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Fear of the academic fake? Journal editorials and the amplification of the 'predatory publishing' discourse

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Abstract

This analysis of 229 editorials and opinion pieces published in science and medical journals explores the affective discourses used to characterise so-called predatory publishing. Most (84%, n = 193) deploy one or more of three related categories of metaphorical and figurative language (fear, fakery and exploitation) to strengthen their rhetorical case. This paper examines the deployment, co-occurrence and amplification of this language across the science publishing system, focusing particularly on the role of major science journals in adopting and normalising this emotive discourse. The analysis shows how few editorials offer alternative perspectives on these developments (n = 9), and their relative invisibility in scholarly debates.

Keywords: discourse analysis, journal editorials, predatory publishing

INTRODUCTION

Several months ago, when conducting a systematic review on authors' motivations for publishing in 'predatory' journals (Mills & Inouye, 2020), we discovered that debates surrounding the phenomenon in existing research adopted a normative tone, with value-laden metaphors and imagery recurring across the literature. Although the focus of the review was on substantive empirical studies, we found that much of this normative discourse appeared in editorials and opinion pieces. It was not our intention to include editorials in our review, but they informed our background reading, and, we presumed, the views of other researchers working in this area. We felt uncomfortable about this language and its willingness to judge authors who submitted papers to such journals as 'ignorant', 'inexperienced', 'naive', or 'victims'. The impetus for this paper was born, defined by the following question: What are the consequences and influences of journals normalising an affective discourse around 'predatory' publishing through editorial commentaries?

Although journal editorials are a different genre than scientific articles, they facilitate communication amongst members of the scientific discourse community, providing a platform for discussion of key issues. In contrast to editorials in newspapers and journalistic outlets, editorials in scientific journals are assumed to maintain some level of objectivity, addressing topics of interest (Bawden, 2016) by 'express[ing] an opinion without being opinionated' (Singh & Singh, 2006, p. 17), sometimes reflecting the positions of journals rather than individuals (Stevens et al., 2018). This makes our observation about the repeated use of metaphors in journal editorials all the more interesting to study, given Lakoff and Johnson's insight that 'our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature' (Lakoff & Johnson, 1980, p. 3).

Metaphors carry implications that attach new meanings to the concepts they describe (Lakoff & Johnson, 1980), and may be used by scientists to convey specific understandings (Van Dijck, 1998). The metaphors embedded in the discourse surrounding 'predatory' publishing—and the 'predatory' metaphor itself—provide just one example of how affective language is

employed in editorials published by science and medical journals. The term, 'predatory publishing,' was first used by data librarian Jeffrey Beall in a 2010 review of nine commercial Open Access publishers (Beall, 2010), in which he argued that 'their mission is not to promote, preserve and make available scholarship; instead, their mission is to exploit the author-pays, Open-Access model for their own profit' (*ibid* p. 15). In early 2012, Beall launched a blog, *Scholarly Open Access*, on which he began to curate a list of 'Predatory, Open-Access Publishers.' By January 2013, there were 269 publishers, and by 2016, 1,028 were listed (Beall, 2016a). The blog was suddenly taken down, with no explanation, in 2017. However, the term 'predatory publisher' was, and remains, evocative—conjuring up images of aggression and animal-like behaviour.

Given these developments, we argue for the importance of systematically analysing the affective discourses deployed by journal editorials, given their role in shaping academic and policy perceptions. We carry out a discourse analysis of 229 editorials in medical and science journals that address so-called 'predatory' publishing. We analyse their affective discursive practices as well as the very few commentaries that seek to challenge the dominant narrative to explore how most editorials published in scientific and medical journals deploy the affective language of 'fakery,' 'fear' and 'exploitation' to characterise the phenomenon of 'predatory' publishing.

Key points

- The discourse about so-called predatory publishing in science and medical journal editorials regularly deploys affective language, such as metaphors of fear, fakery and exploitation.
- The predator/prey metaphor is often elaborated and extended with affective imagery.
- *Nature* published the largest number of these editorials in our sample—13 since 2012.
- Beall's conception of 'predatory publishing' and its association with OA continues to shape editorial discourse.
- Very few science editorials offer alternative perspectives or critique dominant narratives: those that do tend to be published in low impact journals.

THE RHETORICAL WORK OF SCIENCE EDITORIALS: A LITERATURE REVIEW

The world's top scientific and medical journals are key sites for the production, circulation and dissemination of new scientific perspectives, knowledge and research. Journals such as *Nature*, *Lancet*, *British Medical Journal (BMJ)*, *New England Journal of Medicine (NEJM)* and *Science* aspire to the highest standards of rigorous peer review, and their selectivity is at the core of their reputation and claims to scientific authority. Many are published weekly, ensuring a high media profile and allowing the latest findings to be disseminated and discussed. These interdisciplinary science and medical journals have extensive editorial sections that contextualize and explain current research. Most editorial commentaries and opinion columns are short and informal pieces, but they allow journals such as *Nature*, *BMJ*, *NEJM* and *Science* to shape research and science policy debates.

