

# The missing link: the quality of UK local and national online media coverage of research

Local and national media have always played an instrumental role in the communication of academic research to the public. In recent years, this has proved even more important due to the extensive online national and international coverage of topics such as climate change and the Covid-19 pandemic. Given that the media represent the public's first point of contact with, and key source of information about, science and research, then, as academics, we need to know, firstly, whether the media make this research easily identifiable for the public and, secondly, whether the research itself is accessible. Our study examined coverage of University of Sheffield published research in UK local and national media to explore how far it is identifiable and accessible; using data from Altmeteric.com we investigated what proportion of research covered provided sufficient details to identify research, including links to the published articles and explored how much of the research was accessible via open access. A large proportion of research that featured in local media cited the journal, academic institution and author, but did not link to the article. By contrast, national media cited the author, institution or funder much less than local news websites, but often linked to the actual research article. Most articles featured were open access. The implications of this and potential reasons for the national and local differences are discussed.

## Keywords

media; altmetrics; scholarly communications; UK news; research communications; impact

## Introduction

National, regional and local media have always played a role in the communication of research and have done so increasingly in recent years in relation to news about Brexit, climate change and the Covid-19 pandemic. Such topics have become staple content for national and local online news platforms. With the advent of the World Wide Web (web) in 1989, and particularly post Web 2.0 in 2004, the opportunities for communicating research online increased significantly as new media and social media platforms started to appear in direct competition with the traditional press.

## Online media and the communication of scientific research

The creation of the web afforded news organizations the ability to share news with huge audiences with very low effort. In addition, the ability to hyperlink web pages without needing to know how to edit html meant that journalists could share their post-edited news articles onto the web without technical assistance. A research news story could now include links to the academic journal, researcher and funder home pages. Yet, despite there being established practices and style guides in other contexts, no shared practice as to how published research should be shared through local and national media across the web seems to have been developed.

Just prior to the invention of the web in 1989, an article by the then Dean of the School of Journalism at the University of Missouri, James Atwater, pointed out, 'So everyone wants to know about science. Fair enough, we all say, but the question really is what should the people know and when should they know it?'<sup>1</sup> At the time of writing this, Atwater would not



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2 have known about the web and the possibilities brought by hyperlinks and social media, but his statement is even more pertinent when science reporting is augmented with links to the science itself.

One only has to consider the Covid-19 pandemic and climate change to realize that scientific controversy is a growing and thorny issue across traditional and social media. Nisbit and Fahy recommended that journalists gave their audiences more information about how and why the research was conducted.<sup>2</sup> They suggested that social media be used as the means to connect scientists with the general public in discussion.

## What are the known problems regarding science, research and the media?

The web has been a catalyst for change to how research is reported but its success has been mixed. One study found there was much more work needed for national newspapers to properly embrace the benefits of data journalism in the UK, with *The Guardian* showing more commitment than their competitors.<sup>3</sup> Whereas another piece of research highlighted a conflict between how scientists presented statistical information to the media and how the media treated that information as unarguable truth.<sup>4</sup>

International market research organization Ipsos found, in their 2021 Veracity Index, that 83% of the British public trusted scientists, whilst trust in journalists was down at just 28%.<sup>5</sup> Worldwide, the Ipsos Global Trustworthiness Index for 2021 highlighted an almost identical divide between how much the general public trusted scientists on the one hand, and journalists on the other.<sup>6</sup> Scientists were deemed second only to doctors among the most trusted professions, with 64% of society considering them trustworthy. By comparison, journalists ranked equally on the scale with bankers and business leaders, at just 23%. Only 10% of those surveyed felt that scientists were untrustworthy, whereas that climbed to 34% for journalists.

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Missing links are just one of the problems academics encounter when their research attracts media attention. Questions relating to coverage,<sup>7</sup> verification,<sup>8</sup> churnalism,<sup>9</sup> bias,<sup>10</sup> sensationalism,<sup>11</sup> distortion,<sup>12</sup> inaccuracy<sup>13</sup> and the media not disclosing whether the research has gone through formal peer review,<sup>14</sup> are some of the other problems researchers face when their work receives wider attention.

One study looking at churnalism, where press releases are employed to generate large amounts of media content, found this practice to be highly problematic for newly published research. Heyl, Joubert and Guenter<sup>15</sup> compared 40 science-related media articles to institutional press releases. They found that most press releases were republished with minimal journalistic input and with no crediting of the original source. This is concerning as the original press release may contain links to the journal article, academic authors, institutions and funders which may not be included in the subsequent news coverage.

