the complexity and multi-faceted nature of the concept. In a recent systematic review of the literature within this field Castello, McAlpine, Sala-Bubare, Inouye, and

Skakni (2021) identify four dimensions that are most frequently discussed. They find studies reporting on researchers' identity being individual or socially constructed, being stable or dynamical over time, being singular or multiple, and being primarily reflected in thoughts or in actions. In our study, we use identity as respondents' self-identification with different institutions and communities. Research within science studies has subsequently pointed to multiple communities that are likely salient to researchers in various contexts. These include organisational, disciplinary, and national contexts (Kastenhofer & Molyneux-Hodgson, 2021). In addition, this research has pointed at the problematic interaction between individual identities and belonging to communities or other collectives. We will revisit these discussions later in this manuscript.

Organisational and National boundaries

As mentioned in the Introduction, many research integrity stakeholders and scholars seem to implicitly adhere to a spatial understanding of locality, one that is restricted to the physical or geographical boundaries of a researcher's work environment. Intuitively, there seem to be good reasons for adhering to such an understanding. One only needs to think of one's own department or university, in which probably not all of one's colleagues belong to the same epistemic or disciplinary community, but nevertheless to some extent identify with the unit. While some disciplines and epistemic communities may be well organised and have their own formal integrity guidelines and regulations, one is more likely to encounter formal codes of conduct within an organisational setting. This also means that one is more likely to face formal punishment in case of breaching norms established on an organisational level, rather than on an epistemic or disciplinary level. If only for this reason, researchers are likely to feel some sense of commitment to organisational guidelines and regulations as well as value the opinion of those in their spatially local community.

This spatial sense of localness does not only comprise the organisational or institutional setting, but also extends into the national context. Several studies have demonstrated the relevance of national integrity guidelines, as well as the diversity among them, even between countries with relatively comparable research systems (Godecharle, Nemery, & Dierickx, 2014).

Hence, spatial understandings of locality obviously play a prominent role in researchers' sense of identity when defining their own 'local' context and when deciding which norms and standards to adhere to in their research. However, on their own they are not sufficient to provide the full picture.

Epistemic communities

Within the science studies literature, a set of related notions such as epistemic cultures (Knorr-Cetina, 2009), thought styles (Fleck, 1979), and epistemological styles (Lamont, 2009) have been suggested as relevant concepts to define and distinguish diverse scientific communities. Indeed, such notions directly give rise to the demarcation of diverse communities. For example, the notion of a *Thought Style*, closely relates to that of a *thought collective*, which is a "community of scientists working on the basis of joint convictions as to which knowledge shall be considered proved, which methodologies are scientifically valid, and which criteria of scientificity are acceptable" (Schnelle, 1981: 733) (Quoted in Antons, Joshi, & Salge, 2019). Similarly, epistemic cultures, putting focus on research practices and epistemic objects, give rise to their related epistemic community, comprising those groups of researchers that share a common epistemic culture. In her inaugural statement as the new president of the European Association of Science and Technology Studies (EASST), Maja Horst, for example, recently verbalized how epistemic communities can provide a shared sense of identity:

> "Over the years STS has developed into a community of concerned academic citizens with a plethora of interesting tales to tell. Some of us have disciplinary homes within STS departments, educational programmes and groups. Many others are living our academic lives in diverse constellations, where we might feel like visitors and sometimes even intruders. EASST serves a crucial role as a home for us all and a place where we can talk together in our shared languages about issues that concern us. Such a disciplinary home away from home is important." (Horst, 2021)

These epistemic, or more broadly, disciplinary communities each come with their own norms, values, practices, and related conceptions of what it means to do responsible research. The disciplinary or epistemic communities are also visible in, for example, evaluative processes, as was recently concluded by Reymert, Jungblut, and Borlaug (2020, p. 17), who found that, "evaluation processes are particularly tied to different internationally oriented fields, with their evaluative cultures deeply embedded in their epistemic traditions and academic work." (See also (Hessels et al., 2019) for similar findings).

Particularly relevant to our task of identifying relevant characteristics of local contexts regarding research integrity, recent studies have indicated variations in researchers' perceptions of what constitute responsible and questionable research practices (QRPs). For instance, this became evident in a recent focus group study by Ravn and Sørensen (2021), in which they demonstrate the close relation between perceptions of QRPs and norms and common practices within an epistemic culture. One of the examples from their study is about the research practice of *fishing*. Among medical scholars this practice is understood as looking at data without a plan, trawling through large datasets in the attempt to find significant correlations. In medical science, this practice is considered detrimental, although it is a rather prevalent practice. In other epistemic communities, particularly within the humanities, continuous, often unplanned, or non-prescribed exploration of already analysed data like, for example, novels, paintings, etc. is a common and unproblematic practice.

Other empirical studies have identified substantial divergence in prevalence of questionable research practices between disciplinary fields, or epistemic communities (Fanelli, 2009; Horbach & Halffman, 2019; Sun, 2013). These results also suggest differences in norms and values regarding standards of good research practices. Similarly, divergence in understanding of what constitutes good science, and whether the issue of irreproducibility is a concern to all areas of science, became apparent in an academic debate between scholars from diverse epistemic communities. Specifically, scholars from the social sciences and humanities argued that reproducibility does not constitute a base value in their communities (Penders, Holbrook, & De Rijcke, 2019), while scholars from other fields, most notably having a medical background, argued that reproducibility ought to be a key principle underlying research in all disciplinary communities (e.g. Peels & Bouter, 2018; Saltelli & Funtowicz, 2017).

Other notions of academic communities

Hence, in addition to spatial locality, epistemic cultures provide a relevant sense of commitment forming attributes in researchers' understanding of their local context and what it means to do proper research in it. If we take a closer look, the multiplicity of relevant aspects and diverse modes of operationalization of such epistemic cultures quickly become visible.

