



Societal impact of university research in the written press: media attention in the context of SIUR and the open science agenda among social scientists in Flanders, Belgium

Hans Jonker¹ · Florian Vanlee¹ · Walter Ysebaert¹

Received: 15 October 2021 / Accepted: 1 April 2022 / Published online: 27 April 2022
© Akadémiai Kiadó, Budapest, Hungary 2022

Abstract

Transferring scientific knowledge to non-academic audiences is an essential aspect of the *open science* agenda, which calls for scholars to pursue a *popularization* of their research. Accordingly, purposefully introducing scientific insights to the public at large is almost univocally deemed commendable. Indeed, in today's models of research evaluation, the objects and activities considered are being extended beyond peer-reviewed journal articles to include non-scholarly *popular* communication. Although *altmetrics* offer one instrumental way to *count* some interactions with lay audiences, their reliance on social media makes them susceptible to manipulation, and mostly reflect circulation among niche audiences. In comparison, attention from non-scholarly media like newspapers and magazines seems a more relevant pathway to effectuate societal impact, due to its recognition in qualitative assessment tools and its broad, societal reach. Based on a case study of social scientists' attention by newspapers and magazines in Flanders (northern Dutch-speaking region of Belgium) in 2019, this paper highlights that frequent participation in the public debate is reserved for high-status researchers only. Results show highly skewed media appearance patterns in both career position and gender, as eight male professors accounted for almost half of all 2019 media attention for social scientists. Because media attention is highly subject-dependent moreover, certain disciplines and fields offer easier pathways to popularization in media than others. Both the open science agenda and research assessment models value presence of researchers in popular media, adding written press attention to existing evaluation assessments however would disproportionately disadvantage early career researchers and exacerbate existing inequalities in academia.

Keywords Science communication · Societal impact · Science popularization · Content analysis · Research evaluation · Open science

✉ Hans Jonker
hans.jonker@vub.be

Florian Vanlee
florian.hendrik.j.vanlee@vub.be

Walter Ysebaert
walter.ysebaert@vub.be

¹ Centre for R&D Monitoring (ECOOM), R&D Centraal, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Elsene, Belgium

Introduction

The term *scholarship* is often shorthand for academia as such, but this specialized activity covers only part of the communicative practices researchers engage in (Wissler, 1997, pp. 95–96). Researchers not only publish their findings and insights in peer-reviewed journal articles or edited volumes, but increasingly feature in non-academic media too. Some are highly active users of social media, using platforms such as Twitter to interact with both scholarly and lay audiences (Davies & Hara, 2017). Others take on more specialized communicative roles, formulating research-based advice for policy and governance (Bielak et al., 2008). Still others cultivate a habitual presence in newspapers or television, bringing scientific expertise to bear on topical issues in the public debate (Johnston, 2017). Surely, scholarly texts are still the main outlet for academic research and provide a legitimized discursive space to present and debate research approaches and findings, but they do not cover their full circulation and reach.

Increasingly, the importance of non-scholarly communication is advocated in the context of *open science* principles (Bucher, 2019). Pointing to traditional scholarly publishing's inaccessibility to society at large—both in terms of financial thresholds (Rentier, 2019) and the density of academic jargon (Cribb & Tjempaka, 2010)—proponents prioritize making scientific knowledge publicly available for everybody. While stimulating open access publishing offers one pathway to implement open science principles (Holbrook, 2019), its reliance on classical modes of scholarly communication continues to present challenges to lay audiences, which often lack the precognition needed to distill relevant insights from texts essentially written for peer specialists (Cribb & Tjempaka, 2010). Similarly, calling for the free accessibility of research data (Gewin, 2016) to be analyzed by whomever willing to do so does to an extent democratize science, but is again predicated on people's ability to engage and interpret the material (Newman et al., 2012). Therefore, many also endorse purposeful transfers of scientific knowledge to society as another essential track in the open science project. Popularizing research processes and findings via non-scholarly media allows researchers to represent science in the public sphere (Burns & Medvecky, 2018) and disseminate otherwise hermetic knowledge to broad segments of society. Like open science advocacy in general, the priority given to *science communication* (Bucher, 2019) in pursuit of science democratization (Holbrook, 2019) is predicated on the conviction that doing so offers opportunities to enhance the positive societal impacts of research. Open science's underlying idea is not just that people are entitled to information resulting from publicly funded research activities, but that its availability benefits society too (Holbrook, 2019). Consequently, arguments for researchers to explore non-scholarly media as an outlet to discuss investigations and their findings tend to emphasize that doing so will have beneficial results in society (Besley et al., 2016). Many researchers refer to achieving societal impact through their work as a core motivation to engage in popular communication (Valinciute, 2020), and illustrates that non-scholarly communication is at least one pathway for university researchers to pursue broader public benefits through their work.

This need to look beyond strictly scholarly output like peer-reviewed journal articles or edited volumes is also recognized by a growing number of research evaluation frameworks (Mingers & Leydesdorff, 2015; Watermeyer & Hedgecoe, 2016). In recognition of the criticism of purely bibliometric instruments to assess scientific performance (Donovan, 2019), contemporary modes of research evaluation are increasingly attentive for indications of excellence beyond traditional academic quality indicators such as impact factors and citation rates (Muhonen et al., 2019). Because the reduction of scientific achievement

to academic recognition alone may have harmful effects on research and its practitioners (Fochler et al., 2016), recent years have witnessed an extension of the objects considered in research evaluation at all levels (e.g. individuals, organizations). These range from relatively straightforward economic outcomes like patents and spin-offs (Mingers & Leydesdorff, 2015) to less easily defined beneficial effects on society (Watermeyer & Chubb, 2019). This latter category in particular, emphasizes the *societal impact of university research* (SIUR) as a key element for more holistic constructions of scientific excellence (Sivertsen & Meijer, 2020; Smit & Hessels, 2021). It has brought non-scholarly forms of communication to the interest of research evaluation, both in science studies (Fecher & Hebing, 2021; Kassab, 2019) and assessment instruments (Muhonen et al., 2019). For instance, novel quantitative tools like *altmetrics* seek to attribute a certain degree of societal recognition based on non-scholarly communication (Sud & Thelwall, 2013). The concept of altmetrics refers to “all metric techniques measuring new forms of performing, discussing or communicating science, especially through social media. It captures different forms of engagement with an article, a scientist or a theory.” (Rousseau et al., 2018, p. 4). Altmetrics are the result of a long history in bibliometrics, during which (alternative) metrics were systematically extended (Rousseau et al., 2018). Here, the argument parallels traditional bibliometric logics that treat citations as a proxy for academic recognition: references to scholarly works in non-scholarly sources are regarded as indicative of a certain societal recognition they enjoy (Bornmann et al., 2019). Regardless of the ongoing expansion of the sources considered by altmetrics, however, their indication of SIUR is considered limited at best (Bornmann, 2013). The reliance on social media renders them prone to *academic spamming* (Erdt et al., 2016), and posts from academics tend to circulate mostly among other academic users (Zhou & Na, 2019). Written media like newspapers and magazines are therefore seen as more legitimate sources to investigate knowledge transfers and societal contributions by researchers. Qualitative approaches to assess researchers’ pursuit of SIUR, like the impact cases used in the UK’s *Research Excellence Framework* (REF) (Watermeyer & Hedgecoe, 2016) or the SIAMPI¹ method (de Jong et al., 2014), habitually admit non-scholarly communication as a modality of *potential* SIUR. Here, the idea is that science communication and popularization through mainstream media is a clear *precondition* for a societal impact too diffuse to directly attribute as a causal effect of research (Smit & Hessels, 2021). These approaches view clear forms of non-scholarly communication as beneficial societal contributions, regardless of whether they result in measurable SIUR or not. When academics lend their expertise to address relevant topics in newspapers or current affairs programs, the expectation is that they transfer and popularize recent knowledge (Burns & Medvecky, 2018). This, in turn, potentially effectuates societal impact, either in a general sense (cf. the democratization of scientific knowledge), or in a specific sense (cf. the transfer of societally relevant insights).