Medical research receives a lot of coverage across the media and work by Selvaraj, Borkar and Prasad<sup>16</sup> explored article attention based on the hosting journal's impact factor. They found that newspapers do not exclusively cover research with the highest impact. Rather, their results found that newspapers tended to report findings from research with relatively smaller sample sizes and less rigorous study designs.

'Where the research has a DOI or similar unique identifier, it is crucial it is shared'

The problem is amplified when important links are not included to the actual research article. This may begin at the press release stage where a piece of research contains a story but no link to the research. It is important to note that in some cases, however, the research may not have been published at this stage. Where the research has a DOI or similar unique identifier, it is crucial it is shared at that first stage. Failure to do so will cause a butterfly effect further down the line as each subsequent piece of media coverage fails to include a link to the article. This can also include subsequent coverage by

- 3 blog sites and social media posts. Providing an identifier such as a DOI or PubMed ID in a news story guarantees greater success in finding out how and where a research output is being received, and by whom in the event the media use a properly formatted press release.

It is unlikely that those working in the practice of churnalism are going to invest time in seeking out missing links whilst copying and pasting a press release onto a news website. The failure to capture this news trail makes it harder not only to track the original research via altmetrics, but also for academics to capture evidence of the potential impact of their work. Altmetric.com, the data tracking company we used for our research, finds most online attention by searching for unique identifiers across their tracked attention sources. In terms of the three key sources they track, News, Policy and Patents, they rely on a combination of link matching and text mining to pick up mentions of research.<sup>17</sup>

## What are some of the proposed solutions?

It can be difficult for academics to claim ownership of their work once it appears across the media without proper citation. Autzen<sup>18</sup> stated in a commentary that, 'Scientific institutions have for a long time known the importance of framing and owning stories about science' and as a result have used press releases as a medium for communicating new outputs.

Proposals for science journalism courses,<sup>19</sup> and initiatives by journalism schools and departments to address the need for better scientific reporting, have gained momentum in recent years. Positive results have been seen from running science journalism courses.<sup>20</sup> As a result of such courses, journalists gained confidence and skills for science reporting as well as demonstrating small, positive changes in source selection, references to scientific uncertainty and thematic framing. Efforts have also been made to build a better understanding and connections between journalists and academics.<sup>21</sup> This is only half of the problem as academics also need to have a better understanding of journalists and their practices. Allgaier et al.<sup>22</sup> identified that several neuroscientists from a group they interviewed ask journalists to show them the draft of the media report before publication. Despite these findings, given the immediate nature of reporting and the 24-hour news agenda, obtaining draft copies of a research-based news story is likely to be the exception rather than the rule.<sup>23</sup>

'Making as much research as possible open access ... also exists as a means of effectively communicating research to the general public'

Making as much research as possible open access (being available to everyone for free by clicking on a link) also exists as a means of effectively communicating research to the general public. A study by Schultz<sup>24</sup> explored to what extent the media featured articles that were available open access as opposed to being paywalled by a publisher. The author concluded that there was a positive correlation with the number of news mentions for open access research over paywalled research articles, regardless of the 'level' of open access, such as gold, green or hybrid. However, the article acknowledged that it could not be determined whether this was a direct result of research being open access, or due to multiple factors, including author characteristics and the use of press releases, as well as the open access nature of a research study.

## Addressing the issues around media coverage of research

Given that the media represent the public's first point of contact with, and key source of information about, science and research, then we need to know, firstly, whether the media makes this research easily identifiable for the public and, secondly, whether the research itself is accessible. The alternative is that science and research is covered by the media in only a vague, non-transparent manner and readers cannot identify, access or check this research, but rather have to rely exclusively on what the media chooses to tell them.

4 Our first objective, therefore, was to explore coverage generally. The principal question was: is the research cited by the media in such a way that the key publication underpinning the news story can be identified? This is important because the research being covered by the media is not some abstract thing but something tangible, produced by and involving multiple stakeholders, including but not limited to: the authors, their organization, the publisher of the work and who has funded it.