Within the practice theory literature, the notion of research practices is a central term focusing on one specific aspect of epistemic communities. Such research practices give rise to a *Community of*

Practice (CoP). A CoP can be defined as relations between people who engage in an activity together. CoPs are defined by a common enterprise, a shared repertoire of activities and understandings, and processes of mutual engagement, in which people negotiate the meaning of practice together (Degn, Franssen, Sørensen, & de Rijcke, 2018; Wenger, 1998). This literature also explicitly pays attention to how new communities are formed or how membership of a community is established. Learning is a critical part of this. Becoming a member of a community of practice, which are intrinsically dynamic groups, requires processes of socialisation. Through 'legitimate peripheral participation', an individual learns the skills and meanings of a particular practice. This is required to become a member of a CoP. On top of such shared understandings and activities, membership of CoP is mediated by the co-use of objects and tools, including facilities and data (Bowker & Star, 2000; Gregory, 2021; Wenger, 1998).

These data practices and matters of infrastructure, subsequently give rise to yet another set of academic communities: those of *data communities.* Defined as a group of researchers – and potentially wider stakeholders – working with or contributing to the same type or set of data, the concept of data communities is intrinsically multiple: "Researchers can belong to multiple data communities. Data communities are not defined by discipline alone, but can form around shared data, common data needs, shared methodologies, or common data uses." (Gregory, 2021, p. 253)

A similar, newly emerging concept within academia, is that of open science communities, i.e. academic communities centred on a common goal or ideological vision of science. While these communities tend to be geographically bounded and driven by early career researchers, their binding force rests on an overarching understanding of what constitutes proper science as well as how some of the issues regarding reliability and trust in science, mentioned in the opening of this paper, are to be addressed.

Encompassing multiple of these categories and diverse communities, Ulrich Beck's notion of the cosmopolitan can help us structure our thoughts. His concept of the cosmopolitan is inspired by the Greek and Roman stoics, who conceptualised a cosmopolitan as a person who at the same time is a citizen in *cosmos* and in a particular *polis* (Beck, 2005, 2006; Mads P Sørensen & Christiansen, 2013). Beck uses this concept to describe the human condition in present-day society, where our lives – no matter where we live in the world – have become increasingly interdependent. To him, global work division facilitated by the development of a global economy and new information technology has - together with new global challenges (ecological crises etc.) - cosmopolitanised us. We live in particular places in the world, but we are at the same time deeply dependent on developments in other parts of the world, which the Covid-19 pandemic recently also made abundantly clear.

In a similar way, the concept of the cosmopolitan academic captures the interwovenness of contemporary academics in national and institutional frameworks as well as transnational epistemic communities and developments. Academics typically feel a sense of community with both their immediate colleagues in the institutions in which they work and colleagues within their discipline, from other institutions within and across national borders. Similarly, knowledge production processes are shaped by standards stemming from the national-institutional context as well as transnational, epistemic communities. Therefore, any notion of 'local' context seems to require some flexibility, allowing for multiplicity and fluidity of 'locality'. In the next section, we use an international survey on research integrity issues to empirically assess researchers' identification with the diverse range of communities discussed in this section.

The IRIS survey – data and methods

To investigate empirically the question of researchers' identification with different communities, we use data from the SOPs4RI International Research Integrity Survey (IRIS), an online survey of active researchers. It includes researchers from the humanities, social sciences, natural sciences (including technical science), and medical sciences (including bio-medicine), who hold at least a master's level degree and produce research for commercial or academic institutions within the EU, EFTA, U.K., Canada, Australia and the US. The survey was conducted in English in 2021, using the Qualtrics platform. 73,757 people responded to the survey. Of these 1,602 were ineligible due to their country of employment being outside our specified countries. A further 6,391 were excluded as they completed less than 25 percent of the survey which gave no information beyond demographics. Lastly, those who did not state they were trained to at least master's level were removed. A remaining 64,074 cases were retained for the analysis. Our analytical sample for some of the analyses below consists of 55,041 respondents, who responded to all four questions related to identification with their department, organisation, scholarly community and professional society. We clearly indicate when this analytical sample is used. The response rate, computed using the American Association for Public Opinion Research's standard definitions (AAPOR 2016), was 7.2 percent (Response Rate 2). The sample was designed to be representative of the population of researchers held in the Clarivate Web of Science (WoS) bibliographic database whose articles had been published in the period 2016-2020 and where at least one author had an affiliation to an institution in one of the target countries. The data are weighted to correct for unequal selection probabilities and for non-response. Further details of the sample design, data collection and weighting can be found in supplementary materials, along with code for reproducing our analyses and details of how to obtain the dataset. This also includes a full list of respondents' demographic information.

Dependent variables

In the survey, respondents were asked how much they identified with their department or centre, their organisation, their scholarly community, their country, and their professional societies. These categories constitute the main elements underpinning our analyses. It should be noted that even though these questions were part of a survey on research integrity, the actual wording of the questions does not refer to the concept of research integrity. However, because the survey continuously refers to this concept, both in the wording of the questions, the invitation letter and additional information, the respondents most likely answered these questions with the research integrity framework in mind.

Cosmos & Polis

Based on our analytical framework and initial views on our data, these five identity items were considered to be potential measures of our concepts of polis, the geographical/physical location or "visible college", and of cosmos, the epistemic community or "invisible college" within which researchers are situated. To assess the plausibility of this notion, we first undertook an exploratory factor analysis (EFA), retaining 54,675 respondents for whom all 5 items applied, the results of which are shown in Figure 1. Two factors explained 52 percent of the variance. The solution shown has been obliquely rotated and the two factors have an estimated correlation of 0.44.