Considering that the performance evaluations of universities and academics are undergoing unprecedented expansion in both considered objects and measures (Mingers & Leydesdorff, 2015; Watermeyer & Hedgecoe, 2016), it is not at all unthinkable that documented instances of researchers’ presence in the written press might be integrated into existing assessment tools. At first, there is the endorsement of science popularization in traditional media in the open science agenda (Cribb & Tjempaka, 2010; Rentier, 2019). Second, the recognition of documented mainstream media presence in (qualitative) SIUR evaluations (Kassab, 2019;

¹ SIAMPI stands for *Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions between science and society*.

Smit & Hessels, 2021) is also increasing. Thirdly, there is the emphasis researchers place on lending their expertise to the media in pursuit of societal benefits (Fecher & Hebing, 2021). These three arguments would certainly lend legitimacy to such an integration is emerging in the minds of policymakers. Newspaper articles and magazines are especially likely candidates for this integration because of their similarity to traditional publications; they are largely disambiguated and *citable*. In fact, private service providers like the Dutch company *Science-Works* already monitor annual references to university researchers in Dutch newspapers as one component of their *Impact Ranking*, which purports to rank Dutch universities by various parameters that would approximate their societal impact. But although featuring in the media is advocated (1) in the name of open science (Bucher, 2019), (2) habitually recognized in qualitative SIUR assessments (Watermeyer & Hedgecoe, 2016) and (3) cited by researchers as a way to pursue non-academic impact (Fecher & Hebing, 2021), little empirical evidence exists that supports or refutes its perceived merits. It remains unclear, for instance, whether merely featuring in written press coverage necessarily signals a *significant* contribution by researchers. Similarly, questions persist about the extent to which the written press engages researchers and their work, or about the role journalists and other gatekeepers play herein. Accordingly, this paper acknowledges that the presence of scientists and science in the written press can be a relevant pathway to SIUR, and can certainly contribute to opening up academic research to broader segments of society. But it is also critically aware of the often hasty integrations of new or alternative outcomes and activities in research assessment tools, sometimes to detrimental effect for researchers, their institutions and science in general (Ràfols, 2019). Therefore, patterns in the presence of scientists in these media are examined to investigate the extent to which researchers receive equitable access to these outlets. Furthermore, it examines the level to which their contributions amount to both knowledge transfers and science-based interventions in the public debate.

Based on a quantitative and qualitative content analysis of social scientists' newspaper presence in 2019 in Flanders, the Dutch-speaking Northern region of Belgium, the present paper explores in depth who emerges in broadsheets, and addresses the types of coverage social scientists feature in. In doing so, it first establishes how written press attention is particularly selective, with a small group of male professors accounting for almost half of yearly newspaper coverage. After addressing this skewedness in the data more comprehensively in terms of career position and gender, the paper subsequently highlights how newspaper presence of scholars is predominantly a *responsive* phenomenon, where scholars are called upon because of their expertise or authority on the subject at hand. Demonstrating that journalists decide how research is reflected in most instances of written press coverage, the study highlights how presence in newspaper reporting amounts to self-authored science communication in limited cases only. Based on these empirical analyses, the paper contributes to both the literature on open science, and to ongoing discussions about societal impact in research evaluation. Firstly, it argues that the open science agenda must be attentive for the unequal access researchers have to mainstream media. Secondly, it cautions against simplistic integrations of written press objects in research assessment schemes to account for societal impact.

From peer-reviewed publications to the public debate

Despite growing interest in contemporary research governance in rewarding alternative research activities and outcomes (Mingers & Leydesdorff, 2015), publication-based measures remain a dominant determinant to assess academic excellence (Spooner, 2018).

Although academics are primarily interested in publishing specialized work for peers, some of them also participate in the public debate. From marine biologists who are interviewed in newspaper articles about climate change and rising sea levels, to biochemists elaborating on innovative cancer treatments in current affairs, to economists with regular columns in newspapers: scientists habitually feature in mainstream media (Anderson et al., 2020). Obviously, their motivations to do so may vary. Presumably, some academics pursue visibility in mainstream media to achieve a degree of celebrity outside of their field of research (Fahy, 2017), whereas others seek to reach out to the general public in order to convey a sense of urgency brought by recent scientific insights (Cox, 2013). Scientists can also participate in the public debate because they consider it an inherent responsibility (Valinciute, 2020).

The open science agenda endorses active participation of researchers in the public debate through their presence in mainstream media (Bucher, 2019). Science popularization and—communication are often explicitly endorsed as one specific pathway to increase the *openness* of research to the public (Lakomý et al., 2019), which in many cases provides the funding needed to conduct inquiry in the first place (Rentier, 2019). Just as academics should try to carry weight in their field by publishing scholarly texts, they should also look for opportunities to put their expertise and insights at the service of society (Peters, 2008). Of course, interventions like these might target particular segments of society, like a personal following on social media platforms (Davies & Hara, 2017) or a specific group of stakeholders participating in institutionally supported outreach programs (Olesk, 2021). A more general role in the public debate is particularly valued, as it is seen as a direct attempt to make the expertise and insights of scientists accessible to large audiences (Bucher, 2019; Peters, 2008). This articulates a specific appreciation of an *heterogenous* public that does not actively seek scientific insights, but does benefit from their availability in mainstream media ecosystems (Burns & Medvecky, 2018). The broad collective of people reached is what distinguishes a presence in newspaper reporting, radio broadcasts or television programs from the relative enclosure of Twitter bubbles (Zhou & Na, 2019) or the opacity of direct exchange between scientists and a select group of societal stakeholders (de Jong et al., 2014).