As our second objective, we wished to explore what percentage of our sample linked to an open access version of the research. The principal question was: is the key publication underpinning the media story actually available to the public? This is particularly important for interested parties who wish to explore the research for themselves. Such 'interested parties' include fellow experts and those who are impacted directly by such research, especially for medical and environmental findings. This is important because if it is inaccessible and behind a paywall then the public cannot check this research themselves, and therefore are wholly reliant on the media's selection and interpretation of the work.

## Methods

Altmetric.com is a data science company that tracks online mentions of research, including on international, national and local media news sites.<sup>25</sup> It achieves this through two methods: firstly, by tracking unique identifiers that are tied to each academic output such as DOIs and PubMed IDs and, secondly, by looking for mentions of research articles by text mining the media coverage.

We conducted a search within Altmetric.com for research that was mentioned on one of the media/news websites and had at least one author based at the University of Sheffield. We chose to explore our own institution, the University of Sheffield, for our case study, as it is a leading research-focused, Russell Group institution involved in high-impact work of interest to the general public. Our institutional Altmetric.com account searches the University of Sheffield by default, but has the ability to search the whole database of academic publications. Focusing the research on our own institution also made good use of our familiarity with its outputs.

We wanted the research to focus on established UK national and local news websites ('local' being regional and city-based coverage). We excluded websites and blogs that focused solely on pure research news such as Phys.org and Medical Xpress because we wanted to focus on platforms that provided a variety of news stories which either had a national reputation or were embedded into local communities. In addition, we chose to focus on platforms intended for the public rather than science-specific websites.

The resulting, smaller sample also made it more possible to manually check each mention to confirm its validity (to ensure the intended citation was present and correct), and to explore how the research was made identifiable by the news source, i.e. whether the research article's authors, collaborators, journal and/or funders were cited in the news article. This enabled us to address our first objective concerning coverage, i.e. whether the research was cited in such a way that the key publication underpinning the media story could be identified. Comparisons between national and local coverage were also possible.

To address our second objective on the open access nature of the cited research, we used Unpaywall's Simple Query Tool to submit the DOIs from the two sets of results to explore what percentage of the coverage cited research that was open access. The Simple Query Tool allows up to 1,000 DOIs to be processed at a time and the results show whether a journal article is open access or not.

## Results

Our search retrieved 8,969 results that included national and local media and websites that published news relating to research. Most of them fell outside of the scope of this project due to not being classified as national or local news sites. These included specialist science

5 platforms such as New Scientist, medwireNews, ScienMag, or institutional and research websites such as Cancer Research UK or University of Cambridge news. After applying our criteria regarding the platforms where the research appeared, we were left with a sample of 843 mentions of the University of Sheffield research in national newspaper websites and 489 mentions in local news websites. In this sample, University of Sheffield research was cited at least once in each of the major UK newspapers online, which are cited in our dataset.<sup>26</sup>

### Working links to news stories from Altmetric.com

Of the 843 national media citations in our sample, we were unable to authenticate the coverage of 572 news stories as the Altmetric.com report did not provide working links to the news story. This was due to a limitation of the third-party platform they used to collect mentions at the time. The Altmetric.com dataset identified each story, but the only feasible way to check coverage for the 572 news articles would have been to carry out manual searches for each news story on the named media website to verify it had been written and that it had cited Sheffield research. This type of 'unlinked' news story affected a certain group of news organizations, most notably the *Daily Mail*. This left a total of 271 results which spanned three national news providers: *The Guardian*, the *Metro* and the *Financial Times*. From our sample of 489 local news stories, we identified 37 different organizations with the most proactive being the *Bridgwater Mercury*, *The Northern Echo* and the *Bromsgrove Advertiser*. A random sample of 10% of these national and local stories were checked to ensure the altmetric data was correct and that University of Sheffield research was cited in some way. The final list consisted of 37 local news websites and three national websites.

### Objective 1: coverage

#### **Working links to research in the national and local media**

The national publications performed much better than their local counterparts with 230/271 (84.9%) of all articles in our sample linking to the research article covered in the news article; only 41 (15.1%) of the functional news sites contained no, incorrect or a bad link to the research. By comparison, the local news sample provided a link to the research article in only 37/489 (7.6%) of articles, leaving 422 (86.3%) of news articles containing no, incorrect or a bad link to the research (see Table 1). Thirty news items were opinion pieces written by academics or journalists – these were not linked to a new research story or breakthrough, unlike the rest of the sample.

