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A corpus study of the term *evidence* in open peer reviews to research articles in the *British Medical Journal*

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Abstract – The linguistic study of peer-review discourse has focused principally on pre-publication occluded referee reports. However, there are few studies on post-publication open peer reviews of research articles. To address this imbalance, we analyse a type of open peer review, Online Rapid Responses (ORRs) to articles, in the *British Medical Journal* (BMJ), which is the leading medical e-journal. Using a corpus-based approach, we focus on the term *evidence* owing to its importance in scientific discourse. We compiled an *ad-hoc* corpus of 875 ORRs (260,651 tokens) and analysed it using *Wordsmith Tools 6* to ascertain the frequency of *evidence*. We then compared its frequency in our corpus with the *British National Corpus* (BNC), the *Corpus of Contemporary American English* (COCA), the COCA academic subcorpus, the *Cambridge Academic English Corpus* (CAEC) and the sub-corpus of reviews in the *Lancaster-Oslo-Bergen Corpus* (LOB-C). We also performed a keyness analysis of our corpora to ascertain the position of *evidence* and obtained the contexts in which it appears. Our analysis reveals that *evidence* is more frequent in our corpus of ORRs than in general and academic corpora, which highlights its importance in the evaluation of research. Our exploration of its contexts of use show that it reflects the concern of the medical academy for evidence appraisal in state-of-the art medicine.

Keywords – evidence; review; academic writing; computer-mediated communication; rapid response

1. INTRODUCTION

Today, all major scientific journals are peer-reviewed, a practice that dates back nearly 300 years (Paltridge 2017: 22). In the field of medicine, academic peer review originated in the *Philosophical Transactions* of the Royal Society (Räisänen 1999; Mulligan *et al.* 2012). Berkenkotter and Huckin (1999: 62) state that peer review "remains the primary means through which authority and authenticity are conferred upon scientific and scholarly papers by journal editors." Similarly, Mungra and Webber (2010) also state that peer review bestows authority as well as validity on a published article through a rigorous editorial evaluation process. Despite the importance of peer

review there has been growing criticism of the process due to its tendency to maintain orthodoxy, the lack of specialised reviewers and the poor quality of reviews, as the process constitutes unpaid work and reviewers receive little if any academic recognition (Travis and Collins 1991; Bornmann and Daniel 2008; Thurner and Hanel 2010). Hence, the idea of supplementing the pre-publication (occluded) peer-review process with some form of open post-publication evaluation in the virtual arena is viewed as a way of opening up the vetting process to the entire scientific community in a particular field. Open-access publishing forums are also deemed to increase transparency, address reproducibility issues, improve experimental design, and enhance the analysis of results (Williams *et al.* 2017).

Several medical 2.0 e-journals now include online peer review responses, rapid responses, electronic comments, or e-letters (Hodonu-Wusu 2018), which appear in open post-publication forums or e-journal sections. Unlike occluded peer reviews, the names of the authors of open reviews and their institutions are disclosed to the authors being reviewed and to readers in general. In medicine, these scientific commentaries and e-letters are, nowadays, acknowledged as being crucial in evidence appraisal (Rogers *et al.* 2020).

In particular, Online Rapid Responses (ORRs) to research articles are instances of peer review in the medical academy. They constitute a distinct online medical subgenre in medicine 2.0 and are characterised by their accessibility. Initially, in the *British Medical Journal* (BMJ), they were labelled 'electronic letters to the editor' or 'rapid responses to electronic comments to the editor'. Subscribers can respond to an article by sending a rapid response to the BMJ website.[1] Such responses are freely accessible to readers. This way, peers within the medical community can participate in the online evaluation of a recently published article.

Furthermore, authors of published research articles in the BMJ have the academic duty to respond to any substantive criticism of their papers contained in ORRs. Readers and article authors can opt to receive email updates on the status of their articles, alerting them to corrections and follow-ups by peers and authors, thus emphasising the interactive nature of the website and its evaluation process. ORRs have become established communicative events in the worldwide online medical community. They initiate the post-publication review debate that follows the online publication of a

[1] https://www.bmj.com/

research article and complement the occluded review process of the e-journal. This way, the perspective of experts in the field other than journal reviewers or referees is also made available to interested readers.

As a relatively new genre, ORRs have received little attention. To redress this situation somewhat, we have carried out a study of the term *evidence* in a corpus of 875 ORRs (260,651 tokens) extracted from the BMJ, one of the world's foremost medical journals. Using a corpus linguistics approach, we analysed the frequency of *evidence* in our corpus and compared it to other corpora. We also looked at its keyness and the contexts in which it is found. The choice of *evidence* for this study is motivated by the centrality of this term in empirical scientific discourse. Evidence is what separates science from other activities (Husserl 1982; Kuhn 1996). Its importance can be gauged by its presence in the term 'evidence-based medicine', which Sacket *et al.* (1996: 312) define as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients."

As the main aim of this study is to shed light on how open reviewers use the term *evidence* in ORRs and to what purposes, our specific research questions are the following:

1) What is the frequency of *evidence* in ORRs? What is its frequency in English varieties such as British English, as represented in the *British National Corpus* (BNC), and American English, as represented in the *Corpus of Contemporary American English* (COCA)? How do they compare?
2) What is the frequency of *evidence* in academic English corpora such as the COCA academic subcorpus, the *Cambridge Academic English Corpus* (CAEC) and the subcorpus of reviews of the *Lancaster-Oslo-Bergen Corpus* (LOB-C)?
3) Is *evidence* a keyword in the ORRs corpus? What is the position of the term in the keyword list?
4) What are the contexts of *evidence* in the corpus of ORRs? What do the colligation and collocation of the term imply regarding the purposes of its usage by open reviewers?

