The evaluation of mental disorders research reported in British and Irish newspapers between 2002 and 2013, and a comparison with the relative disease burdens and with research outputs in the two countries

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ABSTRACT

Mental disorders are a major contributor to the disease burden in Europe. We studied how research on them was communicated to British and Irish newspaper readers through an analysis of stories in the *Daily Mail* (DML) and *The Guardian* (GDN) in the UK and the *Irish Times* (IET) in Ireland, in 2002–13, and whether the coverage reflected the relative burdens of mental disorders, or the amount of research, in the two countries. The cited papers were identified through the newspapers' archive or the Factiva database, and their details and those of the research they cited from the Web of Science, with 1,128 stories in total. Alzheimer's and other dementias was the leading UK press research topic, but depression was for Ireland. The countries whose research was most cited were the United States, followed by Canada and Europe, notably the UK and Ireland in their respective newspapers. Over 68% of the Irish research papers cited by IET were supported by the state, compared with only 38% of all Irish mental disorders research. The UK newspapers had many stories on lifestyle factors (DML) or drug treatments (GDN); IET gave more space to epidemiology. The UK papers gave little attention to non-drug treatments. Many stories quoted commentators, who in the UK were often charities, but the IET tended to use academics.

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1. Introduction

Mental disorders are amongst the most prevalent non-communicable diseases in Europe, with the third highest disease burden [1–3]. Consequently, there has been considerable research into them. A recent study examined the research activities and impact in five non-communicable disease areas, from 2002 to 2013, and found that mental disorders represented 5.7% of all biomedical research in the EUR31 countries (the 28 European Union Member States, plus Iceland, Norway and Switzerland) [4]. It also found that the total research and development expenditure on mental disorders in 2013 in EUR31 was €3,280 million. A different study that investigated research funding found that non-communicable dis-

eases, including mental disorders, attracted more research funding than communicable diseases, such as malaria [5]. The Roadmap for Mental Health Research in Europe (ROAMER) project found that some European countries, in particular those in north-west Europe [6], carried out more mental health research than others. It also found that epidemiology research was the most common research domain. A review of mental health research in the UK found that there had been many major UK-based and/or UK-led contributions to mental health research [7]. However, it highlighted past reports that showed that the funding allocated to mental health research in the UK was disproportionately low in comparison to the burden of disease [7–9].

In this paper, mental disorders are taken to include all those listed by the World Health Organization under "Mental and substance use disorders", plus "Alzheimer disease and other dementias" and "self-harm" (which includes suicide), as both of these are primarily caused by mental rather than physical problems. However, it was decided at an early stage of the project to exclude certain mental conditions for which no remedy was likely

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to be found, namely "Autism and Asperger syndrome" and "Idiopathic intellectual disability" [4].

1.1. Mental health disease burden

The burden of a disease on a population is most commonly calculated as Disability Adjusted Life Years (DALYs). The burden of mental disorders (as defined above) in Europe in 2015 was estimated by the World Health Organization as 13.9% of total DALYs, much higher than the world mean of 8.2% [3]. The burden in the UK was 15.7% and that in Ireland was 17.6% [10]. Within these totals, depressive disorders and self-harm caused 34% of the burden in Europe, with dementias having the second highest disease burden at 26% [3]. However, in the UK, dementias caused the highest burden at 35% compared with depression and self-harm at 27%. In Ireland, the proportions were reversed, at 18% for dementias and 35% for depression and self-harm.

1.2. Epidemiology of mental disorders

A study in 2010 estimated that 38% of the population of the European Union suffer from a mental disorder every year [2]. This corresponds to an estimated 165 million people [2]. The prevalence of mental disorders was not found to have increased since 2005, other than with the inclusion of new disorders [1,2]. The diagnostic criteria and recording of mental health disorders varies between European countries, and even amongst the four territories of the UK. In England, 17% of adults experienced one of the common mental health disorders (depressive and anxiety disorders) in 2014 [11]. In Ireland, 19.5% of adults aged 19–24 experienced a mental disorder in 2012 [12]. Although depressive disorders are one of the most common mental health disorders, they are relatively neglected in research, along with alcohol misuse [4,11,13]. There are many treatments available for mental health disorders, including pharmacological drugs, such as antidepressants, and non-pharmacological treatments, such as cognitive behavioural therapy or psychotherapy. However, these are more effective for some disorders than others. In the UK, 12% of adults suffering from mental disorders were receiving treatment in 2014, with medication three times as common as non-pharmacological treatment [11]. Treatment use was also more common with greater severity of symptoms [11].