'The national publications performed much better than their local counterparts'

	National News (n = 271)	Local News (n = 489)
Link to article	230 (84.9%)	37 (7.6%)
No link to article	21 (7.7%)	231 (47.2%)
Bad Link	20 (7.4%)	191 (39.1%)
Editorial/Opinion piece	0	30 (6.1%)
Total	271	489

Table 1. Links to research article in national and local news

The existence of links to the research in only 7.6% of local news stories is clearly poor journalistic practice, creating problems for readers who might wish to further investigate a story or news item. The problem is largely caused by churnalism, where a local news platform's primary aim is to create a regular stream of attention-capturing content with minimal effort. This is driven by a greater reliance on capturing marketing income rather than traditional newspaper sales, with the added pressure of having a limited workforce to generate original news content. In terms of coverage, *About Manchester*, which is a digital magazine for Greater Manchester, performed the best with all 33 news items still online. *About Manchester* publishes its own content in addition to repurposing articles under a Creative Commons licence from *The Conversation*, as we discovered in our sample. *The*

6 *Conversation* is a national news web-only platform, supported by universities, that works in tandem with academics to produce news and feature articles online. Nationally, there were far fewer broken and bad links, which might be a reflection on the resources national news websites have at their disposal compared to smaller local organizations (detailed coverage data by individual media platform for the national and local samples are presented in the Appendix, Tables S1 and S2).

**Availability of citation details to identify research**

In terms of stories and research with working links, in the national news sample we found that over a third (42.6%) cited a named author of the research article in national news coverage (see Table 2). Nationally, that percentage fell to 16% for named authors affiliated at the University of Sheffield. It is important to note that this was probably a reflection on which institution led the research and therefore who had been designated first author. In rare cases, multiple authors from more than one institution have been cited. Named authors were usually the research project lead or lead author on the published article. National news coverage cited a third of organizations external to the University of Sheffield (33.5%) and just over a third mentioned the journal in which the research had been published (39.7%). Funders were rarely cited, with just 10 (4%) of the 251 news stories mentioning a funding source. Funding information is much more likely to be included in press releases if they are generated by the funders themselves, and not all research has a funder attached to the work.

Identification details	National News (n = 251*)	Local News (n = 298*)
Author cited	107 (42.6%)	266 (89.3%)
Sheffield author cited	40 (16%)	104 (34.9%)
No author cited	144 (57.4%)	2 (0.7%)
Editorial/opinion piece	0	30 (10%)
Organization associated with research cited	84 (33.5%)	250 (83.9%)
Journal cited	97 (39.7%)	30 (10%)
Funder cited	10 (4%)	263 (88.3%)

Table 2. National news titles: availability of citation details to identify published research in media. \*Totals minus the bad links (National news stories: 20/271; Local news stories: 191/489)

In the local news sample, 89.3% of all local news articles with working links cited an academic by name, and University of Sheffield authors were cited in just over a third (34.9%) of all local news stories (see Table 2). Again, we believe that this is due to the featured research being led by another institution in collaboration with academics based at Sheffield. The research organization external to the University of Sheffield was cited in most local news stories (83.9%). As was the journal that had published the work, with 263 of 298 local news stories citing the publishing title. Funders were cited in just over a fifth (22.5%) of local news stories, and again this may be a result of the original press release not including a funder or, in some cases, that no funder was tied to the work. We discovered that most of the local news stories with a working link cited an academic institution and the relevant journal. It is important to note that these citations are credits to the author and the entities behind them, they are not hyperlinked back to the academic entities themselves.

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**Journalist credit as part of media coverage**

We explored whether any of the local and national news articles provided a journalist's name as a credit to the news story (Table 3). This could be useful for engagement between academics and journalists and provides interested parties with a follow-up contact. We found that, on a national level, authorship identity is very different and in-house authors are far more likely to be cited (89%) than for local news websites. This is probably due to national news websites having greater resources to create original news content and that national journalists are better known than their regional counterparts. National news organizations also often have topic specialists, such as an environment or health editor.