Our research complements previous studies in that it identifies the keywords which characterise ORRs in medicine. Moreover, it also looks in depth into the purpose and usage of the word *evidence*, which is of strategic importance in scientific discourse. Our

study also provides an analysis of the collocational and colligational behaviour of the term in ORRs and adds to existing knowledge regarding this particular online genre.

The paper is organised as follows. In Section 2, we provide a review of the literature on academic reviews and the presence of the term *evidence* in academic corpora. Section 3 deals with the characteristics of our corpus and the methodology used in the study and Section 4 discusses the corpus-based results. Finally, Section 5 provides a summary and some concluding remarks.

2. Review of literature

According to the International Committee of Journal Editors (2015), peer review on submitted articles is carried out by experts who are not members of the journal's editorial staff (Hames 2012; Paltridge 2017). Furthermore, peer review is seen as the cornerstone of academic publishing (Hames 2012) and, as such, is essential to the recognition and integration of new research (Hyland 2015).

The discourse of journal reviewers has been the subject of sustained academic study since the 1990s. Several authors have focused on the peer review process and its genres (Kourilovà 1996; Okamura and Shaw 2000). Most have centred on 'occluded' reviews, to employ Swales' (1996) term. Occluded peer review and open peer reviews differ at least in two aspects, namely, authorship and readership. The authors of occluded review reports are referees, a select group of experts appointed by the journal editorial board, whereas authors of ORRs are journal readers working in medical institutions, hospitals, or medical research centres worldwide. Regarding readership, occluded peer review reports are only read by authors of research articles, reviewers, and journal editors, whereas ORRs are public and can be read potentially by anyone with access to them.

The study of occluded reviews in different disciplines has mainly focused on their structure, content, and language. Fortanet-Gómez (2008a, 2008b) studied the overall structure of reviewers' reports in the fields of business organisation and applied linguistics. Fortanet-Gómez (2008a: 35) suggests that reviews consist of a four-move structure: (i) summarising judgment regarding suitability for publication, (ii) outlining the article, (iii) points of criticism, and (iv) conclusion and recommendations. Samraj (2016) distinguishes between major revisions and reject reviews, finding patterns

similar to those of Fortanet-Gómez (2008a). She also finds that the two differ organisationally in commentary sections. Paltridge (2017: 41–49), using Fortanet-Gómez's move structure (2008a), distinguishes between accept reviews, minor revision reviews, major revision reviews, and reject reviews. Paltridge identifies more cases of Move 1 (Judgment Regarding Suitability for Publication) in accept and minor revision reviews and an increasing presence of Move 3 (Points of Criticism) in minor revision reviews, major revision reviews and reject reviews.

Several researchers have focused on the content of occluded referee reports on research articles and have provided the reasons why a paper may or may not be considered worthy of publication. Gosden (2001, 2002, 2003) analyses thematic content in peer reviews and the structure and functions of referees' comments on scientific papers in chemistry, physics, and microbiology. Of particular interest is that one of the categories identified in referee comments is the consideration of "claims" (Gosden 2003: 92). In this respect, referees often criticise the strength of the researchers' specific or overall claims, that is, the strength of the evidence they provide. The assessment of the robustness of the researchers' claims has also been observed in open peer reviews in medicine (García-Ostbye 2018). Woods (2006), acting as a reviewer, categorises the commentaries he makes. His comment categories cover inadequate methods, insufficient explanation of results, limited or misused data, inappropriate choice of journal, problems with presentation and style, unacknowledged bias, inadequate knowledge, limited analysis and inadequate discussion. Coniam (2012), who also acted as a reviewer for the journal *System*, focuses on the areas of the research article that are commented on most frequently: the acceptability of claims, suitability of the methodology, appropriate nature of the data, and clarity of the research questions. Hewings (2004: 260) looks into what was assessed in the reviews to the journal *English for Specific Purposes* (ESP) and concludes that the most commonly evaluated entities are the article itself, expression, claims, analysis, goals, evidence, literature review, bibliographical references, procedure, and knowledge of the field.

Finally, Paltridge (2017: 52–64), also in the field of ESP, looks into positive and negative comments in acceptance and rejection reviews and reviews that ask for minor or major revisions. He tallies the frequency of occurrence of text features in reviews with positive and negative comments, characterising them accordingly. The text features he evaluates are topic, audience, purpose/problem statement/research question, literature

review, methods/research design, presentation and analysis of results, and their discussion/significance, pedagogical implications, language use/style, and clarity. In this respect, a study by Astudillo *et al.* (2016) reveals a higher presence of negative comments in peer review reports.

As for the research article sections that are subjected to most peer review by referees, Belcher (2007) examines positive and negative comments on accepted and rejected papers in reviewers' reports to *ESP*. She identifies the method and discussion sections of research articles as the ones submitted to the most thorough levels of review. Later, Mungra and Weber (2010) study the content of medical review comments, which range from the observation of errors of reasoning regarding the authors' data to the incorrect scientific interpretations of other authors' publications, and the lack of association between data and claims or between claims and prior research. They find that, when assessing a research article in medicine, referees evaluate every section, especially the body of evidence that the author presents in the introduction and discussion sections, the strength of the research method(s) used, their interpretation of results, and the conclusions they reach.