The first challenge we faced in approaching this study was understanding the persuasive role played by editorials in our analysis, and their deployment of metaphorical language. Sociologists and historians of science have long attended to the rhetorical work involved in making credible scientific truth claims (Ceccarelli, 2001; Gross, 1990; Gross et al., 2002). In a 1995 *BMJ* editorial, entitled 'The Rhetoric of Research', Richard Horton (now editor of *Lancet*) agreed, arguing that 'scientific writing is by definition rhetorical…the analysis of rhetorical devices deserves serious attention by authors, readers and editors' (Horton, 1995, p. 988). This attention to scientific rhetoric has also been taken up by those researching the influential role of 'spin' within biomedical research (e.g. Chiu et al., 2017). A parallel analysis of publications within psychiatry (Jellison et al., 2019) has shown how journal authors use specific reporting strategies to distract from statistically insignificant results. Similarly, the influential work of Gross (1990) in defining a new field of scientific rhetoric of science focused on the 'suasive' dimension of the scientific discourse used by Copernicus, Newton, Darwin, Watson and Crick. Others explore the role of more technical figures of speech within scientific writing (Fahnestock, 1999). As Gross et al. (2002) demonstrate, 'the truths of science are not beyond argument; rather, they are achievements of argument; science rests on facts and theories that have been argued into place' (p. 43). In a systematic analysis of more than 2,000 published journal articles from the 17th to the 20th century, Gross et al. (2002) trace the gradual shift from description to theorized interpretation, but also the rise of a representation of science as an 'objective enterprise' (p. 231), such as through the use of the passive voice, visual devices and mathematical models. For example, in their analysis of 20th century scientific writing, they find very few examples of metaphorical language (0.1 per 100 words). They go on to argue that if metaphors 'were far more pervasive they would be counterproductive in communicating science effectively' (*ibid*, 166).

Some research has specifically focused on role and influence of journal editorials. One example comes from Smart et al. (2008), showing how scientific editorials worked to help standardise the ways scientists classify race. Work by Miller et al. (2006) examined how genetics journal editorials portrayed the future for genetic research, while Stevens et al. (2018) analysed editorials for the discourses surrounding Big Data in healthcare literature. Both noted the use of metaphor to make claims/convey messages.

There has also been a particular focus on editorials in *Nature* and *Science*, given their influence within the scientific community. For instance, Waaijer et al. (2011) use scientometric techniques to map, count and analyse more than 1,500 editorials published in *Nature* and *Science* between 2000 and 2009. Their analysis compares the editorial positions of both journals on key science policy issues, including coverage on space and physics (5%), publication issues (10%), global political and environmental problems (18%), biomedical issues (almost 30%) and science policy issues (39%). They identify significant differences between the two journals' editorial discourses. *Nature's* editorials are more focused on internal science policy issues (such as research integrity and ethics) whilst *Science* attends more to the political influence of scientists. Waaijer et al. suggest that *Nature's* attention to the internal governance of science may be a result of its independence, whereas *Science* is a learned society journal, and thus might be 'more reticent' in tackling internal science issues (Waaijer et al., 2010, p. 157).

Hulme et al. (2018) explore how climate change is discussed in the editorials of *Science* and *Nature*. They conduct a comparative analysis of the two journals' approaches to framing climate change issues, analysing just under 500 editorials over 50 years (1966–2016). They seek to classify them by the primary 'challenge' these changes presented. Initially there were very few editorials on the topic, and these were often sceptical – such as one 1980 editorial on the 'greenhouse scare'. This later changed, and they suggest that *Nature* began to take a more 'internationalist' perspective, with editorials on global science governance, whereas *Science* focused more on scientific puzzles, given the politicisation of climate debates in the United States.

Hulme et al. (2018) go on to relate the frequency of editorials about climate change to broader media interest in the topic, building on Jasanoff's important insight that 'science and society are co-produced, each underwriting the other's existence' (Jasanoff, 2004, p. 17). They demonstrate the intertwining of scientific representations and public discourses about the environment. In the same vein, we assess how these editorials shape broader perceptions of 'predatory' publishing in the scientific community, and when – if at all – they acknowledge the structural transformations of science publishing and its consequences.

Scientific journals—and their editorials—have also played advocacy roles. Perhaps one of the most well-known scientific journals, *Nature* was founded in 1865 as a popular science weekly (Baldwin, 2015), and has always seen itself as an advocate for science (Baldwin, 2015), taking up explicit political positions on topics such as climate change. Today its international prestige makes it an important actor in science policy debates. In his 1989 editorial, 'Can journals influence science', *Nature's* editor John Maddox argued that journals had tremendous influence over scientific careers and science itself. They were not 'simply passive vehicles of communication', holding up a 'mirror in the face of scientific research' (Maddox, 1989; p. 657). He also worried that researchers were 'moulding accounts of their research in response to external demands' (*ibid*, p. 657). Hulme et al. (2018, p. 515) suggest that this advocacy work highlights the often hidden 'value-laden dimensions of science'. Sometimes these political stances are made explicit, but not always. The implicit values and normative discourses contained within these editorials are particularly influential, especially as these editorials have individual DOIs and are cited as academic sources in their own right (*ibid*, p. 516).