	National News (n = 251*)	Local News (n = 298*)
No author	20 (8%)	13 (4.4%)
Newsroom credit	224 (89%)	36 (12.1%)
PA Media	7 (2.8%)	219 (73.5%)
Editorial/Opinion piece	0	30 (10%)

Table 3. National news and local news titles: Journalist credit. \*Totals minus the bad links (National news stories: 20/271; Local news stories: 191/489)

We found that most local news articles from our sample were attributed to PA Media. This is the national news agency within the UK where large teams of journalists write and edit news articles, with many of the scientific stories originating from academic press releases. Journalists within the agency are usually uncredited for their contracted work which is hosted on the PA Media newswire for subscribers who can repurpose or share the news article verbatim on their own news website. Only a small proportion (12.1%) of local news articles gave credit to a named author with an even smaller proportion providing no credit at all (4.4%). Almost one in ten news articles published in the local sample were opinion pieces that mentioned the research, rather than building a news story around it.

## Objective 2: open access

Using Unpaywall's Simple Query Tool we explored what percentage of news stories had open access links to a University of Sheffield research article as identified by Altmetric.com. Open access findings for both the national and local sample are presented in Table 4. As noted above, an impressive 230/271 (89.4%) of the national news stories provided a working link to the research. Of these 188/230 (81.7%) were open access and only 42 (18.3%) were paywalled. The remaining 41 were broken or had no links to the research. By contrast, only a small percentage of local news stories linked to a research article with a Sheffield author, with just 37/498 from the total sample (7.6%), with two of them linked to paywalled versions of the research (detailed open access data by individual media platform for the national and local samples are presented in the Appendix, Tables S1 and S2). For details relating to the newspaper ownerships and how they performed in relation to open access, please refer to the Appendix, Tables S1–S4.

	National News (n = 271)	Local News (n = 489)
Open access	188 (69.3%)	35 (7.2%)
Not open access (paywall)	42 (15.5%)	2 (0.4%)
No or broken link to article	41 (15.1%)	462 (92.4%)

Table 4. National and local news titles: open access links to research mentions

We found a lack of links was particularly problematic in local media coverage, especially given the high percentage of featured research that was available publicly, as shown in the Appendix, Table S2. In total, 449 out of 489 news stories featuring University of Sheffield research in the local media were available via open access versions.

## Discussion

According to the data obtained from Altmetric.com, we found that the University of Sheffield research was cited at least once in each of the major UK newspapers online. However, we were only able to validate the citations for three of these platforms, *The Guardian*, the *Metro* and the *Financial Times*. This is due to how Altmetric.com works with third party providers to obtain news media data. At the time of conducting this research it was something Altmetric.com were aware of and working to improve.

We found that the vast majority of local news stories, that did not contain a link to an article, originated from and were syndicated by PA Media. This raises questions about how research is communicated by funders, journals, research media teams and, ultimately, the media.

8 The high number of research mentions within local news highlights that the origin of these stories has come from an authoritative source. Most local newsrooms are too under-resourced to conduct thorough information quality checks, so largely rely on press releases or content provided by a news agency such as PA Media. Therefore, it is reasonable to conclude that most of these news stories were the result of university, funder and academic journal press releases. Many of the stories were duplicated across local news websites that are syndicated and take their content from PA Media. We used the online media directory Media.info to explore the ownership of the news sites to gain a better picture of their syndications. An example of this was seen when a story relating to research on the topic of birds was published by the University of Glasgow, on their news page. The story was covered on the same day with identical academic quotes across three local news websites, all of which originated from the PA Media agency.<sup>27</sup>

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On a local level, where links within news stories took readers to third party commercial websites, we can only speculate that adding links to the academics and their research reduces the opportunity for the news sites to generate advertising revenue. It also makes it less likely readers will click on other links that take them to commercial partners, which is a priority for news organizations with dwindling readerships. This aligns with the widespread practice of churnalism and our finding that hyperlinks within these news articles generally did not direct readers to anything relating to the research. Without links to the academics, their institutions and journals, it becomes less likely that readers will explore the research topic further, unless it is of particular interest to them.

Local news outperformed national news in terms of naming authors, organizations, journals and funders. Although it is important to note that the comparison being made is between many local, often syndicated, websites and just three national news organizations. Local news websites rely heavily on PA Media, which receives or sources press releases from research institutions, so the reproduction of the same or similar text across such outlets is not surprising.

Where national media vastly outperformed local research coverage was in the number of direct links to the research article. We found that a large proportion of research mentioned in local media cited the journal but did not cite or link to the actual article, despite most being available via open access.