Figure 1: Rotated factor loadings from exploratory factor analysis (n=54,675)

Looking at the rotated factor loadings in figure 1, we see clearly that department and organisation are located close together in the parameter space, with high loadings on the first factor, which we label polis. By contrast, professional societies and scholarly community load strongly on the second factor, which we label cosmos. Country loads very similarly on both factors. We can make sense of this by seeing that self-identifying with one's country as a researcher can be both an abstract notion and a more concrete one. In the abstract, self-identifying as a researcher of one's country could reflect a cultural, historical or even political consciousness. Conversely, and more concretely, researchers may consider themselves in relation to the network of national funding bodies, research infrastructure, higher education system and regulatory arrangements under which research is carried out in practice. Because of this ambiguity in interpretation, we drop country as one of our indicators of polis and cosmos, retaining only those that are clearly differentiated as indicators of one or the other concept. We compute two new variables, representing polis and cosmos, as mean scores on the two component items for each identity retaining an analytical sample of 55,041 researchers who provided responses to all four items. Finally, we standardise the polis and cosmos variables so that they both have means of zero and standard deviations of one.

Independent variables

To explore associations between various features of the researchers' working life and the strength of their self-identification with either the polis or the cosmos, we asked them to select the field within which they mainly work. We here use the full sample of 64,074 respondents. Response options were the fields of research and development (FORD) classification taken from the OECD Frascati manual. We grouped these fields into four main categories: the natural sciences (including technical sciences) which include 40% of respondents, medical sciences (including biomedicine) with 16% of respondents, the social sciences include 30%, and the humanities 15% of the respondents. We also asked them to select within which country their current employer is based and grouped them as working within either EU countries (77% of respondents), EFTA countries (5% of respondents), or other countries of interest (UK, USA, Canada and Australia, 18% of respondents). Further, we asked respondents to state their sex, with those who prefer not to say (2%) recoded as missing. 57% of respondents are male and 43% female.

We also wanted to know within which type of organisation the researcher was based. For the purposes of our study, researchers are divided into two groups, those working within universities or academic settings (77%) and those who are working in industry, not-for-profit research institutes, government research centres, healthcare settings or other non-academic settings (23%). We additionally supposed that the type of employment contract held might be associated with respondents' sense of belonging to diverse communities, as well as the stage of career and extent of their current research activity. Respondents were asked what type of employment contract they currently hold, which has been recoded into two categories for our purposes: those with permanent contracts (66%) and those without (temporary contracts, or no employment contract) (34%). Researchers are divided into four career stages, early, mid, later or retired. In addition to this we included a variable derived from a question asking in which year the PhD or equivalent had been awarded. The given year was used to group respondents into those who had received their PhD within the last 5 years -- which is a fairly standard period of time to be considered as early career researchers (19%) and those with more than 5 years of experience since obtaining their PhD or equivalent (81%).

Finally, we asked researchers to tell us how much of their working time they spend carrying out research, including applying for research grants and research related activities, rather than other activities associated with their role such as teaching, general administration or management. Response options were none of their time, about one-third, half, two-thirds of their time, or all of their time. We treat this as a continuous variable in the analysis.

The exact question wordings and response options can be found in S1 in the Supplementary material.

Analysis plan

To examine the correlates of identity, we fit OLS regression models with both cosmos and polis as dependent variables, using the covariates as described above to explore any association between field, country, career stage, sector, sex, contract type, experience and time spend actively researching with strength of self-identification with cosmos and polis. All subsequent analyses are carried out on a retained sample of 55,041 who responded to all four identity items.

To examine whose opinion researchers value the most, we fit a multinomial logit model to estimate the odds of selecting department, organisation, country, professional bodies or scholarly community, using the same set of covariates.

For both of these analyses, we also estimated versions that had country fixed effects added. There were no substantial differences in results with their inclusion, so we present results from models without the country adjustments, for the sake of clarity and simplicity.

Empirical results

Table 1 present respondents' answers to the question of how much they identify as a researcher of each of the five main categories of interest.

Table 1: Researchers' self-identification with diverse communities

As can be seen from the percentages shown in Table 1, respondents self-identify most strongly as a researcher of their department or centre (just over 70 percent identify "a lot" or "a great deal") and least strongly as a member of any professional societies they are affiliated with (just under 40 percent identifying 'a lot' or 'a great deal'). These percentages include only those researchers not responding with 'does not apply' to any community (between 95-98 percent across items). We also asked whose opinion respondents valued 'the most' from the same five options. Here, respondents could only select one of the five options. In contradistinction to the identity question, a substantial majority of respondents (65%) here chose the option 'a researcher within their scholarly community'.

Figure 2 shows the results of a multinomial logit regression of whose opinion researchers most value about their research on the covariates described above, showing predicted margins for career stage. The graph shows the estimated probabilities of researchers selecting each of the response options at different stages of their careers, at mean levels of all of the other covariates. We see that early

career researchers value their department members' opinions more than researchers who have progressed further through their career. We can also discern a general tendency such that the probability of caring most about the opinion of those in physical proximity decreases and of concerning oneself most about the good opinion of the broader scholarly community increases in later stages.

Figure 2: Predicted probability over career stage for valuing different groups' opinions

We next present the predicted probabilities for field (Figure 3). The medical sciences in particular are less likely than the other fields to be most concerned by the opinion of their scholarly community, and more likely to care most about the opinion of the professional bodies they are associated with.

Figure 3: Predicted probability over research fields for valuing different groups' opinions

Moving on to researcher self-identification, figure 4 shows the association between a researcher's field of research, the region in which they are located, the stage of their career, the length of their experience, their sex, employment type, sector and amount of time spend actively researching and how strongly they self-identify as researchers within polis and within cosmos. Each section of the graph shows the strength and direction of association of each category to cosmos or polis in relation to a base category, all other things being equal (with the exception of research active which is treated as a continuous variable). The base category from which comparisons are being made can be found in each case on the red line. The relationship with polis is shown in dark blue, and with cosmos in light blue and represent OLS parameter estimates with 95 percent confidence intervals.