This science advocacy includes regular editorials calling for replicable science and data transparency (Roig, 2014). Along with *Science*, *Nature* has voiced concerns about scientific fraud and plagiarism since the 1970s. Price (2013) traces the emergence of 'research integrity' to the early 1990s and the creation of national offices of research integrity: the discourse has become increasingly common. Since 2010 both journals have published opinion pieces or news items on the topic approximately once a month. *Science* published a high profile 'sting' in 2013 (Bohannon, 2013) that showed that only half of the carefully-crafted spoof science papers he submitted to Open Access journals were rejected during peer-review. However, these forms of deception have also been criticized on ethical grounds (Al-Khatib & da Silva, 2016).

The *New England Journal of Medicine* was one of the first to develop a conflict of interest policy for editorials and reviews (Relman, 1990). Despite this, Macklin (2016) criticizes the way *NEJM* editorials covered a bitter dispute over the ethical consent procedures for a trial involving extremely premature infants. Acknowledging her own role in the controversy, she notes that 'bias can be introduced in major scientific journals by the editors' choices and policies' and in particular 'by the sheer number of publications on one side of a controversial issue' (*ibid*, pp. 221–222).

Two years after the first use of the term 'predatory publishing' (Beall, 2010), *Nature* published a 'Worldview' opinion column entitled 'Predatory publishers are corrupting Open Access' (Beall, 2012). The column has since been cited more than 700 times. As we will go on to show, many other journal editorials adopt a similarly emotive framing of the issue. The 'predatory' concept was also taken up and used by journalists writing in *Times Higher* and the *Chronicle of Higher Education* (e.g. Matthews, 2018; Pettit, 2018; Watson, 2017). University librarians began to offer workshops on how to spot predatory publishers and promoted training webinars offered by major publishers (Mills et al., 2021). Beall made his lists available as downloadable pdfs. These circulated across the world's universities and were often used to inform institutional assessments of the quality of staff research outputs (e.g. Mouton & Valentine, 2017). Many research universities in the Global South have their own lists of approved journals, or adopt the lists developed by national higher education commissions. The US company Cabells sells its own lists to universities. Despite a growing number of critiques of the notion of 'predatory journals' as overly simplistic (Reynolds, 2016), bundling together poor quality with misconduct (Eriksson & Helgesson, 2018), and ignoring the concerns of scholars in emerging research universities (Smart, 2017), the discourse, and the list-making, continue.

METHODS

This study uses 'affective-discourse' analysis (Wetherell et al., 2015) to characterise how 'predatory' publishing is represented in editorials in scientific and medical journals. This approach brings together methods from critical discourse analysis (Fairclough, 2003) with insights from affect theory, a field that has sought to understand the impact of feelings and emotions on the body. Rather than separating language from affect, Wetherell (2013) argues that the power of an ideological language lies precisely in the feelings and emotions that it can draw upon and invoke. Analysing the language of New Zealand newspaper editorials about a national holiday (Waitangi Day), Wetherell et al. focus on how the editorials' 'affective-discursive practices…construct relations of proximity, distance, affiliation and detachment and inclusion and exclusion' (Wetherell et al., 2015, p. 58). We carried out a detailed qualitative analysis of an editorial corpora, coding the texts and identifying patterns in how 'predatory' publishing is framed. We explored the affective discourses surrounding the issue of 'predatory' publishing and their communication in science editorials.

The editorials were initially identified as part of the systematic review (Mills & Inouye, 2020), in which the keywords 'predatory journal*', 'predatory publish*', 'questionable journal*', 'questionable publish*', 'parod* journal*', and 'parod* publish', were used to capture relevant literature across Scopus, Web of Science and ProQuest Social Science databases. We did not set limits on time frame or language of publication, though nearly all results were published in English. These databases were chosen because, between them, they represent the dominant scholarly journals. Of the 686 results, filtered for duplicates and relevant titles, 394 were identified as 'editorials'.

Our aim was to ensure that all the articles within the sample were broadly similar in format and style. Scientific journals often publish a range of items, including editorials, invited views and comments, letters, shorter news items, book reviews, as well as original research articles. We defined 'editorial' inclusively, as a written commentary in which the author(s) (or the journal editors themselves) presented a particular viewpoint on a topical issue. This included opinion pieces and letters to editors, with labels such 'commentary', 'editorial', 'letter', 'opinion', 'perspective', 'world view' and so forth. Thus, our definition of the term 'editorial' encompassed a range of opinion-focused genres published in scientific and medical journals. One of the challenges of determining what to classify as an 'editorial' was the range of opinion pieces. Several journals, such as *Nature*, have 'news' sections in which recent issues in the field are discussed. However, given that journals with news sections also had editorial and/or correspondence sections which signified a differentiation between news and opinion, we chose to exclude news pieces. This exclusion means that our analysis underestimates the total number of non-research articles on the topic by up to 20%, given the number of news stories about predation in these