While most studies have focused on the discourse of occluded peer review, fewer have addressed open peer review discourse. One of them is Hyland and Zou (2020: 98), which discusses the extent to which academic blog responses constitute an academic review genre and compares how writers construct criticism in blog responses and book reviews. However, to the best of our knowledge, only García-Ostbye (2018) has addressed ORRs in post-publication medical review fora. She finds more critical responses (61%) than supporting responses (28%) and more infrequent replies to comments (11%). Regarding the structure of ORRs, she characterises it as highly flexible and letter-like. She finds that ORRs include an *ad-hoc* selection of strategies to convince a potentially hostile readership of a personal viewpoint on a published research article, an activity in which the authors' face is central. Finally, she identifies the consideration of evidence in the medical field as one of the strategies in the generic structure of ORRs constituting 24 per cent in the specific medical corpus (24 occurrences), see García-Ostbye (2018: 182).

Regarding the presence of *evidence* in academic corpora, it seems to be affected by corpus sources and discipline-based differences. For example, it is not attested in a relevant position in wordlists from corpora based on research articles and textbooks in

several academic fields: research articles in medicine (Chen and Ge 2007; Wang *et al.* 2008), textbooks in medicine (Hsu 2013), research articles in agriculture (Martínez *et al.* 2009) or in engineering textbooks (Ward 2009; Veenstra and Sato 2018). It is, however, attested among the 100 most frequent words in the research articles in the *Applied Linguistics Research Articles Corpus* (ALC), (see Vongpumivitch *et al.* 2009: 39). Finally, to the best of our knowledge there are no wordlists based on open reviews in medicine except those compiled by García-Ostbye (2018), in which the term *evidence* ranks position 78.

Our research complements previous studies in that it identifies the keywords which characterise ORRs in medicine. Moreover, it also looks in depth into the purpose and usage of the word *evidence*, which is of strategic importance in scientific discourse. Our study also provides an analysis of the collocational and colligational behaviour of the term in ORRs and adds to existing knowledge regarding this particular online genre.

3. Corpus characteristics and methodology

The main criterion for selecting the BMJ as our corpus is its worldwide prestige. It is one of the leading online journals in the medical field, with an impact factor of 30.313 for the period between 2019 and 2020.

The texts that make up the corpus represent authentic online discourse in medicine, authored by medical professionals and researchers in medicine worldwide. As such, these texts are examples of expert-to-expert communication in English as a lingua franca. The corpus comprises all 875 ORRs to research articles published on the BMJ website[2] in 2006. These contained 260,651 tokens (word forms, digits, abbreviations regardless of how often they are repeated) and 13,873 types (distinct word forms, digits or abbreviations). The year 2006 was chosen as access was free to non-subscribers.

To ascertain the weight and importance of the term *evidence* in our corpus, we first compared its normalised frequency with that found in the academic component of the BNC and COCA. We also compared the normalised frequency of *evidence* in our corpus with that attested in the *Cambridge Academic English Corpus* (CAEC), which was accessed through *SketchEngine* (Kilgarrif *et al.* 2014),[3] and with a sub-corpus of

[2] https://www.thebmj.com/
[3] https://www.sketchengine.eu/bibliography-of-sketch-engine/

reviews from the *Lancaster-Oslo-Bergen* Corpus (LOB-C). Then, we ran a keyword search, a Keyword in Context (KWIC) search and a collocation and colligation search using *Wordsmith Tools 6* (Scott 2012)

4. RESULTS AND DISCUSSION

4.1. Frequency of the term evidence in ORRs and other corpora

We will first present our results for the normalised frequency of *evidence* in our corpus compared to the others (see Table 1 below).

Corpus	Normalised frequencies
ORRs	1.370
BNC	0.215
COCA	0.161
LOB-C	0.001
CEAC	0.498
COCA (academic subcorpus)	0.236

Table 1: Normalised frequencies per 1,000 words of *evidence* in six corpora

As can be seen in Table 1, the low frequency for *evidence* in the general English corpora was unsurprising as this term would only be expected to occur in a limited number of contexts in general English. We also thought it would be unlikely that *evidence* would be frequent in the LOB-C specialised review corpus as it was made up of non-academic texts. We did not expect, however, that the difference between the relativised frequency of *evidence* in our corpus compared to the academic subcorpora in CEAC and COCA would be so great. Interestingly, after the removal of common function words, using a stoplist, the term has been observed among the most common words occurring at least 1,000 times in occluded peer review reports in the *BMJ* (Falk Delgado *et al.* 2019).