The specific importance for academics of addressing the sizeable, diverse and not necessarily interested audience of mainstream media is evident in the many references to such cases when researchers bring up the societal impact they believe they have facilitated. A prominent strategy among researchers is to rely on attention from mainstream media, this provides non-academic benefits which complement scientific recognition (Fecher & Hebing, 2021). Many feel that using their privileged insights to weigh on the public debate is a key responsibility (Valinciute, 2020), and that research-based opinions benefit societal debates. Public debate requires factual information, and researchers are especially well-placed to provide the public with the most up-to-date insights (Burns & Medvecky, 2018; Peters, 2008). Bringing scientifically sound information to the public debate through media with a large and diverse consumer base is considered a beneficial and laudable pursuit for researchers. In order to expand conceptions of academic excellence, more and more funding bodies and national governments seek to include SIUR in allocation models as well (Smit & Hessels, 2021). This has opened up opportunities for scholars to present their appearance in mainstream media as an indication of the beneficial role their research exerts on society. As a result, being consulted by journalists for specific expertise, and garnering attention from mainstream media for particular projects or results or popularizing the findings of research via the popular press is habitually submitted and admitted as evidence of societal contributions made by researchers when non-academic impact is assessed

(Holbrook, 2019; Smit & Hessels, 2021; Watermeyer & Hedgecoe, 2016). Again, the recognition of such instances articulates a widely shared conviction that the public circulation of scientists' view about topics they have particular expertise in is valuable and beneficial, to the extent that the potential impact it has can be rewarded by funding mechanisms.

Although the assumption that society benefits from featuring factual, research-based contributions from academics is hardly controversial, there is no solid evidence for assuming that the presence of researchers in mainstream media is as such consequential, or that pursuing it is rewarding. For one, popular media are hardly unbiased platforms ready to serve as a neutral conduit for what researchers have to offer (Burns & Medvecky, 2018). Mainstream media operate by their own—often competition-based—logics (Olesk, 2021). As such, the belief that scientists would have an *equal* opportunity to access mainstream media as a platform to make research-based contributions to society would border on naivety, as previous research underlined how media attention for scholars is strongly status-dependent (Dudo, 2013; Dunwoody et al., 2009; Jensen et al., 2008). While particular areas of expertise are met with academic recognition in scholarly communication, for instance, their interest to the public debate could well be meagre at best. And even though early career researchers may hold specifically relevant knowledge about current issues in the public debate, their relative discretion or scarce credentials might impede their presence in mainstream media. Consequently, further research into the actual presence of researchers in traditional outlets like newspaper reporting or broadcasting is needed to further reflect on (1) what the role of scientists in mainstream media is, (2) in which ways they are able to transfer what they know to the public at large, and (3) whether it is warranted or even wise to actively endorse this pursuit.

Scholars in broadsheets: Flemish social scientists in the written press

When appearances of researchers in mainstream media are related to SIUR, both in impact assessments (see Kassab (2019); Watermeyer and Chubb (2019)) and research (Bauer & Jensen, 2011; Dudo, 2012; Fecher & Hebing, 2021), they are mostly self-reported. This provides relevant insights, but is insufficient for the purposes of the present paper. It also relevant to assess those instances of which scholars themselves are unaware. Today, mainstream media habitually seize upon opinions publicly expressed on social media platforms (Paulussen & Harder, 2014), meaning that researchers are not always necessarily aware of their media appearances. Similarly, written press coverage effectuating SIUR might in some cases be traced to press releases (Autzen, 2014) or productive publications (Anderson et al., 2020), again supporting the inclusion of documents researchers might be unaware of. At the same time, focusing only on press releases or publications would not fit the purposes of the present study either. Where analyses of the relation between academic recognition and mainstream media attention yield valuable insights (Anderson et al., 2020; Jensen et al., 2008), it is reductive to constrain potential instances of SIUR facilitated by popular media coverage to those instances that explicitly address identifiable scientific publications. Due to the logics of mainstream media, research is likely to be *personalized* (Fahy, 2017), making it likely that most instances of scientists appearing in the written press do not strictly *cite* a specific publication. Instead, academics may *popularize* the knowledge and insights they have generated over the course of their research activities, without (formal) recourse to the scholarly publications that report these findings to peer audiences. Consequently, it is necessary to look at instances where scholars' names appear

Table 1 Descriptive summary of researchers sample (N = 1581)

Gender and university affiliation	<i>n</i>	%
Career position		
Predoc	888	56.2
Postdoc	340	21.5
Professor	314	19.9
Emeritus	39	2.5
Gender		
Female	766	48.5
Male	815	51.5
University ^a		
KU Leuven	395	25.0
UAntwerpen	411	26.0
UGent	290	18,3
VUB	485	30.7
Total	1581	100.0

^aUniversiteit Hasselt was not included, as it has no social science faculty

in press documents, thus including both known and unknown cases of media coverage in the analysis.

These considerations are reflected in the data collection for the present study, which prioritized the creation of a temporally demarcated, exhaustive set of written press documents explicitly referring to researchers working at one of the four social sciences faculties from universities in Flanders. Using the *Flemish Research Information Space* (FRIS), an opensource data portal on researchers and their research in Flanders,² we identified a total of 1.581 active social scientists³ (predocs, postdocs, professors and emeriti) for analysis (see Table 1). In doing so, the study applied institution-based inclusion criteria: we collected the information of each researcher working at a social science faculty funded by the Flemish Community (cf. *Katholieke Universiteit Leuven* (KU Leuven), *Universiteit Antwerpen* (UAntwerpen), *Universiteit Gent* (UGent) and *Vrije Universiteit Brussel* (VUB)), including micro- and meso-level organizational units in those faculties, such as departments (e.g. *Department of Communication Science*, UGent), specialized institutes (e.g. the *Herman Deleeck Centre for Social Policy*, UAntwerpen) and research groups (e.g. the *Research Centre on Gender, Diversity and Intersectionality*, VUB). Our choice to investigate social scientists in particular reflects the more pressing demand for alternative quality indicators for social sciences and humanities disciplines (Gijssels & Steenssens, 2011). Subsequently, the names of each active researcher at a Flemish social science faculty were queried in *GoPress*. This online database operated by press agency *Belga* collects all articles published by Belgian outlets with national circulation, and allows downloading them as individual PDF-files. Reducing the scope to Dutch-language outlets alone,⁴ we collected

² Vlaamse overheid – Departement Economie, Wetenschap en Innovatie.