TABLE 1 Categories of affective discourse

Category	Definition	Example 1	Example 2
Fear	Language that incites a sense of alarm or wariness	'To conclude, predatory publishing is a *hydra-headed monster* that is *not easy to kill'* (Panda, 2020, p. 113).	'I am *plagued* with solicitations from predatory journals—*the bubonic plague of the publishing world'* (Cook, 2017, p. 1).
Fakery	Language pertaining to falseness, intentional deception, *etc*.	'Not only does this *dirty* the work in genuine journals, but it also establishes a *false legitimacy* of the *pseudoscience* that was performed in the *fake journal'* (Maddy & Tosti, 2017, p. 307).	'These are the scientific journals equivalent to *counterfeit coinage'* (Beninger et al., 2016, p. 2).
Exploitation	Language alluding to researchers who publish in 'predatory' journals as being taken advantage of/victimised	'A few simple steps can help researchers *avoid being prey* to *scientific predators'* (Janodia, 2017, p. 2362).	'Predatory journals, like most *hunters*, *exploit the weaknesses of their prey'* (Clark & Thompson, 2017, p. 2499).
Alternative perspectives	Text that challenges the dominant framing of 'predatory' publishers, and does not deploy discourses of fear, fakery, or exploitation	'Beall's black-and-white, good-and bad dichotomy in scholarly publishing between tradition and OA publishing certainly seems *over simplistic*… Unquestionably, scholarly publishing and biomedical science itself are going through a crisis, but the economic roots of this are deeper and wider than often realized. *Excessively blaming predatory publishing for this may be misleading and distractive'* (Hanscheid et al., 2018, p. 526).	'There is evidence that some authors purposefully publish in these journals… Therefore, maybe the correct analogy is *not of predator and prey*, but one of *symbiosis*… Further than that, *predatory journals are no threat, at least not to scientific integrity*. One might even argue that serious print journals that are owned by large publishers or scientific organizations, and that make enormous profits *…are more predatory'* (Rifai et al., 2019, p. 233).

journals. Although there are subtle distinctions between editorials, letters and commentaries—the most obvious being that editorials are supposed to be more objective than, say, letters or commentaries that may provide greater freedom for debate, we felt it important to include a variety of editorial/opinion pieces in order to explore the range of discourse surrounding 'predatory' publishing, as it was difficult at times to distinguish between 'editorial', 'worldview' and 'perspective'.

We downloaded full texts of as many of the 394 editorials as possible, resulting in a corpus of 350 pieces. Some editorials were behind paywalls to which we did not have access. The 350 editorials were filtered, and only included if published in peer-reviewed medical or science journals, to create a final corpus of 229 editorials. Although we did not set any limits on language of publication, only editorials published in English were included, unless editorials in non-English language journals were also available in English translation. In line with the filtering process for our systematic review, editorials either focused explicitly on 'predatory' publishing or discussed 'predatory' publishing within the context of a larger issue, such as Open-Access or research integrity.

The editorials were then examined for patterns in the types of affective discourse used to characterise predatory publishing. Over several iterative readings, three major categories emerged: fear, fakery and exploitation. Although coding was done by one author, sample segments of text were discussed and the coding process was refined between both authors. Table 1 offers definitions and examples. Identifying instances of the three types of discourse necessitated making judgements about what language could be categorised as affective. For instance, are words such as 'alarm' or 'red flag' evidence of a discourse of fear in themselves, or does this depend on how the language is used in the editorial context? We decided that the context determined the affective impact. For instance, 'Often there is no review process at all or only a 'fake' review system' (Ring, 2018, p. 511). In this sentence, the author puts the term 'fake,' in scare quotes, signalling the adoption of another's use of the word, or scepticism about the concept. This example was not categorised as fakery discourse. In contrast, the phrase '…scourge of fake journals that is threatening the scientific enterprise' (Goodman, 2018, p. 155) combines the word 'fake' with other emotive words ('scourge' and 'threat') to amplify the affective impact of the sentence.

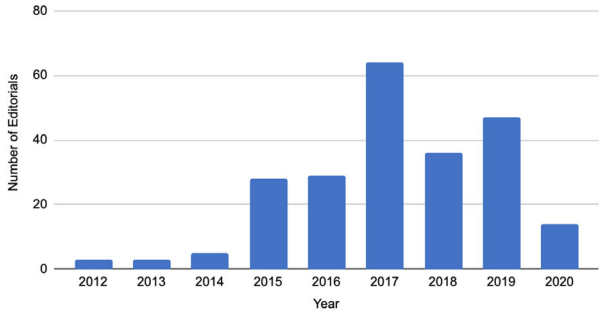

FIGURE 1 Number of editorials published per year. *2020 data as of April 27, 2020.

The full texts of the included editorials were imported into a folder and organised alphabetically by author via Mendeley. In reading the full texts, each editorial was opened in Mendeley desktop, and segments reflecting each type of discourse were highlighted within the editorial. The editorial analysis data were organised using an Excel spreadsheet with columns for the discipline of the journal and each major category of discourse, listing the number of segments in which an affective discourse of fear, fakery, or exploitation was used, along with examples of such language. One sentence constituted a segment. Other columns were used to keep track of research papers cited as evidence, national/contextual information and additional notes. A further final category—alternative perspective—was created to capture the very few editorials (n = 9, or 3.9%) that offered alternative views on 'predatory' publishing, avoiding those of fear, fakery and exploitation.