4.2. ORR corpus keywords

In the next stage of our analysis, we ran the keyword search option in *Wordsmith Tools 6* using the LOB-C corpus as our reference corpus. The term *evidence* was found to be the 21st most frequent keyword, as shown in Table 2 below. Regarding the function words in the table, they show some of the characteristics of scientific discourse. For example, the word *that*, which can represent a conjunction, a demonstrative an adjective, a demonstrative pronoun or a relative pronoun, is the most frequent keyword. The third most frequent keyword, *we*, indicates the presence of research authors and

appeals to the scientific community (namely, health professionals in academia) in these post-publication online debates and highlights their social nature. The first-person plural pronoun helps establish interpersonal relationships with the reader (Hyland 2005) and thus emphasises medical activity as a communal endeavour. The high frequency of *we* suggests an egalitarian online relationship and such a result contrasts sharply with previous studies, such as that of Samraj (2021), which singled out second person pronouns as a discourse characteristic of negative evaluation in occluded manuscript reviews. Regarding the high frequency of *may* and *would*, it may be explained by the presence of tentative explanations, discussions, and hedged alternative interpretation of research results, which are characteristic of scientific discourse in medicine (Salager-Meyer 1994).

	Keyword	Frequency in the ORRs Corpus	Percentage in the ORRs Corpus	Number of texts where it occurs
1	*That*	3,567	1.37	303
2	*Study*	1,242	0.48	11
3	*We*	1,202	0.46	43
4	*Patients*	1,193	0.46	0
5	*Would*	830	0.32	39
6	*May*	824	0.32	22
7	*Risk*	719	0.28	1
8	*Et*	558	0.21	0
9	*Al*	545	0.21	0
10	*Results*	493	0.19	1
11	*Health*	489	0.19	1
12	*Treatment*	488	0.19	7
13	*Trial*	476	0.18	1
14	*Authors*	476	0.18	4
15	*Data*	419	0.16	0
16	*Care*	418	0.16	2
17	*Group*	416	0.16	8
18	*Studies*	402	0.15	5
19	*Analysis*	367	0.14	2
20	*Research*	363	0.14	3
21	*Evidence*	351	0.14	5

Table 2: Keywords in ORRs

As we expected, the most frequent content words are all related to the fields of medicine and research: five words for medicine and 12, including *evidence*, for research. In the area of medicine, we have *patients*, *risk*, *health*, *treatment*, and *care*. The words related to research comprise *study*, *et*, *al*, *results*, *authors*, *trial*, *data*, *group*, *studies*, *analysis*, *research*, and *evidence*.

4.3. Contexts of the keyword evidence

To ascertain how the term *evidence* is used and why, we analysed the most frequent contexts of the term in the corpus of ORRs. The contexts were identified and categorised inductively, focusing on their collocation and colligation. In what follows, we provide examples of *evidence* in these contexts.

4.3.1. Negative particles preceding *evidence*

The term *evidence* is often preceded by negative particles in ORRs (38 occurrences), generally the negative determiner *no*, to signal insufficient or complete lack of evidence to make an assertion in the field. Table 3 below includes some illustrative examples.

	EXAMPLES
1.	In response to the recommendation of the delayed prescribing approach for acute infective conjunctivitis, it is indeed a novel idea for reducing medicalisation of many self-limiting disease in the community. **There is no current evidence that** routine use of topical antibiotics reduces the bacterial load in the community.
2.	Compared with immediate antibiotics delayed prescribing had the advantage of reduced antibiotic use, **no evidence of medicalisation**, similar symptom control, and reduced reattendance for eye infections.
3.	In conclusion, residents of major metropolitan areas live in a veritable sea of radio-frequency energy. Despite this, **there is no epidemiological evidence that** continuous exposure to low amounts of electromagnetic energy plays any role in causing cancer.
4.	Radio operators have been sensitized to be alert to the possibility of medical consequences caused by unsafe transmitter operation. Yet with all of these warnings, **there is no evidence** – anecdotal or otherwise – **that** a physical presence near low power radio transmitters or antennae causes any adverse medical consequence to Amateur Radio operators.
5.	The Buscemi and colleagues' meta-analysis (1) concludes that **there is no evidence that** melatonin is effective in treating secondary sleep disorders or sleep disorders accompanying sleep restriction. Here, readers need to recall that there is another meta-analysis by these colleagues, pointing at the efficacy and safety of melatonin in the management of chronic or primary insomnia (2)
6.	With a RR of 0.65 and 95% CI of 0.48 to 0.88 from like-with-like cohort studies, I submit that to put out the message that **there is no clear evidence to** support a reduction in risk of CV death from long chain omega-3 usage is highly irresponsible.
7.	Compared to patients operated on within 24 hours, delay to surgery in patients who were initially medically unfit was associated with increased mortality (hazard ratio 1.3; 95% confidence interval 1.1 to 1.4). However, **there was no evidence of** an association between delay to surgery and mortality for patients whose operation was delayed for administrative reasons (HR 0.9, 95% CI 0.8 to 1.0) or for other reasons (HR 1.1, 95% CI 0.9 to 1.2).

Table 3: Some examples of negative determiners preceding *evidence* in ORRs

As shown in Table 3, the negative determiners preceding *evidence* highlight the presence of criticism in ORRs. This is to be expected as negative appraisal is an important function of any type of review (Samraj 2016). In this respect, they resemble occluded reviews of manuscripts that are deemed to require major revision or are

rejected, which is consistent with previous research on occluded peer review referee reports (Kourilovà 1996; Samraj 2016). Criticism has also been observed by Hyland and Zou (2020) in academic blog responses and by Rogers *et al.* (2020) in critical appraisal in letters.

4.3.2. Colligation of *evidence* with premodifiers

In ORRs, the term *evidence* colligates with adjectives (108 occurrences) which refer to the presence, amount, quality, and nature of the evidence provided in the article under open review and/or the evidence available in the field of medicine, as illustrated in Table 4 below.