Given that local newspapers are less likely to invest time in seeking out academic webpages and open access links to the research or weaken their income by replacing commercial hyperlinks with academic ones which do not return any income, a new model needs to be explored. This may take the form of a citation that follows the news story with a hyperlink to the research. A good example is the one offered by Nicholls at the end of his *Guardian* newspaper article; 'Babblers speak to the origin of language'.<sup>28</sup> A formatted citation of the research with hyperlink could be provided at the end of each press release and news websites could be encouraged to include this as a footnote to the news story. In addition, a set of guidelines could be shared among journalists and journalism students who are involved in the reporting of research, with a request to include the name of the journal and research article title, lead author, institution where they work and, where applicable, the funder. The addition of a hyperlink, requiring minimal effort, preferably to an open access record of the research, would represent a positive step forward in many of these cases.

This would have many benefits. Firstly, for academics and funders, who can then see where their research is being mentioned in the media, thus offering a potential pathway to impact. Secondly, it assists institutions in using altmetrics to form a rich picture of where their research is being shared and discussed on the web. It also has the potential to help journalists to build a better connection and trust with academics. Finally, and arguably

9 most importantly, it assists in the transfer of knowledge from the research community to interested members of the general public, who are then able to access the research being cited in the news story for themselves. This is dependent on whether the research article is open access, although this could be addressed if those working in research communications shared open access versions of research articles in addition to any paywalled version.

In order to facilitate such research communication in the media, we propose a brief checklist for journalists working at local and national level to try to ensure they include as much of the available information as possible as part of any news story based on research. We recommend that the following details should be included, where applicable, as part of any research press release:

1. Lead author or corresponding author.
2. Affiliations.
3. Title of research article (if published or in preparation).
4. Title of journal or other host (preprint server, open access repository).
5. Funder.
6. URL to citation or items listed above, if available.

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Achieving this is easier said than done and, arguably, needs to be taught at university and journalism school level, whilst support from journalism associations could reinforce the idea of mentioning sources, credits and citations within stories. Nevertheless, there remains the thorny issue of editorial control and that newsrooms have their own ways of compiling news stories, as well as their own conscious and unconscious biases.

## Limitations of this research

This study has a number of limitations, most notably that we were unable to capture a full picture of UK media coverage at the time we collected the data. University of Sheffield research has featured at some point across all national media news outlets, but we were unable to validate the coverage across all the major news sites. From our original dataset, we discovered that 843 national news stories had cited University of Sheffield research, but we were only able to manually validate 271 of those news items. This was because the news page for an item is either no longer live or is not linked back from the Altmetric.com database and therefore would have required manual validation. To have searched and validated the remaining 572 items, of which the majority were from the *Daily Mail* (n = 288), would have been highly resource intensive.

Some news articles in our final sample focused on the research, especially with breakthrough stories, whereas other research was cited as supplementary evidence to support a news article. Further research into the depth and quality of research coverage in the media using altmetrics would be of interest. In addition, we were unable to ascertain whether every record in our sample contained at least one Sheffield-based author,<sup>29</sup> highlighting the problem that not all data harvested by Altmetric.com can be guaranteed as 100% accurate when exploring policy document citations. The Altmetric.com database is constantly evolving to provide a richer snapshot of mentions of scholarly outputs so this may have improved somewhat from when we extracted our sample.

Paywalled journalism caused a small problem in terms of investigating our data to validate which elements of a research article were cited and linked in a news story. Most national news organizations rely on subscription-based income, whether that be a traditional

10 newspaper or their subscription-based website. The *Financial Times* content has limited free access compared to the *Metro*, which relies on advertising revenue in exchange for providing free access to news. This is a limitation that could hamper further research in this area as national newspapers increasingly move to an online subscription model due to the continual squeeze on their income from newer, digital news resources and a decrease in traditional news readership.<sup>30</sup> Additional research would require access to relevant news stories to cross-check citations and hyperlinks. This may not be possible if the news story is behind a publisher’s subscription paywall.

Another problem was presented by broken links to research within the news stories themselves. An example of this was seen when a piece of research in *The Lancet* about breast cancer was covered by *The Guardian*.<sup>31</sup> Due to a rogue full stop at the end of the URL, the link failed to take the reader to *The Lancet* article, but instead, took the reader to a broken link page. We have archived *The Guardian* news story on the Internet Archive.<sup>32</sup> This is a rare mistake by a newspaper but expanded across a wider sample, together with the issues mentioned previously, there could be many thousands of research articles that are inaccessible to the general public. The problem of dead links was much more noticeable with the local sample of news stories and this highlights that local news sites churn through large amounts of news, which leaves more scope for bad links and deleted web pages.