This sort of study faces a number of methodological challenges. First, a few authors tend to dominate the editorial columns, potentially skewing the overall sample. Second is the difficulty of accessing editorials of journals behind paywalls. Some editorials will have been missed in initial literature searches if one of the keywords was not in the editorial title. Likewise, had we included 'Beall' as a search term, we may have found other editorials. Further, it is possible that we missed additional editorials due to the databases we selected. Including additional databases such as PubMed or Google Scholar may have returned additional results. Having a single author code the editorials may be another limitation; if both authors had been involved in coding the dataset separately the validity of our results would have been strengthened. Finally, we did not do an in-depth analysis of the small number of editorials (n = 53) appearing in social science and humanities journals, which were excluded from our final corpus. An analysis shows that most of these were editorials in journals in fields allied to medicine and science, such as medical ethics, public health and medical education (*Science and Engineering Ethics* published six) as well as a few in information and library science journals. They largely echoed a similar perspective to science editorials. Thus, we chose not to include these because they did not appear to offer a different discourse to that within science journals. Most social science and humanities journals do not take up editorial positions or espouse strong normative positions about the issues of research integrity.

RESULTS AND DISCUSSION

Of the 229 editorials included in the analysis, 63.3% (n = 145) appeared in medical journals, 17.9% (n = 41) appeared in scientific or engineering journals, 15.7% (n = 36) appeared in nursing journals, 1.9% (n = 4) appeared in dentistry journals, and 1.4% (n = 3) appeared in pharmacy journals. The editorials appeared under a range of headings, labelled as: editorial (n = 100), letters to the editor (n = 41), comment/commentary (n = 26),

correspondence (n = 20), opinion (n = 15), perspective (n = 5), viewpoint (n = 5), world view (n = 3), communication (n = 3) and one each of: point of view, Q/A, thinking outside the box, food for thought, focus point, for debate, forum, special contribution, scholarly dialogue, critic at large and column.

Although we did not set historical time limits on the literature searches, none of the editorials appearing in this analysis were published prior to 2012, highlighting the influence of Beall's column in *Nature* (Beall, 2012). Further, 56.3% (n = 129) of the editorials explicitly referred to Beall/Beall's list in their texts, demonstrating Beall's influence on the discourse around 'predatory' publishing. Nine editorials were authored by Beall himself. Since 2012 to late April 2020 when data collection took place, there has been a steady increase in numbers of editorials and commentaries published each year, from 3 in 2012, to 28 in 2015 and 47 in 2019. The largest number of editorials were published in 2017 (n = 64) (see Fig. 1). This was the year in which Beall's list was suddenly removed from the web, possibly for legal reasons, prompting a further set of editorial commentaries.

Nature published the largest number (n = 13) of editorials and commentaries on predatory publishing, as well as a number of other news pieces. High-impact journals (*Nature*, *Science*, *BMJ* (see Jemielniak, Jemielniak et al., 2019)) published 18 pieces. Reflecting repeated concerns about publishers based in South Asia, 26 pieces were published in Indian journals (nine by *Current Science*) and 11 in Pakistani scientific journals. The *Journal of Korean Medical Science* also published six papers. However, the majority of journals publishing the editorials included in our sample come from Northern Europe (n = 89) and North America (n = 73). Figure 2 provides a breakdown of journal publisher locations, highlighting the role of the world's dominant scientific journals and publishers in raising doubts about the quality of work published at the margins of these academic system.

A number of editorials extended the discussion of 'predatory' journals to include other types of questionable publications such as hijacked journals (n = 24). Another group of 45 (19.7%) included specific guidelines for identifying or avoiding 'predatory' publications. The analysis revealed a range of synonyms for 'predatory' publishing. Labels such as 'fraudulent', 'parasitic', 'dubious', 'fake', 'pseudo', and 'bogus', were used interchangeably with 'predatory', again deploying discourses of fear, fakery and exploitation.

A number of editorials (n = 45) also used the word 'spam' to describe the various solicitation emails sent by 'predatory' publishers to invite researchers to submit their work. These editorials frame spam as both an identifying feature of 'predatory' publications and a tactic used to lure authors, thus pairing the idea of spam with discourses of fear and exploitation (see e.g., Beall, 2016b). Some authors (Faggion, 2019; Moher & Srivastava, 2015; Tulandi & Balayla, 2019) appear more interested in the phenomenon of spam/solicitation emails themselves, conducting analyses of the invitations they receive or discussing such invitations and the journals they originate from as a source of irritation rather than danger (Camacho & Reckley, 2018). This suggests yet another possible framing of 'predatory' journals as sources of academic spam, presenting an area for future research.