1.3. Mortality from mental disorders

A systematic review reported that approximately 90% of people who died by suicide were found to have had a mental disorder at psychological autopsy [14]. The numbers of deaths from suicide amounted to over 66,000 in the EUR31 countries in 2015 [15]. [The rate per 100,000 people was highest in Lithuania (35) and some other EU Member States in eastern Europe, and lowest in Cyprus and Greece (5) and other Mediterranean countries (Italy, Malta and Spain; 8)]. Ireland had an age-adjusted rate of 11.5 per 100,000 people in that year, compared with 8.7 for the UK.

Deaths from Alzheimer's disease and other dementias have been increasing rapidly, and in 2016 they were the leading cause of death in England and Wales, particularly among women [15]. In Ireland, they were the second-highest cause of death, but the rate per 100,000 people was only 28.5 compared with 49.2 in the UK in 2014 [16]. In both the UK and Ireland, deaths as a result of illicit drug use were more than twice as common as those from alcohol misuse [10], although alcohol will have contributed to other deaths such as ones from motor traffic accidents and inter-personal violence. Deaths from mental and substance use disorders were almost three times greater for males than females [15]. This may be the result of

perceptions about mental health that result in men being less likely than women to seek medical treatment for mental health issues.

1.4. Mental health research impact

Previous research evaluated the impact of research papers in five non-communicable disease (NCD) areas from 2002 to 2013 through five key measures, including academic citations, the percentage of reviews, national health advisory committee members, the evidence base of clinical guidelines, and the stories of biomedical research in European newspapers [4]. Thus, although the publications by members of national health advisory committees in 2009–13 were proportionate to the overall burden from these five NCDs, they were disproportionate to the individual mental disorder burdens in Europe, with illicit drug addiction, alcohol misuse, anxiety disorders, and depression under-represented, while schizophrenia was overrepresented [17]. The analysis of the stories of biomedical research in European newspapers revealed that they showed considerable interest in mental disorders research, which comprised almost a quarter of the papers that they cited [4]. In this paper we describe the findings for mental disorders stories in the time period 2002–13 in more detail and explore their policy implications.

The primary purpose of this study is to investigate whether reporting of mental disorders research reflects the disease burden for the various mental disorders. We hypothesise that mental disorders research reporting will reflect disease burden, because reporting on the diseases that are most commonly affecting their readership (i.e. their national population) would fulfil the mandate of newspapers to inform and educate in the best interests of their readers. Additionally, reporting on medical research in general, particularly those stories that mention "research" or a "study" in the headline, gives gravitas to newspaper stories as they are clearly shown to be evidence-based and filled with expert knowledge as opposed to opinion [18]. Ultimately, both of these strategies help to fulfil the ultimate aim of the newspapers, which is to sell as many copies as possible. Other aspects of mental disorders research reporting that we will examine include the types of research favoured by individual newspapers, individual country contributions to research, funding (2009–13 only) and any commentators quoted in stories. This study differs from previous studies because we investigated all of these aspects of mental disorders research reportage across a time period of 12 years [19,20].

2. Methods

2.1. Selection and processing of newspapers

We selected two well-known newspapers from the United Kingdom, the *Daily Mail* (DML) and *The Guardian* (GDN), and one from Ireland, the *Irish Times* (IET). The DML is a politically right-wing tabloid with extensive health research coverage, and the GDN is politically left-of-centre and was a broadsheet during the period of our survey (2002–13) but is now in Berliner format. The IET is a broadsheet, and is politically liberal on social issues, although for much of its existence since it was founded in 1859 it reflected Unionist viewpoints.

Of the three, the DML has the highest print and digital circulation, 1,270,418 and 35,686, respectively (issued on 13th of September 2018), followed by the GDN, 134,943 (issued on 13th of September 2018, digital figures unavailable), while the IET has the lowest, 60,352 and 18,903 (issued 23rd of August 2018) [21]. Although the DML is not the most popular newspaper in the UK as measured by print circulation figures, it was reported in 2012 that the digital edition of the DML, *Mail Online*, was the most pop-

ular news website not only in the UK but also worldwide [22]. We selected these three newspapers because of their popularity and their various reputations, either as trusted news sources or anti-establishment organs. This enables them all to influence public opinion and thus be seen as valuable resources by politicians who often write opinion columns in newspapers hoping to impress the public. In particular, stories about medical research influence public opinion, both on an individual level, in the discussions patients have with their GPs or hospital doctors about recent headlines and stories, and on a wider scale, in the campaigns run by patient advocacy groups, such as for treatments not currently available on the NHS.