We see then, for example, that for researchers of the same sex, from the same region and type of organisation, on the same types of contract, with the same level of experience at the same stages of their careers, spending similar amounts of time actively researching, being a researcher within the humanities or social sciences is associated with feeling less part of polis than for researchers in the natural sciences. Researchers in the humanities feel more part of cosmos than researchers in any of the other fields. Social and medical scientists feel more part of cosmos than natural scientists.

Being in the humanities is associated with a just less than half of a standard deviation lower score on the polis variable than is the case for researchers in the natural sciences.

There are no clear differences between researchers from different countries groups in how strongly they feel part of the community of researchers within their physical location. However, researchers from the UK, USA, Australia and Canada self-identify more strongly with their epistemic communities than do their European counterparts.

Figure 4: OLS regression estimates predicting polis and cosmos scores (n=55,041)

As might be expected, as their careers progress, researchers feel more part of both cosmos and polis than early career researchers do. Being a retired researcher is associated with more than half a standard deviation increase in how strongly one self-identifies with the "invisible college", cosmos, in comparison with early career researchers. Those who consider themselves to be mid-career researchers feel to be more part of cosmos and polis than early career researchers regardless of whether they have held their PhD for 5 years or more. We see that researchers within each stage of their career feel more part of polis and of cosmos if they have more than 5 years of experience than their colleagues with less than 5 years since obtaining their PhD or equivalent.

There is no difference in strength of self-identification with polis regardless of whether researchers work within or outside of academic organisations. Researchers outside of academia self-identify one-fifth of a standard deviation less with the wider epistemic community. More active research activity is associated with a stronger sense of belonging to polis and cosmos with an increase of just over one standard deviation in the polis score for researchers spending all their time actively researching compared with those spending none of their time currently, and .4 of a standard deviation on the cosmos score.

Researchers working without a permanent contract self-identify one third of a standard deviation less strongly with their immediate environment than researchers with a permanent contract. They self-identify one-tenth of a standard deviation less with the cosmos than their counterparts. Men self-identify slightly less with the cosmos than women but with no difference in their sense of belonging to the community of researchers within their polis.

Overall, being a researcher in the natural or medical sciences, being in the mid to later stages of your career, having more than 5 years' experience and a permanent contract, and spending more time actively researching are associated with greater levels of self-identification with the immediate working surroundings, the polis or "visible college".

Researchers in the medical and social sciences and especially the humanities, from UK, USA, Australia and Canada, in mid to later stages of careers, women, and based in academic institutions with permanent contracts and increased research activity show greater self-identification with the wider epistemic community, the cosmos or "invisible college".

The cosmopolitan academic and research integrity regulations

As the results of the survey indicate, an academic's local context can be conceptualised in rather opposite ways. On the one side as a geographical and/or physical location – a specific national setting, an institution, or a specific unit within this institution. On the other side as a particular epistemic community (epistemic culture, thought style, etc.) to which the academic can be said to belong. As shown, both these ways of thinking about the context are important when it comes to implementing regulations and guidelines for more responsible ways of conducting research. To succeed, such regulations must take national legislation and organisational specificities into account, but also have to be in line with the particular knowledge production standards of the epistemic community to which the academic belongs. Therefore, as briefly introduced in the previous sections,

we suggest thinking about contemporary academics as *cosmopolitan* academics, inspired by Ulrich Beck's concept of the cosmopolitan.

If we define research integrity as ENERI does, as "**…** the attitude and habit of the researchers to conduct their research according to appropriate ethical, legal and professional frameworks, obligations and standards" (ENERI, 2019), academics have a *both-and* obligation. They must meet legal standards and ethics requirements at their institution and in their country – as well as the professional standards of the epistemic culture to which they belong. However, there is no doubt that 'cosmos' in the form of transnational epistemic communities have become more and more important in academia over the last 40 years. Due to the development of communication technology, academics today know much more about what is going on in their field globally than previously. They also travel more, collaborate more, and publish more across national borders than before (See for example, Olechnicka, Ploszaj, & Celińska-Janowicz, 2019; Mads P. Sørensen & Schneider, 2016), and they do it in English, which has become the new *lingua franca* of the Academy, outmanoeuvring national languages for research purposes (Mads P. Sørensen, Young, & Pedersen, 2019). According to Wagner, we are experiencing a transformation from "a nationally centered scientific system to a global one in which researchers, not national authorities, set the rules." (Wagner, 2009, p 9). She calls this new system 'the new invisible college'. The old invisible college was the one formed by the correspondence and collaboration between researchers like Newton, Boyle and others in the 17th century via The Royal Society. According to Wagner, science today "still takes place at laboratory benches and field locations around the globe, but the communication structures that help drive advances in science and technology no longer rely primarily on national institutions. Instead, scientific networks operate and interconnect practitioners locally, regionally, and globally, with little regard for national borders." (p 51-52). It should be noted that Wagner's ideas and analyses received several critiques. For example, Arvanitis (2011) argued that Wagner simplifies and exaggerates the development towards the new invisible college. According to him, nation states still play a key role in science policy. The state is thus not withering away, but in some cases getting strengthened by scientific globalization. Arvanitis (2011) also thinks Wagner is too positive towards the development. He fears that the new invisible college may reinforce existing power structures and hierarchies within the global scientific community (e.g. North-South relations), rather than promoting more inclusive and equitable forms of scientific collaboration.

Research integrity is also not just about following legal or institutional requirements in the country and institution in which one works. It is also about the expectations and professional standards that are acceptable within the epistemic communities to which we as academics belong. In fact, the survey indicates the latter to hold prominence in researchers' contemporary understanding of what constitutes good science. The current cosmopolitan academic meets the standards of the epistemic community in, for example, international collaboration, journal peer review processes and at conferences. Often the standards are not that dissimilar, but sometimes there are relatively big differences between national/institutional requirements and the acceptable standards within the epistemic community. To give an example, ethical review processes have so far not been a general requirement for empirical studies involving human beings within the humanities and social sciences in all countries, but the epistemic community will typically expect ethical approvals of all empirical studies involving human beings. Even if acceptable at researchers' home institutions, the *polis*, many journals, constituting part of the *cosmos*, refuse to publish results from studies without such ethical approvals. Since access to these core academic outlets is commonly regulated through members of ones cosmos, rather than ones polis, this could explain researchers' strong sense of identification with cosmos.