	EXAMPLES
1.	There was also **insufficient evidence** to evaluate the accuracy of MRI in patients presenting with different clinical symptoms.
2.	MR was not withdrawn on the basis of Wakefield's **anecdotal evidence** in 12 patients -instead it was subjected to proper scrutiny.
3.	If authors refer specifically to older patients, **clear evidence** is derived from the MEDENOX (3) and PREVENT (4) studies.
4.	Harnden *et al.* **present convincing evidence** that a common cause (Bordetella pertussis) of persistent cough in adolescents and adults also extends to school age children
5.	There is no doubt about the **emerging evidence** demonstrating that acupuncture may have some specific treatment efficacy in knee pain1, neck pain 2 and back pain 3.
6.	There is little doubt that **increasing evidence** is emerging which indicates that the context in which a treatment is delivered may be of great importance 9. If this is indeed the case, then the major effects which we observe within clinical trials of both acupuncture and conventional medicine may be more related to the context and environment of the trial than with the specific efficacy of the treatment being studied 6, 9.
7.	For alpha-linolenic acid, the **epidemiological evidence** is less convincing and randomized controlled trials are lacking.
8.	The reason why indication for reconstruction is not clear cut is that we lack **scientific evidence** that it prevents from late osteoarthritis, and this is the second point we would like to discuss.

Table 4: Some examples of colligation of the term *evidence* with premodifiers in ORRs

Adjectives that denote low quantities justify the relativisation or rejection of a particular claim or assertion in the article or the discipline, such as, for example, *insufficient* (2 occurrences), *limited* (2 occurrences), *poor* (1 occurrence), *anecdotal* (1 occurrence). On the contrary, there are adjectives that express the writer's support of the evidence existing in the field or provided in the paper for example, *clear* (6 occurrences), *strong* (4 occurrences), *convincing* (3 occurrences), *valid* (2 occurrences), *good* (1 occurrence), *abundant* (1 occurrence), *best available* (1 occurrence), *current* (1 occurrence), *important* (1 occurrence). Some adjectives, such as *emerging* (3 occurrences), *growing* (2 occurrences), or *increasing* (1 occurrence), refer to changes in the amount of

evidence analysed and reveal emerging research tendencies in the discipline. Other adjectives, such as *epidemiological* (3 occurrences), *experimental* (1 occurrence), *scientific* (5 occurrences), and *randomised* (1 occurrence), reveal the origin, type, or category of evidence, which helps the virtual community focus on these particular research categorisations.

4.3.3. Collocation of *evidence* with postmodifying non-finite noun clauses

Evidence is often followed (26 occurrences) by postmodifying non-finite noun clauses (Biber *et al.* 1999: 291). In Table 5 below, the first three examples refer to the person or research group providing the evidence, the next three allude to the availability of the evidence, and the last two indicate the conclusions to be drawn from the evidence.

	EXAMPLES
1.	**The evidence cited by Lewith and White is unpersuasive** or totally not applicable. … If there is no placebo control possible for acupuncture experiments then it becomes impossible to ever falsify acupuncture claims and the proposition that acupuncture is more than placebo
2.	However, **the evidence presented by Bekkelund and colleagues for visual field loss is, for several reasons, far from convincing**. The authors do not represent the visual field in the most appropriate format for interpretation and they do not provide any indication as to the reliability of the response from the patient during each examination.
3.	**The evidence provided by the paper however appears incomplete**. The definition of quality is performance in the clinical domains of the new GMS contract. However, this only measures part of the quality spectrum for primary care activity.
4.	In the introduction to their paper, …, the authors also state that the baseline risk of VTE in medical patients remains uncertain as does the effectiveness of thromboprophylactic therapy in these individuals. Neither of these statements can be substantiated on review of **the evidence available regarding the risk of VTE in acute medical admissions** and the established thromboprophylactic therapies used in these patients
5.	The assertion of Dr Antony in his rapid reply that "some writers and researchers have concluded that these dangers are so great that online discussion groups should be professionally moderated." Is not referenced and I doubt that anybody actually said something like this. I am not aware of any **evidence suggesting that** moderated communities are "better" than unmoderated communities, or the other way around [2]. The Esquivel paper unfortunately doesn't contribute to answering this question.
6.	Would there be unexpected repercussions, including retinopathy, when hyperbaria is combined with 100% oxygen that too when the blood-brain barrier is compromised in HIE? May I remind that **evidence supporting resuscitation of newborn with room air (not 100% oxygen) is mounting in the recent western 4 and eastern 5 literature**.
7.	Surely with abortions in the UK now exceeding 200 000 a year, **the evidence indicating a link with preterm births deserved at least a mention** or else evidence that there is no such association should have been presented to reassure the thousands of women undergoing terminations of pregnancy each week?
8.	We must try to suspend our own opinion until there is **evidence regarding efficacy of Japanese acupuncture** which is widely legitimized. There are therefore a number of other possible explanations for the study. The first is that all acupuncture may be placebo with deeper and more painful needling being a more powerful placebo than superficial needling

Table 5: Collocation of the term *evidence* with postmodifying non-finite noun clauses

After a close reading of the examples from the corpus, we have identified that an important function of these postmodifying clauses is to express criticism (e.g., *evidence cited by […] is unpersuasive*, *evidence presented by […] is […] far from convincing*, *evidenced provided by […] appears incomplete*). These critical acts may constitute a direct attack on the researchers' reasons for making assertions, for legitimising their claims, and may also be considered face-threatening acts. These clauses are also found more often simply to provide a description of the evidence (e.g., *evidence available*, *evidence suggesting*, *evidence supporting*, *evidence indicating*, *evidence regarding*), as can be seen in examples 4 to 7 in Table 5.