Relevant newspaper stories (*i.e.* that cited mental disorders research papers) were sought from the full-text archive of the DML and the newspaper database Factiva (© Dow Jones) for the GDN and the IET with a systematic search strategy from 1 January 2002 to 31 December 2013 as follows:

(addict* OR ADHD OR alcoholi* OR Alzheimer's OR anorexia OR anxiety OR bipolar OR bulimia OR dementia OR depression OR hyperactivity OR schizophrenia OR self-harm* OR suicide*) and (research* or study or scientists or expert*)

However, this search also generated many false positives, which were discarded by AS and EP, who skim-read each story. Newspaper stories were retained only if they cited a research paper, while stories that did not cite any research were discarded. Details of the retained stories were downloaded and saved to a formatted Microsoft (MS) Excel spreadsheet. They included details from the newspaper story, such as the date, newspaper, headline, synopsis, and the journalist's name and position. Details of the cited research were added by the researchers, such as codes describing the individual disorder and the research type, the scientists, institution, and journal of publication (if given), as well as details of any commentators and their institutions whose opinions were sought in order to put the new research in context.

2.2. Identification and analysis of selected research articles

The collected data were used to locate the research paper in the Web of Science © Clarivate Analytics (WoS). Any research papers that were not found in this database were excluded from our study. This database contains the full bibliographic details for each research paper, including (for those published in 2009 and later) data on funding. All these details were downloaded as individual text files for each research paper, with numbers corresponding to the citing newspaper story. A special visual basic application (VBA) program, written by Philip Roe of Evaluametrics Ltd (see Acknowledgements), was used to convert the text files to Excel format. Other VBA macros were used for analysis of the cited research papers. We calculated the fractional counts of the countries of origin for each research paper, as determined by the addresses listed. We also classified the cited papers' research levels on a scale from 1.0 = clinical observation to 4.0 = basic research [23]. This classification was determined by an analysis of the words in the title of each paper. The research domain (e.g. epidemiology, electroconvulsive therapy, etc.) and individual mental disorder (e.g. unipolar depression, alcohol misuse) of each research paper was assigned manually by the researcher who provided codes from a small standardised thesaurus containing codes for each research domain and individual mental disorder, for example epidemiology was coded as EPID and Alzheimer's disease as ALZ. The names and institutions of commentators were also copied and pasted by the researchers from the newspaper story texts to the spreadsheet. They were often quoted in order to provide context and a wider understanding about the research papers and their findings to a readership without an academic background.

Table 1
The percentage allocation of stories by mental disorder for the Irish Times (IET), Daily Mail (DML) and The Guardian (GDN) for the top 12 disorders. The highest percentages are shown in **bold** where they exceed 5%.

Mental disorder	IET, %	DML, %	GDN, %
Depression (unipolar)	**18.4**	**12.2**	**13.8**
Alzheimer's disease & other dementias	**15.3**	**29.8**	**27.0**
Suicide and self-harm	**14.5**	2.6	3.6
Addiction to illicit drugs	**10.5**	**5.9**	**8.7**
Alcohol misuse	**10.5**	**7.9**	**6.1**
Anxiety disorders	**7.7**	**7.5**	**7.1**
Schizophrenia	**5.2**	1.3	3.6
Hyperactive disorder	4.1	3.8	0
Eating disorders	2.1	2.8	2.0
Bipolar disorder	1.7	1.8	0
Sleep disorders	1.7	**6.2**	2.5
Post-Traumatic Stress Disorder	0.3	1.5	2.0

2.3. Statistical analyses undertaken

We analysed the types of mental disorders (e.g. unipolar depression, alcohol misuse) that were reported in the newspaper stories and compared them with the distribution of research outputs on mental disorders, and the disease burden from these disorders, in the UK and Ireland. We also analysed the countries of origin of the cited research papers, using fractional counts. [For example, a paper with one French and two German addresses would be categorised as FR 0.33, DE 0.67]. This enabled us to see which countries' research was being cited by British and Irish newspapers respectively. For the papers from 2009–13 cited by the IET, we compared their funding with that of the Irish papers in mental disorders in 2012–13, based both on the formal acknowledgements and the papers' addresses (for government, collecting charity, and industrial laboratories). Finally, we analysed the institutions, and types of organisation, to which commentators belonged.