³ In this context, *active* refers to researchers that occupied a documented mandate in 2019. When researchers had multiple affiliations, the institution they mainly worked for was selected. Invited international researchers were present in the FRIS-database and where therefor included.

⁴ A full list of the included titles can be consulted as an appendix to this paper (cf. Appendix 1).

all instances of written press attention for each individual researcher. We focused on Flemish newspapers and magazines due the Dutch-speaking media ecosystem in Flanders, excluding media from the French-speaking southern region of Wallonia. In the course of this process, we filtered out namesakes, and removed impertinent documents, for instance coverage for other reasons than university research (e.g. because of a political mandate). Rectors were excluded in the analysis, as they were featured in the media due to their mandate of rector and not because of media coverage of their research.

For this explorative analysis, we limited data collection to written press documents published from January 1st 2019 to December 31st 2019, as 2020 and 2021 were expected to be atypical periods due to the prominence of the covid-19 pandemic in the mainstream news media, which are beyond the scope of present study. Ultimately, these iterative steps resulted in a dataset of researchers with a documented presence in written press articles of 234 individual social scientists (DS1), and a dataset of full-text written press documents totaling 2526 individual entries (DS2). Initially comprising only of researchers' full names, university and departmental affiliations, DS1 was enriched by adding information on gender, career status (cf. predoc, postdoc, professor, or emeritus) and scientific publication count (as provided by FRIS). This allowed for descriptive analyses of variations in the researchers present in written press documents, highlighting which particular profiles are more prominent than others. DS2 on the other hand consisted of the collected written press articles ($N=2526$), which were coded using NVivo 12 software according to their type of media attention (e.g. discussion of research).

Results

Social scientists in Flemish written news media: public intellectuals, status and gender

Due to the scarcity of existing figures, it is difficult to qualify the 2526 individual instances wherein named social scientists appeared in Flemish written press outlets in 2019, but these figures do point at a habitual presence of at least a fraction of this particular research community in domestic newspapers and magazines. However, it should be noted that this figure requires some nuance due to the relatively high media concentration in Flanders (Hendrickx & Ranaivoson, 2019). As a few conglomerates own various newspapers or magazines, content tends to migrate quickly from an original source to other titles owned by the same holding. Consequently, the *amount* of articles on individual researchers does not necessarily misrepresent the potential reach of their contribution—as it is disseminated by various outlets, presumably creating a larger audience—but it does skew any claims that could be based on the *incidence* of mainstream media attention. We therefor assume that mentions of science in the written press are a precondition for potential SIUR as they contribute to the opening up of science. While this paper cannot state a *measured* impact from media mentions in written press documents, it does demonstrate dominant patterns in media attention for scholars. This sets a context in which scientists undertake popularization activities.

In terms of the social scientists themselves, the fact stands out that only 234 out of 1581 (14.8%) researchers included in DS1 were mentioned by newspapers and magazines in 2019, meaning that 85.2% of researchers did not appear at all. In fact, appearances in the written press were highly skewed altogether, as the eight most prominent researchers⁵ in DS1 accounted for almost half (48.6%) of all media mentions in 2019. Their presence in the written press is solidified by commissions to write weekly columns on broad topics and current affairs, which offers opportunities to partake in popular public debates from a research-based position. Logically, these *whales* in the field of media attention constitute remarkable outliers, and correspond with what others have dubbed as a *public intellectual* (Posner, 2003) or a *celebrity scientist* (Fahy, 2017): an exceptional type of researcher who can be seen as a part of a *scientific elite* (Jensen et al., 2008) and is responsible for a large amount of popularization activities. On the one hand, one can conceptualize these public intellectuals as being rewarded with media attention because of their excellent outreaching efforts and their talent for translating complex scientific knowledge into concise interpretations on current affairs. These professors are able to *translate* their academic *symbolic capital* (Bourdieu, 1984) into public arenas, “thus popularizing not only on issues directly related to their own domain but on virtually any issue.” (Jensen et al., 2008, p. 536). On the other hand these *visible scientists* (Goodell, 1977) have become *adopters of media logic* (Olesk, 2021) and have—supported by increasingly routine institutional PR-strategies—established a public reputation not just based on their scientific activities but based on their past public involvement as an expert on the topic at hand. Here, a self-reinforcing dynamic named the *Matthew effect* appears, as previous visibility translates into further media presence (Bucchi, 2014). With eight professors being responsible for almost half (48.6%) of 2019 media presence, these few public celebrities are indeed at the top of a pyramidal structure (Bucchi, 2014), being consulted on broad *societal topics* and not just their specific field of knowledge. Expanding on the role and implication of these public intermediaries between science and society needs a dedicated investigation, and cannot be further explained here.

Even after correcting for outliers like these public intellectuals, scholars with professorial positions were, on average, more than twenty times more likely ($M=2.96$; $SD=7.32$) to be mentioned in the written press of 2019 than predocs ($M=0.13$; $SD=0.88$) and more than six times more likely than postdocs ($M=0.47$; $SD=1.78$). Accordingly, receiving access from newspaper and magazine reporting seems to be easier for scholars with higher career positions. Of course, this is partly informed by longer careers, meaning that professors simply have more scientific publications and thus more demonstrable expertise to which journalists can have recourse. When #mentions in 2019 media were correlated with #scientific publications after controlling for #years active as a researcher, the data suggests that media appearance remained significantly status dependent ($\beta=0.331$, $p<0.001$). Professorial titles and the positions of power they give access to (e.g. heading a research institute, holding a distinguished lectureship), seem to be perceived as an earmark of expertise in mainstream media. This entails not only a voice of authority in a single or particular study domain, but also a certain legitimacy to speak in the name of the research institute instead of a personal viewpoint (Boltanski & Maldidier, 1970; Jensen et al., 2008). This, together with the fact that just over half (52.1%, cf. Table 2) of the social scientists that

⁵ Prof. dr. Carl Devos (UGent), prof. dr. Dave Sinardet (VUB), prof. dr. Bart Maddens (KU Leuven), prof. dr. Ive Marx (UAntwerpen), em. prof. dr. Mark Elchardus (KU Leuven), prof. dr. Hendrik Vos (UGent), prof. dr. Nicolas Bouteuca (UGent), prof. dr. Jonathan Holslag (VUB).