## Conclusion

How national and local news organizations cover research in terms of mentions and links does vary. The local news websites in our sample are more likely to cite an academic, university, journal and funder than the national newspapers. The majority of these local news stories originated from PA Media, who may acquire these news stories as press releases from journals, funders and research centres. By contrast, the national news media, while more likely to provide less citation detail than their local counterparts, were more likely to provide a hyperlink to the research in question. In addition, these links were largely to open access research articles which help readers discover the research for themselves. Given that the media represent the public’s key source of information on science and research, then it is clear that national media are most adept at making the research mentioned easily identifiable for the public, and that the research is often accessible. However, our research highlights the disparities in the nature of national and local media coverage of published research, as well as a greater need for transparency and better linkage between the agencies communicating the research. This would benefit not only academics, their institutions and funders, but also members of the public who wish to read the research for themselves.

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### Appendix

Outlet	Total news stories	Active news stories	Bad link	Open access	Paywalled
<i>Financial Times</i>	3	1	2	1	0
<i>Metro</i>	27	27	0	23	4
<i>The Guardian</i>	241	223	18	186	37
Total	271	251	20	210	41

Table S1. National news titles: coverage and open access

Outlet	Total news stories	Active news stories	Bad link	Open access	Paywalled
<i>About Manchester</i>	33	33	0	28	5
<i>Bournemouth Daily Echo</i>	35	13	22	33	2
<i>Bracknell News</i>	11	11	0	10	1
<i>Braintree &amp; Witham Times</i>	38	16	22	36	2
<i>Bridgwater Mercury</i>	37	24	13	34	3
<i>Bromsgrove Advertiser</i>	40	25	15	37	3
<i>Epping Forest Guardian</i>	16	16	0	15	1
<i>Hereford Times</i>	36	24	12	33	3
<i>Mid Sussex Times</i>	15	1	14	15	0
<i>The Northern Echo</i>	55	19	36	53	2
<i>The Press (York)</i>	13	13	0	12	1
<i>This is Local London</i>	13	13	0	12	1
<i>Wandsworth Times</i>	10	10	0	9	1
<i>Westmorland Gazette</i>	17	15	2	15	2
<i>Winsford Guardian</i>	35	14	21	34	1
Other local titles (see list below)	85	51	34	73	12
<b>Total</b>	<b>489</b>	<b>298</b>	<b>191</b>	<b>449</b>	<b>40</b>

Table S2. Local news titles: coverage and open access (minimum of 10 news stories)

The following outlets were recorded as having at least one news story in our sample: *Bognor Regis Observer*, *Brentwood Weekly News*, *Bridport News*, *Chorley Guardian*, *Cornwall Live*, *Derbyshire Live*, *Devon Live*, *Durham Times*, *Gazetta*, *Hampshire Chronicle*, *Leicester Mercury*, *Mid Devon Star*, *Nottinghamshire Live*, *Southern Daily Echo*, *Telegraph & Argus*, *The National*, *The Plymouth Herald*, *The Wear Valley Advertiser*, *The Whitehaven News*, *The Courier*, *This is the Westcountry*, *Western Daily Press*

Syndicate	Total links	Active news story	Bad link	Open access	Paywalled
Nikkei	3	1	2	1	0
GMG	27	27	0	23	4
DMG Media	241	223	20	186	37
	271	251	22	210	41

Table S3. National news titles: media coverage by syndicate

Syndicate	Total link	Active news story	Bad link	Open access	Paywalled
<i>About Manchester</i>	33	33	0	28	5
DC Thompson	3	1	2	2	1
jpimedia	18	4	14	18	0
Newsquest Media	420	251	169	386	34
Reach PLC	15	9	6	15	0
	489	298	191	449	40

Table S4. Local news titles: media coverage by syndicate

#### Data Accessibility Statement

The data that support the findings of this study are openly available in figshare, hosted at the University of Sheffield at <https://doi.org/10.15131/shef.data.22211635.v1>

#### Abbreviations and Acronyms

A list of the abbreviations and acronyms used in this and other *Insights* articles can be accessed here – click on the URL below and then select the 'full list of industry A&As' link: <http://www.uksg.org/publications#aa>.

#### Competing Interests

The authors have declared no competing interests.

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