4.3.4. Colligation of *evidence* with *that*-clauses

As we can see in Table 6, *evidence* colligates with *that* complement clauses (47 occurrences). As was the case with postmodifying non-finite noun clauses, their main function is to provide more information about the *evidence* being mentioned such as, for instance, in example 1 (see Table 6) where the effect of low molecular weight heparins on bleeding complications is mentioned. Similarly, in example 2, information is added regarding proof that a common cause of persistent cough is found not only in adolescents and adults but also in school children, or, in example 3, where information on the relation between osteonecrosis and low-dose corticosteroids is provided.

	EXAMPLES
1.	The results of Cook *et al.* conflict with the **evidence that the use of low molecular weight heparins (LMWH) for thromboprophylaxis** does not cause more bleeding complications than heparin (UFH).
2.	Harnden *et al.* present convincing **evidence that a common cause (Bordetella pertussis) of persistent cough** in adolescents and adults also extends to school age children.
3.	However, we do not agree that the references you quoted provide **evidence that osteonecrosis** *was related* to low-dose corticosteroids.
4.	The Buscemi and colleagues meta-analysis (1) concludes **that there is no evidence that melatonin** is effective in treating secondary sleep disorders or sleep disorders accompanying sleep restriction. Here, readers need to recall that there is another meta-analysis by these colleagues, pointing at the efficacy and safety of melatonin in the management of chronic or primary insomnia.
5.	First, without any scientific evidence McCrea (2) and Nesbitt (3) responses try to convince the readers that hip fracture precedes the fall (breaking and falling) and not vice versa (falling and breaking). However, the landmark study on injury mechanisms of hip fracture (4), followed by many others (5,6,7), has given **strong evidence that majority of hip fractures** among older adults are caused by a sideways fall onto the hip (greater trochanter).
6.	Finally, the rate of fractures outside hip and pelvis was similar in our protector group and control group thus **providing further evidence that** the groups were very comparable.

Table 6: Colligation of *evidence* with *that*-clauses

4.3.5. Colligation of *evidence* with premodifiers and *to*-infinitive clauses

In our corpus, *evidence* is also attested in a syntactic relation with premodifiers and *to*-infinitive clauses (29 occurrences). The number of examples displaying a negative appraisal of *evidence* with a *to*-infinitive clause is 15, while there are 12 examples showing positive appraisal. Whether appraisal is positive or negative depends on the premodifiers. As can be seen in Table 7, the first four examples collocate with *evidence* to show its strength while the remaining examples show its weakness.

	EXAMPLES
1.	CT head exposes a child to a dose of 0.5Gy (approx. 100 chest X-rays) (3) and **there is some evidence to show a detrimental effect on children's cognitive development** (4).
2.	**There is a body of evidence to suggest** that Sudden Infant Death Syndrome commonly referred to as cot death is linked to a mild diffuse brain injury acquired by the fetus in utero or during the birth procedure linked to trauma.
3.	We do not think that **there is sufficient evidence from RCTs to convince us of the safety** in a re world population undergoing hysterectomy.
4.	Hence a longitudinal study to follow up on the present result to observe the association between these two factors with other social and economic environment would give health care providers comparatively **strong evidence to predict to a certain extent one's health outcome** given a person is both a smoker and is obese.
5.	The fact that previous Cochrane reviews by Hooper have concluded that **there was no evidence to support the hypothesis** that reducing dietary salt intake decreased blood pressure, or that reducing saturated fat intake decreased heart disease risks seems to me to make the point very eloquently.
6.	Thus, **there is no valid evidence to recommend perioperative beta-blockade** on the sole indication of diabetes mellitus.
7.	The quality of health care has improved immeasurably in recent years because of the combined efforts of doctors and researchers to use **the best available evidence to inform decisions about clinical practice for individual patients**.
8.	**There was also insufficient evidence to evaluate the accuracy** of MRI in patients presenting with different clinical symptoms.

Table 7: Colligation of *evidence* with premodifiers and *to*-infinitive clauses

The most common verbs in the *to*-infinitive clauses colligating with *evidence* are *support* (5 occurrences), *suggest* (9 occurrences), *understand* (2 occurrences), and *show* (2 occurrences). The remaining verbs are only found once (e.g., *change*, *evaluate*, *extract*, *guide*, *inform*, *justify*, etc.). Infinitives are employed to indicate some of the uses the medical community makes of the evidence at their disposal (e.g., *to show effects*, *to suggest*, *to convince*, *to support a hypothesis*, *to make predictions or recommendations*).

4.3.6. Collocations of *evidence* with partitive noun phrases

On the basis of the data from the open review corpus, *evidence* also collocates with partitive noun phrases (22 occurrences). Partitive noun phrases assess the presence or absence of evidence in the field, its quantification, qualification, classification, or the indication of its sources. They also signal support for the assertions made about the evidence, as exemplified in Table 8.