Table 2 Number of social scientists appearing at least once in 2019 media by gender and career position ($n = 234$)

Career position	Gender		Total
	Male	Female	
Predoc	19 8.1%	22 9.4%	41 17.5%
Postdoc	28 12.0%	28 12.0%	56 23.9%
Professor	87 37.2%	35 15.0%	122 52.1%
Emeritus	14 6.0%	1 0.4%	15 6.4%
Total $N = 1581$	149 63.2%	86 36.8%	234 100.0%

appeared in 2019 media were professors, points to the fact that researchers with a higher status (more scientific publications and a higher career position) were not simply more prominently present in the written press (Dudo, 2013; Dunwoody et al., 2009; Jensen et al., 2008). It also seems likely that they were actively prioritized over other researchers, whose expertise might perhaps be more pertinent to the specific topic at hand, but whose career position and status carried less weight to appear (at somewhat similar levels) in mainstream written press outlets.

In addition to the determinant role played by status and career position, gender differences seem salient too. Male social scientists featured almost twice as many times (63.2%) in the written press of 2019 compared to female social scientists (36.8%), as shown in Table 2. As 48.5% of social scientists in the total sample was female, this points to an underrepresentation of female social scientists in the Flemish written press. This is more pronounced in the case of female professors, who appeared in only 15% of the collected written press documents, notwithstanding that 26.9%⁶ of the social science professoriate in the sample was female.

Table 2 also illustrates that the representation of female and male social scientists in the written press is comparable at earlier career stages, with gender differences increasing as status rises. This dynamic is both present in staff numbers and media appearances as the most prominent gender disparities in media appearance are clearly related to gender discrepancies in the professorial segment. The lower presence of female social sciences professors in Flemish written press articles could reflect their prioritizing of *classical* scholarly communication (e.g. journal articles; edited volumes), which are—unlike science communication and popularization—used as parameters in tenure tracks in Flanders. Indeed, the eight *whales* responsible for almost half of the presence of social scientists in Flemish written press reporting in 2019 were male full professors. This suggests that their higher media visibility is not only grounded on authority and prestige, but also on the ability to engage in activities that do not (or do no longer) yield productive outcomes in terms of promotion tracks.

When only university affiliation is taken into account, the distribution of written press documents featuring social scientists at Flemish universities does not point to *prominent*

⁶ Emeriti not included. With emeriti included, the social science professorate would drop to 24,7% female.

Table 3 Media mentions by discipline and staff members

Discipline ^a	Staff members	Total media mentions	
		<i>n</i>	%
KU Leuven			
Media and communications	82	56	2.2
Other social sciences	4	1	<0.1
Political sciences	146	311	12.3
Sociology and anthropology	163	131	5.2
UAntwerpen			
Media and communications	94	34	1.3
Other social sciences	24	54	2.1
Pedagogical and educational sciences	88	16	0.6
Political sciences	80	155	6.1
Sociology and anthropology	125	254	10.1
UGent			
Media and communications	99	103	4.1
Political sciences	125	657 ¹	26.0
Sociology and anthropology	66	22	0.9
VUB			
Economics and business	179	58	2.3
Media and communications	122	112	4.4
Other social sciences	17	0	0.0
Political sciences	97	353	14
Sociology and anthropology	71	209	8.3
Total	1582	2526	100

^aWe used the *Flemish Research Discipline Standard* (Vancauwenbergh & Poelmans, 2019) to designate disciplines. Because of our institution-based criteria, included disciplines vary by university. ¹290 media mentions came from prof. dr. Carl Devos

or *overlooked* social science faculties (see Table 3). Regarding their associated disciplines, social scientists at UGent aggregated 31.0% of yearly media attention, which is mainly due to the relative high number (26.0%) in the *Political sciences* discipline. One plausible explanation for this is that 2019 was an election year in Belgium – where federal elections were held alongside European and regional elections – which created a substantial demand for political scientists to deliver political interpretations and commentaries on current affairs. In addition, *Sociology and anthropology* seems to appear as a more *popular* discipline when comparing across universities, lending their expertise to current social debates.

Qualitative analysis on Flemish written news articles and social scientists

Qualitative analysis of the 2526 collected written press documents clearly demonstrates that presence in mainstream news media is in the first place a *responsive* phenomenon with social science researchers in Flanders. A vast majority of articles (87.1%, $N=2526$) of articles were not authored by researchers in DS1, but by journalists and editors. Researchers' presence in mainstream news media is not so much the outcome of *proactive* measures to

popularize or otherwise disseminate particular insights to lay audiences, but instead result from being consulted as an expert with relevant knowledge about a topical issue in the public debate. Generally, researchers were called upon for a concise explanation or interview based on their expertise, know-how and authority in their study domain. Accordingly, journalists and editors (and not the researchers they feature) act as gatekeepers, determining when, why and how scholars are presented in news reporting. This resonates with earlier findings that mainstream media coverage of researchers and their research have to “fit the editorial focus and news values of mainstream media outlets” (Anderson et al., 2020, p. 2). Consequently, attention for and presence of social scientists in Flemish written news reporting is partly determined by the particular subject or study area individual researchers work on, and the relevance thereof to themes that are likely to surface in mainstream media. In the case for political scientists, topics like (inter)national or regional politics are mainstays of popular news cycles (Boydston, 2013), while other topics enjoy less popular attention. Due to this, opportunities researchers have to address topical issues in public debate are also dependent on their particular field of specialization.

Additionally, the qualitative content analysis shows that social scientists’ role in written press documents was less about self-disseminating their expertise through the media, but was more in providing knowledge in short and declarative instances. Table 3 shows that just over half (53.5%) of 2019 media mentions involved a researcher giving a short explanation in a written press article, usually in only a few sentences. In this category, individual or several researchers could be called upon by journalists based on their particular expertise, and asked to comment concisely on a recent phenomenon or event. Consequently, the presence of researchers seems to be motivated not so much by a need on the part of these news media to showcase constructive scientific knowledge about the subject as such. Rather, the expert’s explanation is used to reinforce the journalist’s argument in the article. Insofar as these cases reflect researchers’ *take* on current events reported by written news media, they largely pass over the scientific bases of these perspectives. Admittedly, this type of presence in the written press could facilitate beneficial results in society (Morton, 2015). Nevertheless, they are mostly descriptive in nature, and rarely amount to a demonstrable research-based public intervention vis-à-vis an opinion on a prominent societal debate or topical issue. Accordingly, it seems somewhat inappropriate to attribute an explanatory statement to a researcher as a *substantial* media reference, particularly because this class of written press attention tends to dislodge social scientists from their practice, instead emphasizing their status as experts as such to substantiate the overall content of the article they are presented in. Dynamics like these, where written press coverage features social scientists primarily to add a degree of depth or gravity, are even more salient with categories like *namedropping* (16,3%, Table 4) or *quote* (0,4%, Table 4)—which occur primarily with high status researchers. Here, mere names—or to a lesser extent quotes, consisting of a strong sentence—are simply mentioned without addressing any expertise from the social scientist as such.