3. Results

In total, there were 1,130 research papers analysed across the three newspapers: 333 stories on mental disorders research from the *Irish Times* (IET), 618 from the *Daily Mail* (DML) and 179 from *The Guardian* (GDN).

3.1. Mental health disorders

Table 1 shows the percentage of stories on the ten most commonly reported disorders, ranked by their presence in the IET. Depression is the most widely reported mental disorder for this newspaper, but Alzheimer's is first for both the DML and the GDN as seen in Fig. 1. Their variation with time in the three papers together is shown in Fig. 1.

3.2. Research levels and domains

Fig. 2 shows the variation of the research level of the papers cited in the newspaper stories in three time periods, 2002-05, 2006-09 and 2010-13. The stories are mainly at the clinical end of the spectrum, but those of the IET have become noticeably more basic over time, as have those in the DML. However, the papers cited by the GDN were relatively basic in the first four years, but became more clinical latterly (Fig. 2).

Of the main research domains or types, epidemiology (37%) was the most widely reported one for the IET, but lifestyle choices were for the DML (33%), and pharmacological treatments and genetics for the GDN (23% each). Economic costs, psychological support, toxicology and surgery were the least reported research domains.
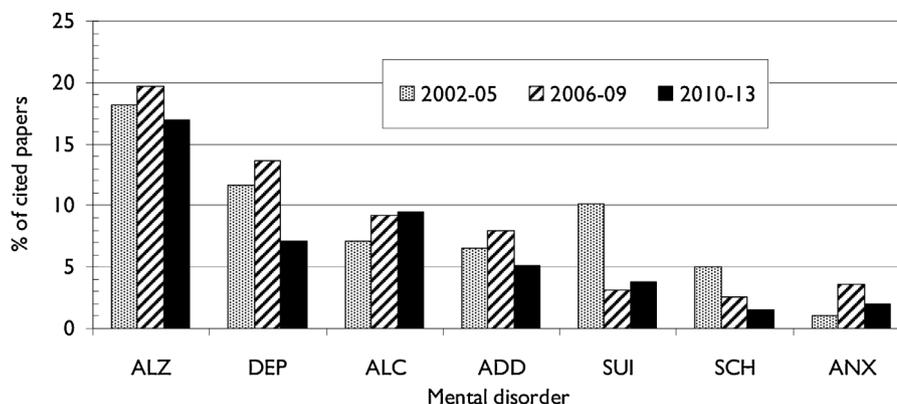
Fig. 1. Variation with time of the mental disorders that were written about in the three newspapers. (ALZ = Alzheimer's and other dementias; DEP = unipolar depression; ALC = alcohol misuse; ADD = drug addiction; SUI = suicide and self-harm; SCH = schizophrenia; ANX = anxiety).
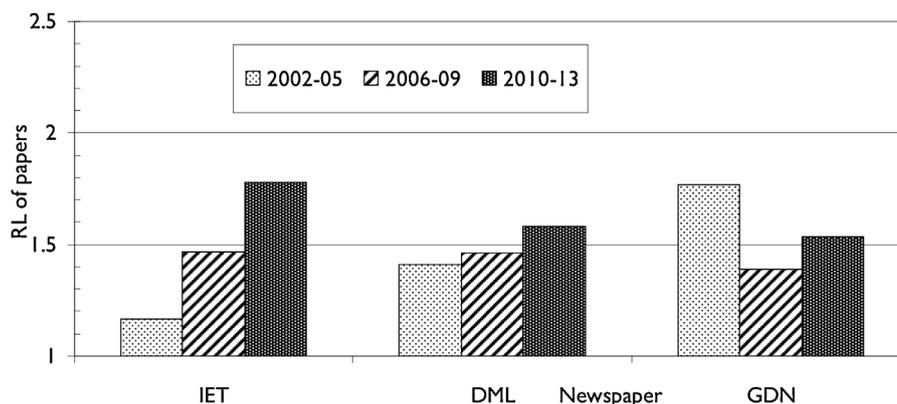

Fig. 2. The research level of the papers cited by the three newspapers in three four-year periods. (RL = 1.0 is clinical observation, RL = 4.0 (not shown) is basic research. IET = *Irish Times;* DML = *Daily Mail*; GDN = *The Guardian*).