	EXAMPLES
1.	There **is a body of evidence** to suggest that Sudden Infant Death Syndrome commonly referred to as cot death is linked to a mild diffuse brain injury acquired by the fetus in utero or during the birth procedure linked to trauma.
2.	Indeed, there is **a wealth of evidence** from published studies to show that supported quit attempts are much more successful than unsupported ones. (Tobacco smoking cessation)
3.	There is quite **a bit of evidence** from Table 3 that the two groups were not similar at baseline and the lack of a major impact may, as in the early Head Start evaluations, be due to confounding.
4.	This highlights the importance of using **the totality of evidence** from other trials.
5.	The bias came from evaluating only randomized clinical trials (RCTs), omitting **large amounts of published evidence** (2) on how dietary omega-3 fats compete with omega-6 fats as they maintain healthy tissues and prevent disease processes.
6.	Few other interventions-lyfestyle, pharmacologic, or surgical have **levels of evidence** or magnitudes of health benefits approaching those of fish consumption. For example, in a meta-analysis of 14 randomized trials of statin therapy, considered by many a pharmacologic panacea, total mortality was reduced by 12 % (RR=0.88,95% CI=0.84-0.91).
7.	Meta-analysis is considered **the highest order of evidence** and the definitive source of conclusive data. Ho and Sheridan [1] failed to report on a more practical and common side effect of prolonged intravenous frusemide use.
8.	We would concur with the concerns expressed by Neely *et al.* (5) about **the lack of evidence** of the superiority of tinzaparin over UFH.

Table 8: Collocations of *evidence* with partitive noun phrases

Partitive noun phrases reveal the presence of an ongoing process of evidence appraisal, with sometimes conflicting evidence, which may directly impact decision processes, risk taking, and cost/benefit assessments adopted by medical professionals in patient care and hospital settings, among others.

4.3.7. Colligation of *evidence* with preceding verbs

The data retrieved from the ORRs corpus shows that *evidence* colligates in the same clause with preceding verb phrases (71 occurrences). There is a great variety of preceding verbs but the most common ones refer to the evidence provided or used; these include *provide* (15 occurrences), *show* (3 occurrences), *give* (3 occurrences), *offer* (2 occurrences) and *use* (3 occurrences). Table 9 below includes some illustrative examples. As shown, two of them, namely *ignore* and *disregard*, refer to obviating the

evidence (see examples 6 and 7), while example (8), *rests on*, refers to the lack of credibility of the evidence presented by researchers.

	EXAMPLES
1.	In any case they **do not offer any evidence** to support this statement.
2.	Everitt *et al.* **have presented an interesting article showing evidence that** delayed antibiotic prescribing is the best management strategy in acute infective conjunctivitis (AIC).
3.	The paper by Zackrisson *et al.* (1), reporting the follow-up of the Malmo trial, **provides important evidence**.
4.	However, the landmark study on injury mechanisms of hip fracture (4), followed by many others **given strong evidence** that majority of hip fractures among older adults are caused by a sideways hip (greater trochanter).
5.	Several large double-blinded placebos controlled antibiotic trials have attempted to clarify the role of C pneumoniae in CHD with conflicting results (3). **Only a few trials have used evidence of pneumoniae infection as inclusion criteria** (and these were dependent on antibody measurements).
6.	The context presented by Hooper *et al.* **ignores strong biological evidence for** the potentially disease-specific effects of omega-3 fat.
7.	As it would not be right to accept the results of the previous meta-analysis as the end of the argument, **it would be equally incorrect to disregard all the evidence supporting metformin plus clomiphene treatment** published before the findings of Moll *et al.* based on the trial alone.
8.	Hooper *et al.*'s condensed version (1) of their 2004 Cochrane omega 3 review up to February 2002 (2) concluded that it is not clear that omega 3 fats alter total mortality… **We do not believe that this conclusion rests on solid evidence** (1).

Table 9: Colligation of *evidence* with preceding verbs

Although many of these verbs serve the purpose of praising or criticising the research articles under scrutiny, their presence also reveals how agile these online debates between researchers are (e.g., *present*, *summarise*, *cite*, *used*), how medical community members operate around the concept of *evidence* (e.g., *showing*, *disregard*, *ignores*), and how its treatment is flexible (e.g., from conclusions resting on solid evidence and presenting convincing evidence to arbitrarily ignoring or disregarding evidence).

4.3.8. Colligation of *evidence* with following verbs

Most of the verbs following *evidence* (28 occurrences) refer to what it reveals overtly or tentatively: *suggest* (6 occurrences), *support* (4 occurrences), *present* (2 occurrences), *provide* (2 occurrences), *show* (2 occurrences), *indicates* (1 occurrence), *points to* (1 occurrence), *produce* (1 occurrence). Some of these verbs are shown in Table 10 below. Two of them, *have* (3 occurrence) and *obtain* (1 occurrence), refer to the evidence the researchers possess (examples 9 and 10). The remaining verbs have diverse meanings: *appear* (1 occurrence), *arise* (1 occurrence), *change* (1 occurrences), *emerge* (1 occurrence), and *fulfil* (1 occurrence).