Substantial discussions of research activities and their results by social scientists occurred only in a limited number of cases, amounting to 7.2% of articles ($N=2526$) in 2019. This category can be distinguished from other forms of responsive media attention by the considerable attention given by the journalist to the contexts, goals and results of research of social scientists. Here, the perspectives and considerations of researchers are prominently presented by mainstream news media, with the latter arguably serving as a conduit for the democratization of scientific knowledge (Burns & Medvecky, 2018) or the popularization of science (Johnston, 2017). A young researcher who has won the *Flemish PhD Cup* for example, is given the opportunity to explain their research to a broad audience. Interestingly, this relatively small category consisted of researchers of all career positions. Although journalists and

Table 4 Type of media attention of social scientists in 2019 media articles ($N=2526$)

Type of media attention	<i>n</i>	%
Not self-authored		
Book review	24	1.0
Discussion of research	182	7.2
Interviewed	122	4.8
Namedropping	411	16.3
Personal portrait	10	0.4
Public lecture announcement	55	2.2
Quote	11	0.4
Referencing researcher	33	1.3
Short explanation	1351	53.5
Total	2199	87.1
Self-authored		
Column (weekly)	173	6.8
Opinion piece	154	6.1
Total	327	12.9

editors are still the gatekeepers that determine who has access to the bulk of attention from the written press, this relatively small category does seem to be closely aligned with the goals of the open science agenda, endorsing active participation of researchers in the public debate (Bucher, 2019). These articles explored substantial and in-depth discussions on the research activities, processes and findings in which the researchers were involved, and brought science to the public in an accessible way.

The emphasis on research processes and results is what distinguishes this notable but minor category of written press attention from *columns* and *opinion pieces* authored by researchers. These constitute a small category of the collected documents (12.9%, Table 4) where social scientists' views are voiced in mainstream newspaper media. Here, researchers themselves retain agency over their content. Content analyses show that they hardly mention their specific research results explicitly. Instead, they mostly reflect expert responses to current affairs. This does not necessarily detract from their societal impact, as both opinion pieces and columns are a steady source of media visibility. They are however not strictly related to the research activities and results referred to in discussions on science communication (Autzen, 2014) and SIUR (Bornmann et al., 2019). Again, the key dynamic seem to relate to the *personalization* of science, with a select, mediagenic subset of high-profile researchers taking on the role of public intellectuals. Their columns and opinion pieces, rather than being accessible reflections of particular findings, are more likely to popularize of a specific field of research or school of thought as such (Jensen et al., 2008), applied to those topics and current issues dominating public interest at a certain moment in time.

Discussion and conclusion

When researchers are required to demonstrate societal impact, they habitually highlight their presence in mainstream media, and present attention from the written press as a pre-condition of a potential non-academic impact they have effectuated (Fecher & Hebing, 2021; Kassab, 2019). The fact that documented knowledge transfer from academic to lay

audiences via mainstream media is accepted as a legitimate rationale of SIUR in qualitative instruments such as the UK's REF (Watermeyer & Chubb, 2019) or the SIAMPI-method (de Jong et al., 2014) thus seems to support such approaches, either in the general sense (cf. democratization of science) or in a specific sense (cf. transfer of relevant knowledge from academics to non-scholarly audiences). However, the results of the present study question this rationale. First, the patterns found in the data point to the dominance of high-status, professorial staff in written press coverage featuring social scientists. In and of itself, this is neither unexpected (Dudo, 2013; Dunwoody et al., 2009; Jensen et al., 2008) nor problematic as such; journalists and editors simply tend to favor established researchers to an extent that reflects their accomplishments and authority in their study domain. Media appearance thus “remains largely institutionalized, bound to leadership roles, regulated by scientific and organizational norms” (Dunwoody et al., 2009, p. 306). However, as the integration of SIUR in assessment instruments is at least partly advocated to negotiate the detrimental effects of traditional bibliometric evaluation tools on early- and mid-career researchers (see Fochler et al. (2016)), simply counting media mentions does not seem to provide an advisable alternative. The gender discrepancies between social science professors' appearances, suggest that partaking in the public sphere is partly dependent on the ability to pursue research outcomes that are currently not commonly included in quality assessments of academic research. Consequently, the attribution of mainstream media attention would disproportionately disadvantage early- and mid-career scholars, for whom it is not possible to combine the pursuit of peer-reviewed publications with such presence and recognition in the public debate. This is evidenced by the fact that just more than half of the individual articles featuring a social scientist working at a Flemish university was attributed to one of only eight professors (cf. supra). Frequently voicing expert opinions on current affairs remains the domain of public intellectuals and the popular *scientific elite* (Jensen et al., 2008). Moreover, self-reinforcing dynamics in media visibility make for an unequal pattern in the bulk of popularization activities, where celebrity scientists (Fahy, 2017) garner not only attention from their research activities, but also from their political opinions and personal lives (Bucchi, 2014). This ties into the *personalization of science*, coupled with changes in organization of media and broader cultural changes, “render the public discourse in the media increasingly dependent on a small number of visible figures, public celebrities with enormous influence and appeal” (Bucchi, 2014, p. 244).

This study highlights that the concept of *media attention* for scholars in written media also needs to be further disentangled. Analysis of the 2526 individual articles featuring at least one social scientist active at a Flemish university, shows that substantial, in-depth attention for research activities or findings is the exception (cf. 7.2%) rather than the evident rule. Instead, social scientists generally (cf. 53.5%) tend to be called upon by journalists to provide a short expert statement, which does not necessarily reflect their research activities or findings as such. Rather, these condensed contributions are used as a *scientific* or an *expert perspective* to reinforce the general view of the articles at hand. While researchers' comments bring valuable and perhaps necessary nuance to coverage that would otherwise take particular interpretations or assumptions for granted, they are largely detached from the investigative context they originate in (Anderson et al., 2020). Accordingly, this category of researcher presence in written news media consists of potentially valuable yet slightly generic transferals of scientific knowledge between the expert and the public. Less cursory but comparably generalist are opinion pieces and weekly columns authored by professors, in which insights that are widespread in a certain field or school of thought are translated to current affairs. In these types of written media presence, researchers do not quite pursue societal impact based on their own particular inquiries or results,

but mobilize a collective body of knowledge to address a topical issue from the scientific community they represent (Jensen et al., 2008). While the open science agenda emphasizes the importance of participating in the public debate, results suggest it is not only a high status activity based on recognition and media literacy (Fahy, 2017), but is mostly reserved for professors who have relative freedom to invest time in *non-academic* communication.