Solidarity

The question then becomes, how researchers negotiate between the various, potentially conflicting, regulations and expectations posed upon them either by their polis or by cosmos. How do researchers balance their adherence to these diverse contexts in their daily research practices and how should research integrity guidelines take account of this?

One way of framing this discussion is via the concept of 'solidarity'. The notion of solidarity finds its sociological roots in the work of Durkheim after which various scholars have applied it in diverse contexts. Recently, Bieliauskaitė (2021) introduced the notion of academic solidarity and related it to issues of research integrity. She understands academic solidarity as 'a sense of community, unity, shared interests, shared responsibility and mutual support' (pg. 6) either within a given group of academics, or even across the boundaries of the academy reaching into society at large. In this, it is crucial to underline that solidarity can both have a positive and a negative connotation. In the positive sense, solidarity means an individual group that focuses on achieving the common goal of the academic community, for example by sharing data, providing peer support or mentoring. But solidarity can also come with a negative connotation when 'activities of members of these groups contradict or deny goals and values of academia, e.g. tolerance of a fellow's misconduct.' (Bieliauskaitė, 2021, pg 6). We should here also note that feelings of solidarity closely relate to having a set of shared goals. This means that the groups and people for which one feels solidarity with are inherently multiple and in constant flux. Therefore, the concept of solidarity can help us explain researchers' simultaneous and alternating feelings of solidarity for groups within their polis and cosmos.

Feeling solidarity for a given community comes with a desire of belonging to this community. Accordingly, one is likely to adhere to the accepted norms and professional standards within it. In case of very strong solidarity, it may even mean that one is willing to accept, indulge, or even cover up for community members in case of transgression of rules alien to the community. This is for example reflected in studies on prominent cases of misconduct, usually involving relatively small cliques of academics that form a strong network guided by their own (interpretation of) norms and regulations (Horbach et al., 2018).

Following the tradition of Durkheim, we thus note that rules – as well as guidelines - can only be effective if they align with solidarity structures within the group to be regulated. He notes that rules remain related to solidarity, they originated from it and are its indicators. But rather than creating rules to foster solidarity, effective rules are merely a "visible symbol" of social solidarity. They are a codified form of the most important moral norms and customs within a group. At the same time, rules act as a factor of solidarity, and their absence (anomie) as a factor and simultaneously as an indicator of a lack of solidarity (Gofman, 2014).

Related to the notion of solidarity is that of competition. Although the two are not mutually exclusive, they may act as an antagonistic pair. Indeed, the communities that we feel solidarity with and those that we compete with are usually fairly distinct. Considering the positive sense of solidarity, one requires a large community of solidarity to establish widespread agreement on regulations and their interpretation, hence demanding relatively low levels of competition. Simultaneously however, too little competition might lead to a state of affairs where academics have little incentive to monitor each other and act, for instance through whistleblowing, in case of

potential transgressions of norms. Despite competition often being considered as one of the drivers of QRPs and research misconduct, one could also argue for a slightly different understanding of competition, where competition besides jeopardizing good research practices also sometimes helps researchers live up to high standards. Again in line with Durkheim, we contend for an academic system in which the aim should not be to abolish competition, but to moderate it (Durkheim, 2014).

The above discussions, focusing on the cosmopolitan academic and academic solidarity, could form the basis for organisational and regulatory bodies to effectively establish and implement frameworks for research integrity. Recent years' development of academia towards cosmos, with bonds established through acts of solidary, points towards another concept that is important to think about, when conceptualising the local context of contemporary researchers, namely Benedict Anderson's concept of 'imagined communities' (Anderson, 2020). Like Anderson, who thinks of the national as a socially constructed community – as an *imagined* community – the starting point for any regulatory research integrity framework must be the 'imagined communities' of the researchers in question. Researchers' loyalty will always be directed towards their imagined research community, which is neither merely overlapping with the local institution or the epistemic culture, but a mix of the two, coinciding with those academics they feel solidarity with.

Discussion – fluid, multiple and situated identities

Relating the survey results to our conceptual discussion, we make several observations. First, both indicate that both geographical proximity *and* epistemic proximity are important. Researchers do not indicate to belong to either the one or the other, but rather feel committed to both of them. Second, the survey results testify to life in academia as one long socialisation process. This can also partly explain why many young scholars feel insecure and alone. They indicate to be more detached from the epistemic as well as the geographical local context than their more senior colleagues. This is especially the case for researchers holding temporary positions. Compared to their permanently employed colleagues, they self-identify less with both communities in polis and cosmos, raising the question about how these scholars are best regulated. If they are unlikely to express solidarity with neither their geographically or epistemically close colleagues, compliance with rules from either community might be at stake. Third, over time, a slight shift from self-identifying as a researcher in polis to identifying as a researcher in cosmos tends to occur. We note again though, that from the survey data alone, it is unclear whether this constitutes a cohort or a socialisation effect. Lastly, researchers working in fields characterised by frequent collaboration on a day-to-day basis in physical constellations, e.g. in a lab in the medical and natural sciences, tend to place more value in their institutional local context than researchers from fields lacking such collaborations (e.g. the humanities). The latter instead tend to value their epistemic communities higher.