Discourse of fear

The results of the discourse analysis found that 72.1% (n = 165) of editorials included language evoking the discourse of fear. Common terms included 'threat', 'warn', and 'trap' for instance:

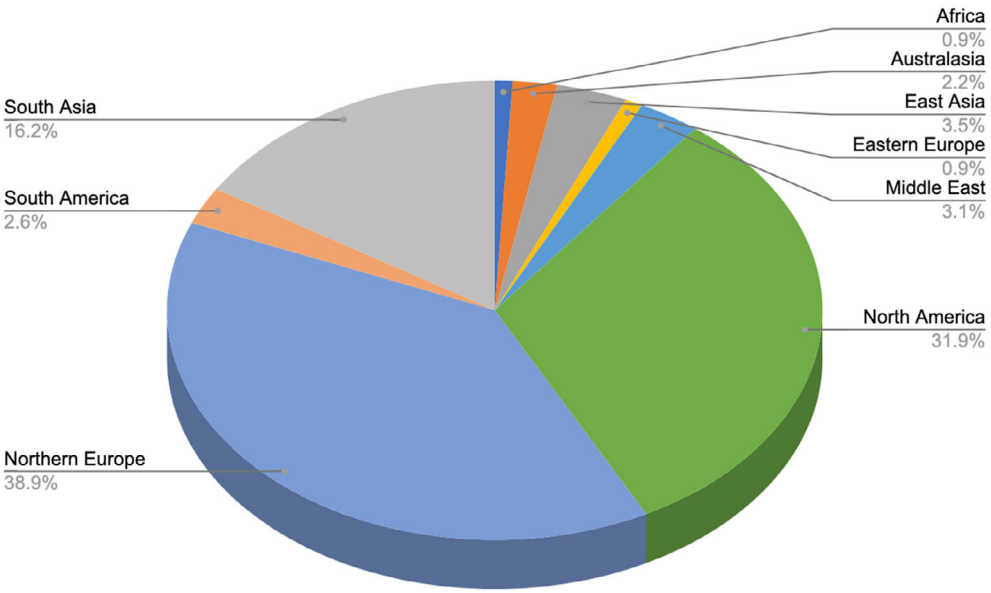

FIGURE 2 Geographical location of journal publishers.

TABLE 2 Common words and phrases associated with fear

Discourse	Common words/phrases
Fear	Abuse, alarm, beware, catastrophic, corrosive, corrupt(ion), criminal(s), damage, danger(ous), defeat, disastrous, enemy, entrap, fight, harm(ful), hazard, malicious, nefarious, plague, pollute, scourge, risk, threat, trap(ped), vicious, vigilant, warn

'avoid the trap of predatory publishing' (Misra et al., 2017, p. 1778). See Table 2 for common words associated with fear. There was also a range in the emotive intensity of language around fear, from presenting 'predatory' publishing as a 'problem' or 'risk', to the 'biggest threat to science since the Inquisition' (Beall, 2017, p. 276), a 'rising, sinister menace' (Munk & Peh, 2016) and 'a threat for the scientific community' (Sau, 2020, p. 184). A number of editorials used additional metaphors to convey a sense of danger and fear in relation to 'predatory' publishers.

Underlying the discourse of fear was the larger argument that 'predatory' publishing is the equivalent of 'academic pollution', damaging the integrity of science. In medical and nursing journals, a further concern was that dissemination of poorly reviewed work could spread false information and result in material harm to patients.

Discourse of fakery

The results found that 52.0% (n = 119) of editorials included language that furthered the discourse of fakery. In general, 'predatory' journals were commonly referred to as 'bogus', 'fake', 'scam', or 'counterfeit' (see Table 3). Authors commonly warned of the journals' 'fake' peer review process, impact factors and editorial boards. For example, 'Not only does this dirty the work in genuine journals, but it also establishes a *false legitimacy* of the *pseudoscience* that was performed in the *fake journal*' (Maddy & Tosti, 2017, p. 307, emphasis added). Several sting operations, most notably those by Bohannon (2013) and Sorokowski et al. (2017) were cited 44 and 19 times respectively, in editorials as evidence of the corrupt and pseudoscientific-nature of 'predatory' publishers.

Discourse of exploitation

The results of the discourse analysis found that 44.5% (n = 102) of editorials included language that deployed the discourse of exploitation. The assumption in this discourse is that those who publish in such outlets are inexperienced or ignorant of 'predatory' journals, and are therefore targeted and taken advantage of, to the detriment of their careers. Many editorials amplified this discourse by further extending the metaphor of predation, referring to researchers who published in 'predatory' journals as 'prey' or 'victims', who were 'trapped' or 'lured' into submitting to such publications (see Table 4): 'By then, hundreds of academics at Indian universities, frantic to publish, had *fallen prey to predators*' (Patwardhan, 2019, p. 7, emphasis added). Forty-four editorials did point out that researchers may purposely choose 'predatory' journals for quick publication in order to bolster CVs (e.g. Bartholomew, 2014; Chauhan & Kashyap, 2016; Chirico, 2017), with some suggesting that such authors are themselves 'corrupt' or 'predatory' themselves (Chirico, 2017) .