The fact that only a fraction of all social scientists working at Flemish universities were mentioned in domestic written press articles involved substantial discussions of research findings and wider contributions (cf. 7.2%) does not in any way discredit references to mainstream media attention in qualitative SIUR assessment instruments such as the REF's impact cases (Watermeyer & Chubb, 2019) or the mixed-method designs of SIAMPI approaches (de Jong et al., 2014). Although the exception rather than rule, this category of researchers in the written press clearly facilitates a wide dissemination of why and how certain research activities were undertaken, what results they delivered and what their implications were. This corresponds closely to ambitions of open science (Bucher, 2019) and science communication or popularization (Burns & Medvecky, 2018), which in turn tie into the logics of valuing the societal impact of university research beyond its academic or economic merits (Donovan, 2019). However, the findings of this study question written press documents as a proxy for SIUR in *quantitative* assessment instruments. Even though the integration of mainstream media presence in existing metric evaluation mechanisms might seem a practical and labor-efficient strategy for SIUR assessment, it is prone to exasperate existing inequities in academia, and truly reflects research impact outside of academia in a limited number of cases only.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11192-022-04374-x>.

Acknowledgements The authors are grateful for Eline Eerdeken, who helped strengthen this paper. Also, the authors would like to thank the reviewers of the *International Society for Informetrics and Scientometrics* for their valuable feedback. This paper is a substantially extended version of the *ISSI2021 18th International Conference on Scientometrics & Informetrics* conference paper (Vanlee et al., 2021).

Author contributions Conceptualization: FV; methodology: HJ; formal analysis: HJ; writing—original draft preparation: FV, HJ, writing—review and editing: FV, HJ; supervision: WY All authors have read and agreed to the published version of the manuscript.

Funding This research received no external funding.

Declarations

Conflict of interest The authors declare no conflict of interest.

References

- Anderson, P. S., Odom, A. R., Gray, H. M., Jones, J. B., Christensen, W. F., Hollingshead, T., Hadfield, J. G., Evans-Pickett, A., Frost, M., Wilson, C., Davidson, L. E., & Seeley, M. K. (2020). A case study exploring associations between popular media attention of scientific research and scientific citations. *PLoS ONE*, 15(7), e0234912. <https://doi.org/10.1371/journal.pone.0234912>
- Autzen, C. (2014). Press releases—The new trend in science communication. *Journal of Science Communication*, 10(22323/2), 13030302.
- Bauer, M. W., & Jensen, P. (2011). The mobilization of scientists for public engagement. *Public Understanding of Science*, 20(1), 3–11. <https://doi.org/10.1177/0963662510394457>

- Besley, J. C., Dudo, A. D., Yuan, S. P., & Abi Ghannam, N. (2016). Qualitative Interviews With Science Communication Trainers About Communication Objectives and Goals. *Science Communication*, 38(3), 356–381. <https://doi.org/10.1177/1075547016645640>
- Bielak, A. T., Campbell, A., Pope, S., Schaefer, K., & Shaxson, L. (2008). From science communication to knowledge brokering: the shift from ‘science push’ to ‘policy pull’. In *Communicating science in social contexts* (pp. 201–226). Springer.
- Boltanski, L., & Maldidier, P. (1970). Carrière scientifique, morale scientifique et vulgarisation. *Social Science Information*, 9(3), 99–118. <https://doi.org/10.1177/053901847000900304>
- Bornmann, L. (2013). What is societal impact of research and how can it be assessed? A literature survey. *Journal of the American Society for Information Science and Technology*, 64(2), 217–233. <https://doi.org/10.1002/asi.22803>
- Bornmann, L., Haunschild, R., & Adams, J. (2019). Do altmetrics assess societal impact in a comparable way to case studies? An empirical test of the convergent validity of altmetrics based on data from the UK research excellence framework (REF). *Journal of Informetrics*, 13(1), 325–340. <https://doi.org/10.1016/j.joi.2019.01.008>
- Bourdieu, P. (1984). *Distinction: A social critique of the judgement of taste*. Routledge.
- Boydston, A. E. (2013). *Making the news: Politics, the media, and agenda setting*. University of Chicago Press.
- Bucchi, M. (2014). Norms, competition and visibility in contemporary science: The legacy of Robert K. Merton. *Journal of Classical Sociology*, 15(3), 233–252. <https://doi.org/10.1177/1468795x14558766>
- Bucher, H.-J. (2019). The contribution of media studies to the understanding of science communication. In A. Leßmöllmann, M. Dascal, & T. Gloning (Eds.), *Science communication* (pp. 51–76). De Gruyter Mouton.
- Burns, M., & Medvecky, F. (2018). The disengaged in science communication: How not to count audiences and publics. *Public Understanding of Science*, 27(2), 118–130. <https://doi.org/10.1177/0963662516678351>
- Cox, R. (2013). *Environmental communication and the public sphere*. Sage.
- Cribb, J., & Tjempaka, S. (2010). Open science: Sharing knowledge in the global century. *Csiro Publishing*. <https://doi.org/10.1071/9780643097643>
- Davies, S. R., & Hara, N. (2017). Public science in a wired world: How online media are shaping science communication. *Science Communication*, 39(5), 563–568. <https://doi.org/10.1177/1075547017736892>
- de Jong, S., Barker, K., Cox, D., Sveinsdottir, T., & Van den Besselaar, P. (2014). Understanding societal impact through productive interactions: ICT research as a case. *Research Evaluation*, 23(2), 89–102. <https://doi.org/10.1093/reseval/rvu001>
- Donovan, C. (2019). For ethical ‘impactology’. *Journal of Responsible Innovation*, 6(1), 78–83. <https://doi.org/10.1080/23299460.2017.1300756>
- Dudo, A. (2012). Toward a model of scientists’ public communication activity. *Science Communication*, 35(4), 476–501. <https://doi.org/10.1177/1075547012460845>
- Dudo, A. (2013). Toward a model of scientists’ public communication activity: The case of biomedical researchers. *Science Communication*, 35(4), 476–501. <https://doi.org/10.1177/1075547012460845>
- Dunwoody, S., Brossard, D., & Dudo, A. (2009). Socialization or rewards? Predicting US scientist-media interactions. *Journalism & Mass Communication Quarterly*, 86(2), 299–314.
- Erdt, M., Nagarajan, A., Sin, S. C., & Theng, Y. L. (2016). Altmetrics: An analysis of the state-of-the-art in measuring research impact on social media. *Scientometrics*, 109(2), 1117–1166. <https://doi.org/10.1007/s11192-016-2077-0>
- Fahy, D. (2017). Historical moments in public understanding of science: 1977, The visible scientists identifies a new scientist for the mass media age. *Public Understanding of Science*, 26(8), 1019–1024. https://doi.org/10.1177/0963662517732909?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dpubmed
- Fecher, B., & Hebing, M. (2021). How do researchers approach societal impact? *PLoS ONE*, 16(7), e0254006. <https://doi.org/10.1371/journal.pone.0254006>
- Fochler, M., Felt, U., & Muller, R. (2016). Unsustainable growth, hyper-competition, and worth in life science research: Narrowing evaluative repertoires in doctoral and postdoctoral scientists’ work and lives. *Minerva*, 54(2), 175–200. <https://doi.org/10.1007/s11024-016-9292-y>
- Gewin, V. (2016). Data sharing: An open mind on open data. *Nature*, 529(7584), 117–119. <https://doi.org/10.1038/nj7584-117a>
- Gijssels, C., & Steenssens, K. (2011). *Naar waarde geschat: Valorisatie van onderzoek in de humane en sociale wetenschappen*. <https://publicaties.vlaanderen.be/view-file/8706>
- Goodell, R. (1977). The visible scientists. *The Sciences*, 17(1), 6–9. <https://doi.org/10.1002/j.2326-1951.1977.tb01494.x>