Both our conceptual understanding and the survey results stress the necessity of taking institutional and organisational as well as epistemic proximity into account when developing research integrity guidelines. This aligns well with previous research, mostly in educational sciences, related to the notion of researcher or academic identity Similar to what our discussion and survey results suggest, studies on researcher identity tend to conceive of it as being socially constructed, dynamical and multiple. Acknowledging that a researcher's identity is likely situated, fluid and context dependent, requires one to properly address it under the circumstances at hand. Regarding research integrity, this seems to include primarily taking stock of researchers' epistemic and scholarly communities, embedding guidelines in the practices deemed appropriate within these networks. Simultaneously,

institutional networks seem to be relevant, whereas national networks, a level at which research integrity regulations often tend to occur, seem to be less significant. We note that, apart from the categories discussed above, researchers may identify with other social groups as well. This may particularly include groups based on gender, (academic) age, or cultural characteristics. In addition, even within the categories mentioned in our survey, researchers can identify with multiple communities, e.g. researchers working in interdisciplinary contexts, bridging multiple epistemic communities, or researchers having multiple institutional affiliations.

On top of the aspects mentioned thus far, notions of power have previously been put forward in relation to research integrity discourses (Horbach, Breit, Halffman, & Mamelund, 2020). Relevant to our current discussion, we note that Durkheim, and later Foucault, have discussed the role of power as a driving force in shaping solidarity and communities. It plays both a role in prioritizing the communities that one wants to belong to as well as in the internal structures and norm-setting practices within such a community (Bieliauskaitė, 2021; Gofman, 2014). These power differences may manifest themselves in academic ranks or a particular type of status that an individual has accrued. However, likely most significantly, power imbalances may occur with respect to individuals' access to resources or their ability to distribute such resources to others (Lukes, 2005). This may partly explain researchers' prime interest in their scholarly communities' opinion, as the peers in this network have the prime power of allowing them access to fundamental resources in academia's quest for credit and recognition, including options to present their work in relevant journals and at relevant conferences, access to collaborative networks, and reward in the form of citations, academic positions and grants (Hessels et al., 2019; Latour & Woolgar, 1986; Valkenburg, Dix, Tijdink, & de Rijcke, 2021). Just as researcher identities, power balances and power dynamics are inherently fluid and situated. Hence, both factors mutually shape and condition each other. In order to ensure that novel guidelines and regulations actually have a positive effect on research practices, it therefore seems imperative to properly identify not only research communities, but also the power dynamics within such communities and the way in which they shape access to crucial resources.

The way and extent to which academics self-identify with a host of diverse academic communities is of broader interest than merely for implementation of research integrity policies. As mentioned above, many day-to-day decisions regarding research collaboration, academic mobility, and publication strategies are based on community norms and tend to strongly vary between communities. Therefore, the findings of our study provide hypotheses for the relative importance of different communities on individual researcher's choices and decisions. However, we must be careful when generalising our findings. Even though the survey questions analysed in this manuscript do not explicitly refer to research integrity, they are embedded in a survey strongly related to this theme. As self-identification to different communities vary depending on the context at hand, more research is needed to examine the extent to which our findings predict academics' sense of belonging to research communities in general.

Conclusion - towards a realistic regulatory framework for research integrity

Even though 'cosmos' seems to be playing a bigger and bigger role for contemporary academics, they are all still situated in a polis, i.e. in a particular physical and geographical context. Therefore, a

regulatory framework for research integrity must be able to embrace both contexts. Research integrity regulations have to take place locally – at concrete institutions – but to be successful, they must also be able to incorporate the academics' wider sense of community. Any mismatch between the regulatory frameworks' understanding of the context in which the academic works and the cosmopolitan academic's imagined community will lead to malfunctioning regulations, to guidelines considered illegitimate, bureaucratic, and burdensome - and to misalignments between specified standards for good research and actual research practices.

Therefore, we must pay attention to the composing aspects of contemporary academic communities. This involves more than merely taking stock of perceived or declared characteristics of communities or its members. Communities are indeed made up of members, who have similarities in the mind of the classifier as well as of interrelations between members in reality. But communities are also rhetorical, they exist by being invoked, represented and presupposed (Baudry, Tancoigne, & Strasser, 2021) and require effort to be maintained. Research integrity policies and regulations can play an important role in this rhetorical endeavour. Therefore, we urge regulators to take close stock of researchers' imagined communities – defined by boundaries of solidarity and including both polis and cosmos – before crafting and implementing novel research integrity regulations. Understanding these communities is critical if research integrity policies are to be accepted and adopted by researchers.

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Table 1: Researchers' self-identification with diverse communities