TABLE 3 Common words and phrases associated with fakery

Discourse	Common words/phrases
Fakery	Bogus, copycat, counterfeit, deceive, defraud, dupe, duplicity, fabricate(d), fake, fraud(ulent), hijacked, masquerade, pseudoscience, scam, sham, trash

TABLE 4 Common words and phrases associated with exploitation

Discourse	Common words/phrases
Exploitation	Easy target, exploit, ignorant, gullible, lure(d), naive, prey, seduce, take(n) advantage of, unsuspecting, unwitting, victim, vulnerable

Degrees of affective intensity

As reflected in Tables 2–4, the affective intensity of each of these three discourses varied, depending on the particular phrases and language used. Fear is invoked in words like 'alarm' or 'threat', but more strongly in phrases such as 'disturbingly unethical', and 'menace'. On the most extreme end are characterisations of 'predatory' publishing as 'a hydra-headed monster' (see Table 1), or as akin to 'drug-resistant microbes, which continue to thrive despite new antibiotics' (Patwardhan, 2019, p. 7). They drew upon sinister and sometimes misanthropic imagery to convey immediate danger and promote collective fear. Likewise, the dangers of fakery of research in 'predatory' journals was reflected in a range of phrases, from 'counterfeit' to 'outright trash'. Language associated with exploitation, however, was relatively consistent and the easiest to identify, as authors tended to explicitly employ words such as 'prey', 'victim(isation)', and 'exploit'. Within this spectrum, editorials elaborating on the predator/prey metaphor were the most emotive and affect-laden.

Co-occurrence of discourses

The affective intensity of editorials varied widely. Sixty-one of the editorials combined all three types of discourse to strengthen their rhetorical impact. Of these, seven were authored by Beall, and four appeared in *Nature*. Discourses of fear regularly co-occurred with discourses of fakery and exploitation. These pieces deployed metaphors that sought to elicit fear of deception and 'entrapment'. The co-occurrence of fear and fakery was visible in language appealing to researchers to 'fight' 'predatory' publishing. For instance, one editorial states that 'To fight them, we must recognize that they exist and stop falling into their traps' (Ortiz-Prado & Lister, 2019, p. 9). Words such as 'fall' and 'trap'

suggest danger and fear, while the use of 'we' calls upon readers to collectively resist and perhaps actively avoid such journals.

The co-occurrence of fear and exploitation commonly appeared via the predator/prey (n = 39) and trap (n = 23) or lure (n = 27) metaphors. For instance, a particularly vivid use of the metaphor: 'Predatory journals are a coterie of vultures who prey on the researchers…and the ignorant researchers, like a flock of sheep happily walking into their trap to be preyed upon' (Tandon et al., 2016, p. 1133). This sentence adds metaphorical specificity to the predator/prey metaphor (vultures and sheep) and the image of vultures attacking or setting a 'trap' for 'ignorant' sheep is one that readers can easily picture, inciting a clear sense of danger and fear. This combination of fear and exploitation discourses is perhaps the most emotive and powerful.

It could be argued that the discourse of fear is particularly associated with the language of fakery and exploitation. Words like 'fake', 'bogus', 'victim', and 'naïve' have connotations of wariness or even danger. For example, take the statement: 'It is hardly surprising, therefore, that people continue to be defrauded by these criminals who have polluted academic publishing' (Watson, 2019, p. 4). Here, phrases like 'defrauded by these criminals' and 'polluted academic publishing' create a sense of fear while also employing discourses of fakery ('defrauded') and exploitation ('defrauded by criminals'). Fear was thus the most common and perhaps overarching discourse associated with 'predatory' publishing across editorials.

Amplification of the discourse

Nature was the first major journal to publish Beall in 2012 (Beall, 2012), and went on to publish a further letter from him in 2016 (Beall, 2016b) as well as an editorial on journal 'blacklists' in 2018 (Nature, 2018). The journal has published more editorials (n = 13) about the topic than any other in our sample. Of these pieces, eight were 'correspondence' (letters), and the remaining five were opinion pieces. None of the pieces included in our sample were 'news' pieces. A range of vivid metaphors are used in *Nature* editorials including: (1) predator and prey/victim (Beall, 2012; Sorokowski et al., 2017); (2) parasite/disease (Patwardhan, 2019; Sorokowski et al., 2017); (3) pollution (Beall, 2016b); and (4) fight/battle (Grudniewicz et al., 2019; Patwardhan, 2019). These metaphorical elaborations of the fear, fakery and exploitation discourse offer some of the most emotive and vivid images of the dangers of 'predatory' publishing. This said, 'correspondence' items, which are significantly shorter, tended to feature fewer instances of affective language than opinion pieces, reflecting variation in use of affective/emotive language across genres.

In several of the *Nature* editorials the emotive language is further reinforced by striking and humorous visuals provided by the publisher. Atop one column is an image of a grinning wolf half-hidden under a journal that sits open on its back, with an image of the sheep on the front cover (Grudniewicz, Moher, & Cobey, et al., 2019, p. 210). Another shows white-coated and bespectacled scientists, holding bags of dollars, looking lost in a cartoonish jungle full of over-size man-eating plants (Moher et al., 2017, p. 23). Each is designed to elicit a strong reaction. The metaphors and images reflect *Nature*'s campaigning style, and its decision to actively promote this affective discourse. The messaging is reinforced by regular news items (seven over the last five years), including items on policy 'crack-downs' on predatory publishing in China and India.

To date there have been a total of 1,158 citations of the 13 *Nature* editorials, with Beall (2012, 2016b) receiving 701 and 98 citations respectively, and Sorokowski et al. (2017) receiving 192 citations. Whilst not direct evidence for the impact of Beall's discourse itself, it highlights *Nature*'s influence on science policy debates across a global scientific community.