- Hendrickx, J., & Ranaivoson, H. (2019). Why and how higher media concentration equals lower news diversity—The Mediahuis case. *Journalism*, 22(11), 2800–2815. <https://doi.org/10.1177/1464884919894138>
- Holbrook, J. B. (2019). Open science, open access, and the democratization of knowledge. *Issues in Science and Technology*, 35(3), 26–28.
- Jensen, P., Rouquier, J.-B., Kreimer, P., & Croissant, Y. (2008). Scientists who engage with society perform better academically. *Science and Public Policy*, 35(7), 527–541. <https://doi.org/10.3152/030234208x329130>
- Johnston, E. (2017). Why speak? *Journal of Science Communication*, 16(01), C02.
- Kassab, O. (2019). Does public outreach impede research performance? Exploring the ‘researcher’s dilemma’ in a sustainability research center. *Science and Public Policy*, 46(5), 710–720. <https://doi.org/10.1093/scipol/scz024>
- Lakomý, M., Hlavová, R., & Machackova, H. (2019). Open science and the science-society relationship. *Society*, 56(3), 246–255.
- Mingers, J., & Leydesdorff, L. (2015). A review of theory and practice in scientometrics. *European Journal of Operational Research*, 246(1), 1–19. <https://doi.org/10.1016/j.ejor.2015.04.002>
- Morton, S. (2015). Progressing research impact assessment: A ‘contributions’ approach. *Research Evaluation*, 24(4), 405–419. <https://doi.org/10.1093/reseval/rvv016>
- Muhonen, R., Benneworth, P., & Olmos-Peñuela, J. (2019). From productive interactions to impact pathways: Understanding the key dimensions in developing SSH research societal impact. *Research Evaluation*, 29(1), 34–47. <https://doi.org/10.1093/reseval/rvz003>
- Newman, G., Wiggins, A., Crall, A., Graham, E., Newman, S., & Crowston, K. (2012). The future of citizen science: emerging technologies and shifting paradigms. *Frontiers in Ecology and the Environment*, 10(6), 298–304. <https://doi.org/10.1890/110294>
- Olesk, A. (2021). The types of visible scientists. *Journal of Science Communication*, 20(02), a06.
- Paulussen, S., & Harder, R. A. (2014). Social Media References in Newspapers: Facebook, Twitter and YouTube as sources in newspaper journalism. *Journalism Practice*, 8(5), 542–551. <https://doi.org/10.1080/17512786.2014.894327>
- Peters, H. P. (2008). Scientists as public experts. In *Handbook of public communication of science and technology* (pp. 145–160). Routledge.
- Posner, R. A. (2003). *Public intellectuals: A study of decline*. Harvard University Press.
- Råfols, I. (2019). S&T indicators in the wild: Contextualization and participation for responsible metrics. *Research Evaluation*, 28(1), 7–22. <https://doi.org/10.1093/reseval/rvy030>
- Rentier, B. (2019). *Open Science, the challenge of transparency*. Académie royale de Belgique.
- Rousseau, R., Egghe, L., & Guns, R. (2018). *Becoming metric-wise: A bibliometric guide for researchers*. Chandos Publishing.
- Sivertsen, G., & Meijer, I. (2020). Normal versus extraordinary societal impact: How to understand, evaluate, and improve research activities in their relations to society? *Research Evaluation*, 29(1), 66–70. <https://doi.org/10.1093/reseval/rvz032>
- Smit, J. P., & Hessels, L. K. (2021). The production of scientific and societal value in research evaluation: A review of societal impact assessment methods. *Research Evaluation*, 30(3), 323–335. <https://doi.org/10.1093/reseval/rvab002>
- Spooner, M. (2018). Pushing boundaries: Academic de-institutionalization and our radical imagination vs. ourselves and audit culture. In *Qualitative inquiry in the public sphere* (pp. 33–45). Routledge.
- Sud, P., & Thelwall, M. (2013). Evaluating altmetrics. *Scientometrics*, 98(2), 1131–1143. <https://doi.org/10.1007/s11192-013-1117-2>
- Valinciute, A. (2020). Lithuanian scientists’ behavior and views on science communication. *Public Understanding of Science*, 29(3), 353–362. <https://doi.org/10.1177/0963662520907001>
- Vancanwenbergh, S., & Poelmans, H. (2019). The creation of the Flemish research discipline list, an important step forward in harmonising research information (systems). *Procedia Computer Science*, 146, 265–278. <https://doi.org/10.1016/j.procs.2019.01.075>
- Vanlee, F., Ysebaert, W., & Jonker, H. (2021). *Distinguishing science communication & popularization from research-based public interventions*. In 18th International Conference on Scientometrics & Informetrics, Leuven, Belgium. <https://kuleuven.app.box.com/s/kdhn54ndlmwti13s4aaxmot19fv9s329>
- Watermeyer, R., & Chubb, J. (2019). Evaluating “impact” in the UK’s Research Excellence Framework (REF): Liminality, looseness and new modalities of scholarly distinction. *Studies in Higher Education*, 44(9), 1554–1566. <https://doi.org/10.1080/03075079.2018.1455082>

- Watermeyer, R., & Hedgecoe, A. (2016). Selling “impact”: peer reviewer projections of what is needed and what counts in REF impact case studies A retrospective analysis. *Journal of Education Policy*, 31(5), 651–665. <https://doi.org/10.1080/02680939.2016.1170885>
- Wissler, R. (1997). Artistic practice and research: Towards a community of judgment. Double dialogues: the arts and their theoretical paradigms conference proceedings,
- Zhou, Y., & Na, J.-C. (2019). A comparative analysis of Twitter users who Tweeted on psychology and political science journal articles. *Online Information Review*, 43(7), 1188–1208. <https://doi.org/10.1108/oir-03-2019-0097>