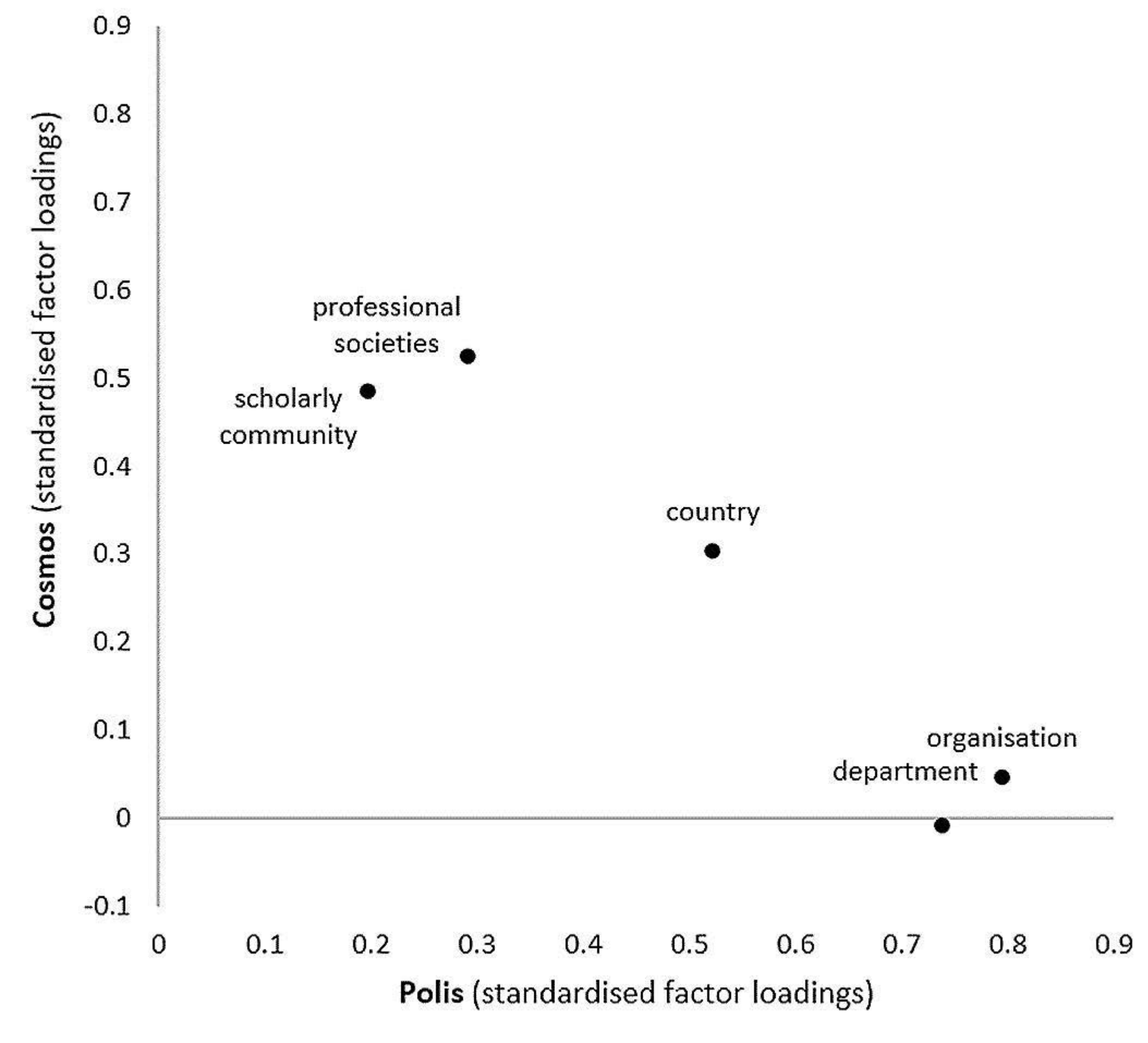
Thinking about your role as a researcher, how much do you identify as each of the following:		A great deal	A lot	A moderate amount	A little	Not at all	Opinion value the most
	(n)	(%)	(%)	(%)	(%)	(%)	(%)
A researcher of my department or centre	*(60,082)*	46	25	17	9	3	12
A researcher of my organisation	*(59,035)*	35	28	22	11	4	6
A researcher within a scholarly community	*(59,898)*	30	24	23	15	7	65
A researcher of the country where I am currently working	*(59,941)*	20	21	27	21	10	7
A member of professional societies I am affiliated with	*(57,761)*	18	21	26	21	14	9

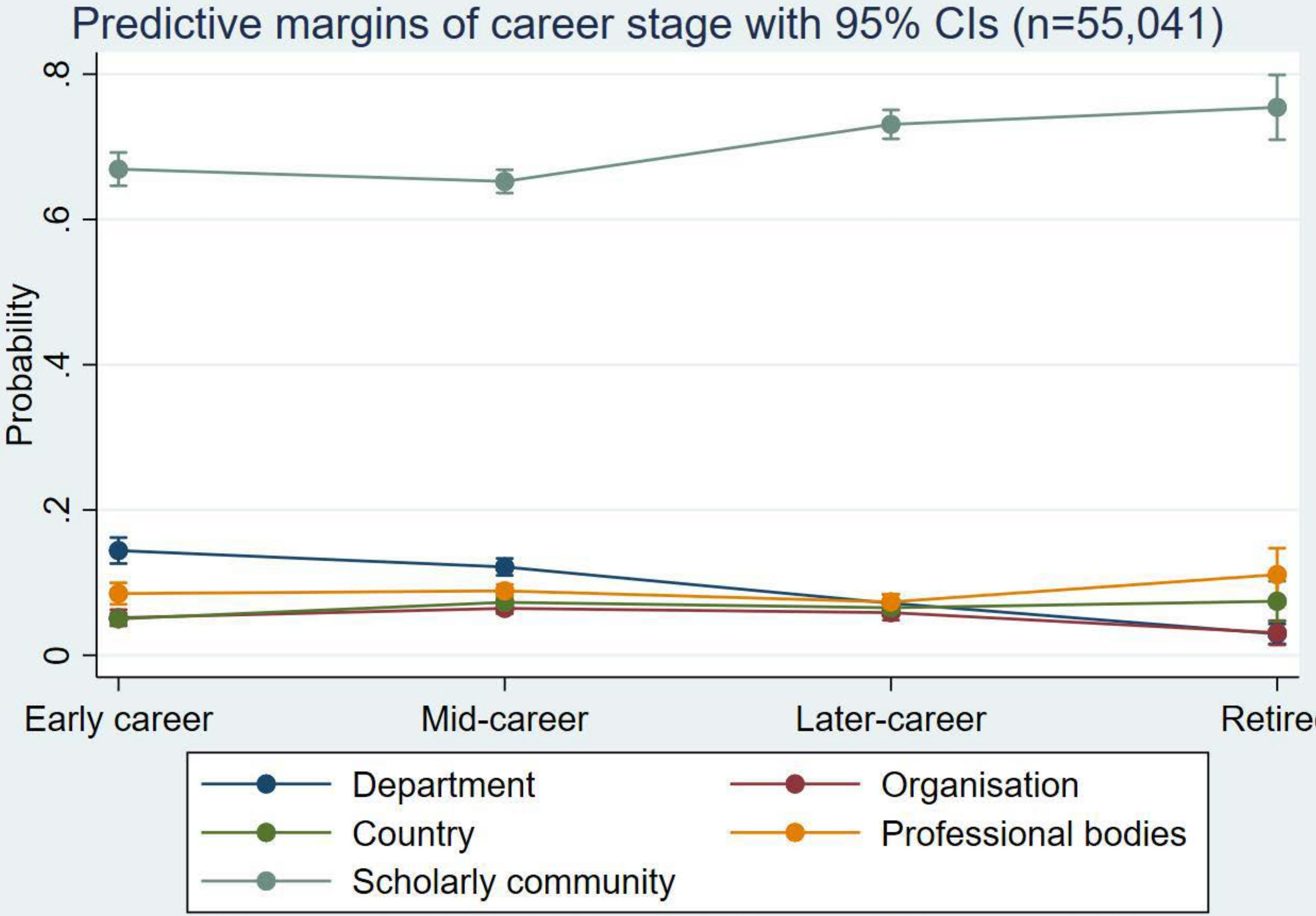
Figure 1: Rotated factor loadings from exploratory factor analysis (n=54,675)