	EXAMPLES
1.	**The clinical evidence would suggest** there is a difference in effect size between Streitberger and real acupuncture 7, but it may just be that Kaptchuk's placebo is a less effective form of acupuncture that is practised in Japan.
2.	Radiation must certainly be taken into account when balancing risk versus benefit in use of CT in mild head injury. **Current best evidence suggests** that the risk of an occasional CT is low, but special caution is needed in children below 18 months.
3.	Our report on the DIPOM trial (1) does not state that metoprolol is of no benefit peri-operatively in non-cardiac surgery. As suggested by McCulloch, we humbly state that **no evidence supports this intervention**.
4.	Jonathan T McCrea makes an interesting point about how hip fractures happen, although as far as I know **the evidence points to** the impact of a fall as the usual cause.
5.	Also, **the evidence could change** rapidly when data from further RCTs at low risk of bias become available.
6.	**Evidence would arise** from a statement like this: "In a consecutive review of all cases delivered to our unit, we found 15 patients with osteonecrosis who received and A cases who did not receive low-dose corticosteroids."
7.	If new **evidence fulfils** our inclusion criteria, we will be happy to include it when updating our review in the future.
8.	I do not claim that osteonecrosis is not associated with low-dose corticosteroids. I only say that **evidence should be obtained** by appropriate methods.

Table 10: Colligation of *evidence* with following verbs

There is a great abundance of hedged statements among the verbs following *evidence*. The verb *suggest* itself, which is found six times, is intrinsically non-categorical. Hedging is also expressed through conditionals (e.g., would suggest, *if new evidence fulfils, suggests, would arise, could change* and phrases such as *as far as I know*). This lack of assertiveness seems to support the adage that no research report provides proof.

5. CONCLUDING REMARKS

This study is the first to focus on ORRs in any electronic journal and provides an insight into the nature of this type of open review, thus complementing studies on traditional occluded peer-reviews. Although it is only the 21st most frequent word in our corpus of ORRs, we have focused on the term *evidence* as, more than any other, it epitomises empirical research, which has come under attack from certain sectors of society (Nasr 2021). Detractors of scientists and science often criticise the opaqueness of empirical research, mainly carried out in laboratories and field studies that include double-blind trials and other procedures which follow strict protocols of confidentiality. These critics also decry what they see as the unquestionable nature of evidence. ORRs provide transparency regarding research methods and results and highlight the contested nature of what is considered *evidence* in medicine. In this sense, ORRs reflect their authors' concern that the research they are assessing should provide sufficient evidence to

convince the reader and the academy and that it builds on present existing research in the field in even more detail.

In our study, we have ascertained that the term *evidence* is not only used more often in ORRs than in other more general corpora, but it is also a keyword of strategic importance in the medical field. The study of how the term is used in ORRs leads us to conclude that the evidence provided by the researchers as well as their claims and assertions regarding the state of the art in the discipline are carefully scrutinised not only by editorial teams and referees, but also by online medical peer experts in the virtual arena before they can become accepted knowledge in the discipline.

Through open peer review, this process becomes even more thorough as it addresses the reliability and validity of the published paper and the most up-to-date research in the field in even more detail, and this has become a characteristic feature of medicine 2.0 culture.

Our examination of words and phrases that collocate with *evidence* shows that, on the one hand, it is preceded by negative particles, determiners and adjectives, partitive noun phrases and verbs and, on the other, followed by postmodifying non-finite noun clauses, *that*-clauses, and *to*-infinitive clauses. By examining the collocations of the term *evidence* in ORRs, we have pinpointed the various ways reviewers assess whether article authors have fully explored the latest developments in the field. We can also see how reviewers examine the inferential processes implemented by the authors when making claims and assertions. The critical nature of reviews becomes apparent through the large number of negative particles that collocate with *evidence*. What is also evident is the frequently tentative nature of the reviewers' comments seen in the presence of hedging devices.

The observation of the term *evidence* in its various contexts places it strategically in the centre of the evaluation process performed by medical experts. In the experts' appraisal of research articles, medical evidence is not considered absolute proof; instead, it points in a particular direction. The careful choice of the words surrounding *evidence* helps to establish the degree of probability of truthfulness of assertions or propositions in the discipline and to what extent the online community of medical professionals can believe them and rely on them for medical practice. That is the reason why medical peers carefully scrutinise the incorporation of new knowledge into the discipline and ensure it reaches the highest scientific standards.

This study has revealed that, in ORRs, the term *evidence* refers to cutting-edge medical knowledge widely recognised by the medical community. It also refers to relevant research in the medical field whose conclusions and assertions have been accepted by the medical community because they have been obtained by adequate experimental design, appropriate methods, and logical, scientific reasoning. In the corpus of ORRs, the term *evidence* refers to both the research article under open review and to the state of the art in the medical field.

This study suggests the presence of an ongoing process of evidence appraisal in academia, in the virtual arena, where experts praise or criticise articles on the grounds of the evidence needed to make assertions and emerging research tendencies. The wide range of uses of this term in the online debates in the BMJ implies that evidence is at the heart of medical academy activity.

There are two main limitations to our study, which, in turn, suggest future avenues of research. The first is that we centre on one medical e-journal, the BMJ. Further studies are needed to discern whether the analysis of *evidence* in different medical e-journals would yield similar results and whether differences would arise across disciplines. Second, as we focus exclusively on the term *evidence*, it would be enlightening to include content words, such as *study*, *patients*, *risk*, or *results* found in our keyword list.

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