Alternative perspectives and dissenting voices

Within our sample of 229, only a very few (n = 9, or just 3.9%) editorial commentaries and letters to editors avoid judgemental or affective discourses. These alternative perspectives on 'predatory' publishing seek to broaden the argument, and point out that 'predatory' publishing, while problematic, may be only a symptom of larger problems within academic publishing. Several point to how (1) quality issues are also common to 'legitimate' journals, and (2) structural influences exacerbate 'predatory' publishing. Others note that despite 'predatory' journals' reputation for exploitation, poor quality research and profiteering, established 'legitimate' journals have also been guilty of low-quality peer-review and a preoccupation with money rather than science (Choonara, 2015; Fernandez-Llimos, 2014; Hanscheid et al., 2018; Rifai et al., 2019): 'Predatory journals are accused of having financial gain as their motive and lacking transparency. The same could be said of reputable publishers, who have been accused of making colossal profits' (Choonara, 2015, p. h708). Prazeres (2017) further questions the ethics of the researchers who seek to expose 'predatory' journals by submitting falsified papers, asking, 'could a sting operation using a fake researcher for a journal's editorial position be considered as breaking said implied trust?' (p. 557).

Dissenting commentaries highlight the structural factors influencing the phenomenon of 'predatory' publishing, pointing to the dangers of making output quantity a criterion for promotion (el-Azhary, 2017; Wager, 2017), government policies incentivizing quantity over quality (Hedding, 2019), and the financial inequalities that impede researchers from low-income countries from accessing resources necessary to produce 'quality' research (Devnani & Gupta, 2015).

A closer look at these pieces reveals that three are published in letters to the editor. Two letters published in the *BMJ* criticize that journal's editorial position on predatory publishing (Choonara, 2015; Devnani & Gupta, 2015). An invited roundtable in *Clinical Chemistry* (Rifai et al., 2019) may not espouse the same emotive discourse, but still accepts the basic premise that 'predation' threatens research integrity. Two invited commentaries in low-status Open Access journals (one a Portuguese medical journal, another an Australian journal (Hanscheid et al., 2018;

Prazeres, 2017) offer more nuanced positions, but are unlikely to be cited. One of the more cited papers in this group is by Wager (2017), who turns the question of predation back into a challenge for universities, pointing to the need for better research training. The observation that these alternative perspectives appear in letters and opinion pieces not officially labelled 'editorials' highlights the paucity of voices challenging the more common and affective discourse around 'predatory' publishing. This is consistent with the results of our systematic review on predatory publishing (Mills & Inouye, 2020), in which only 16 of the 292 non-editorial title-filtered papers (5.8%) constituted empirical examples of studies that examined researcher perspectives on publishing in 'predatory' journals, considering additional factors such as power relations and institutional incentives, pressures and national contexts. This research is being published in social science journals and journals published in the Global South, rather than in the elite science and medical journals. Thus, its insights and perspectives are largely invisible to the broader research community.

CONCLUSION

We have analysed the affective discourses about 'predatory publishing' deployed in scientific and medical journal editorials since 2012 to understand the consequences of normalising an affective discourse about 'predatory publishing'. In our discussion we have focused particularly on the most influential 'high-impact' multidisciplinary science journals, as these set a scientific and policy agenda for other disciplines and journals to follow. The great majority of the editorials use a combination of metaphors to invoke an affective response in the reader, emphasising the 'fake' and 'deceptive' nature of 'predatory' publishers, presenting them as a critical threat to the integrity of science and, in healthcare, as a risk to patients themselves. Researchers who publish in 'predatory' journals are often characterized as naïve and helpless 'victims'.

The academic consensus about predatory publishing is rarely challenged in these editorials. Only a few link concerns about research integrity to the broader transformations in the economics and geopolitics of academic publishing. The pressures on researchers in emerging research universities to publish in 'internationally recognized' journals for promotion, tenure or as a condition of a postgraduate degree is rarely discussed. The consequences of prohibitively high APCs and the perceived gatekeeping of elite journals are often only acknowledged in letters' sections or the editorials of less read low-impact journals.

This normalisation of an emotive and value-laden editorial discourse prevents a more nuanced and evidence-based discussion of the challenges of research integrity, the changing economics of Open-Access publishing, and the importance of a range of initiatives to promote journal quality and build capacity.

What are the implications of our findings for science communication and scholarly publishing? Acknowledging the influence of journal editorial rhetoric would strengthen the case for stronger editorial accountability and the declaration of potential conflicts of interest. The findings also highlight the role that science editorials can play in mobilising and sustaining science policy, and the importance of elite and influential 'Northern' journals remaining attentive to the global contexts of science practice (Jasanoff, 2004). Finally, the research demonstrates the need to understand the institutional drivers and incentives shaping the publishing practices of individual academics, rather than simply resorting to rhetorical strategies to belittle and dismiss these phenomena.

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AUTHOR CONTRIBUTIONS

KI and DM conceptualised the study, and KI carried out the searches, filtering, and analysis of the editorials, in consultation with DM. Both authors prepared and edited the manuscript.

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