Figure 2: Predicted probability over career stage for valuing different groups' opinions

Figure 3: Predicted probability over research fields for valuing different groups' opinions

Figure 4: OLS regression estimates predicting polis and cosmos scores (n=55,041)


0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
Cosmos (standardised factor loadings)
professional societies
scholarly community
country
organisation department
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Polis (standardised factor loadings)


Predictive margins of career stage with 95% CIs (n=55,041)
Probability
0
.2
.4
.6
.8
Early career
Mid-career
Later-career
Retired
Department
Country
Scholarly community
Organisation
Professional bodies

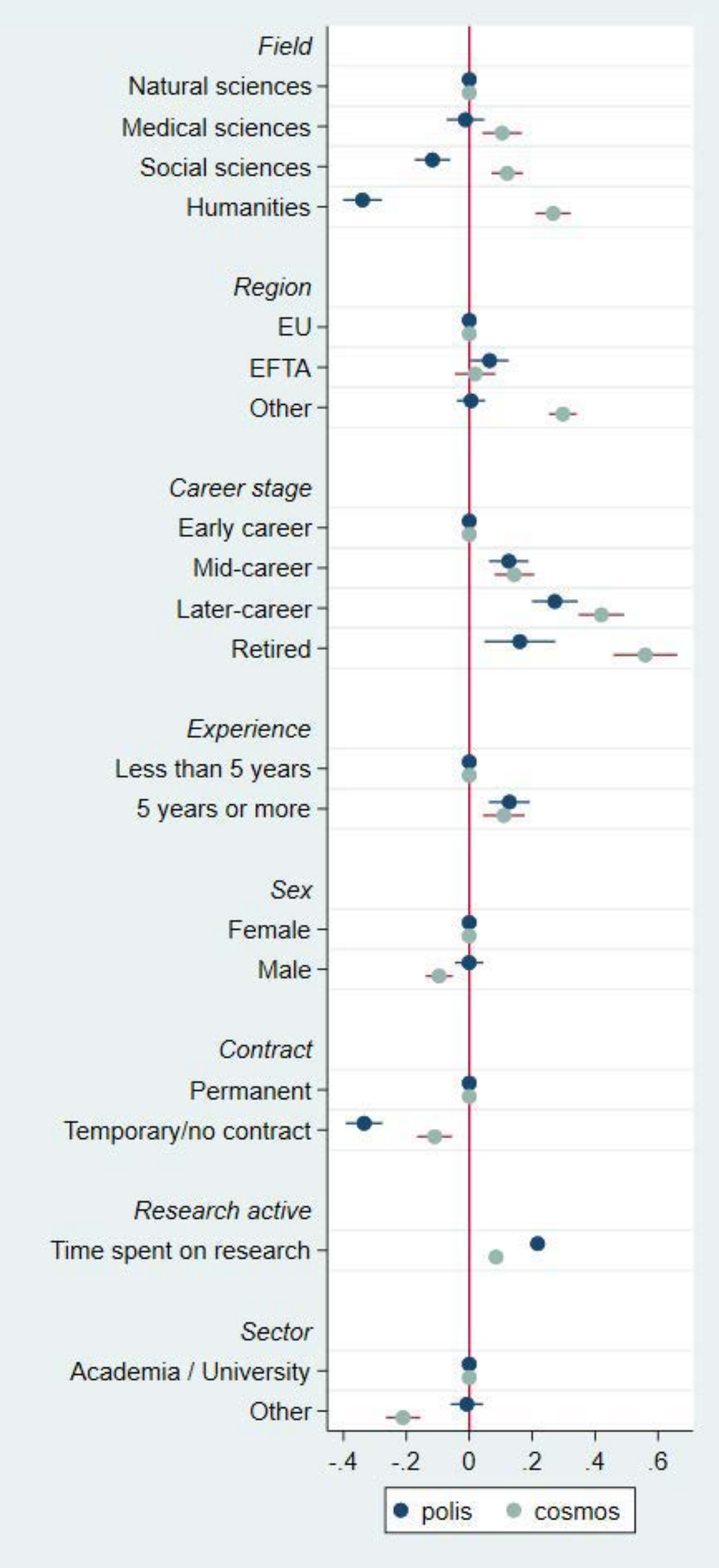
Predictive margins of field with 95% CIs (n=55,041)

Probability

0
.2
.4
.6
.8

Natural sciences
Medical sciences
Social sciences
Humanities

Department
Country
Scholarly community
Organisation
Professional bodies


Field
Natural sciences
Medical sciences
Social sciences
Humanities
Region
EU
EFTA
Other
Career stage
Early career
Mid-career
Later-career
Retired
Experience
Less than 5 years
5 years or more
Sex
Female
Male
Contract
Permanent
Temporary/no contract
Research active
Time spent on research
Sector
Academia / University
Other
-.4
-.2
0
.2
.4
.6
polis
cosmos