Pathology was frequently reported in the IET but not in the two UK newspapers. Stories on nutrition research, and on quality of life, appeared mostly in the DML. There were few stories about diagnosis, public health or prognosis. In total, there were 65 stories about drug treatment, but only 17 about alternative treatments not involving drugs (Table 2).

3.3. Country contributions to the cited papers

For all three newspapers, the leading country contributing to the cited research papers was the USA, with over 33% of the fractional counts of papers (Fig. 3). The contributions of the UK in the DML were over-cited three times relative to the UK presence in mental disorders research, but those in the GDN by four times. However, Irish papers cited in the IET were over-cited by a factor of as much as 42. The UK was second in terms of contributions, and for the IET the Irish contribution was third. Next came the other European countries (EUR29) with nearly 19%, except in the DML which gave relatively more space to the Anglophone Commonwealth countries (Australia, Canada and New Zealand). The rest of the world contributed rather little to these cited papers.

3.4. The funding of the cited papers from Ireland

Irish mental disorders papers in 2012–13 numbered 289 on a fractional count basis, and the main sectors of funding were the Irish government (109 papers, or 38%), industry (20 papers, 7%) and the European Union (EU, 12 papers, 4.3%). There was very little support (13%) from the private-non-profit sector as the only major medical research charity in Ireland is the Irish Cancer Society. This

Table 2
The percentage allocation of stories by research domain for the Irish Times (IET), Daily Mail (DML) and The Guardian (GDN) for the top 17 domains. The highest percentages are shown in **bold** where they exceed 5%.

Research domain	IET, %	DML, %	GDN, %
Epidemiology	**36.8**	**10.4**	**21.6**
Pathology	**19.0**	0.3	0
Drugs (pharmacological treatments)	**11.5**	**14.8**	**22.8**
Other interventions	**10.1**	2.7	0.4
Genetics research	4.9	**12.2**	**22.8**
Nutrition	4.1	**15.3**	**7.2**
Lifestyle choices	3.6	**32.5**	**22.4**
Diagnosis	3.6	1.2	0.8
Public health	2.4	0.3	0
Prognosis	1.7	0.3	0.4
Electroconvulsive therapy	0.6	0.1	0.8
Economic cost	0.6	0.3	0
Quality of life	0.4	**5.1**	0
Psychological support	0.4	0.1	0
Toxicology	0.2	1.8	0
Behavioural treatment	0.2	2.2	0.4
Surgery	0.0	0.4	0.4

was much less than in the UK, where the Wellcome Trust provided one third of the private-non-profit sector's contribution. However, the papers cited in the IET received relatively much more support from the Irish government (69%) and from the EU (8%).

3.5. Commentators

All three newspapers included comments from external experts on the significance of the results: 104 (31%) in the IET, but somewhat fewer (24%) in the UK newspapers. [The difference for the
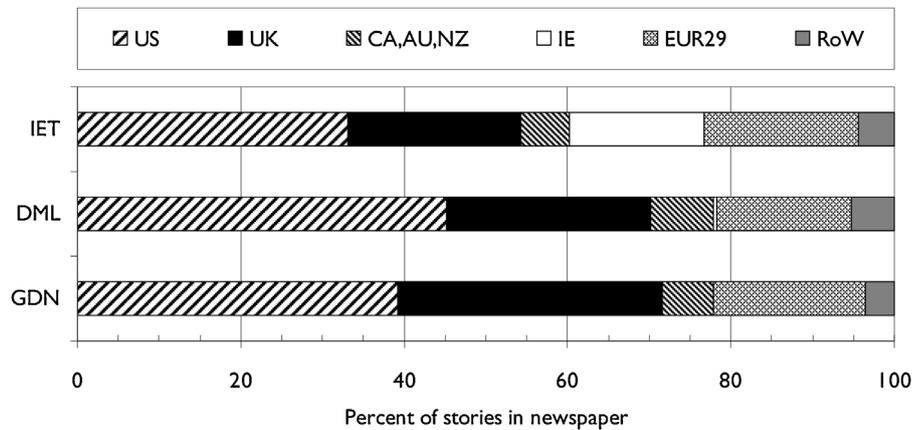
Fig. 3. The country contributions to the papers cited by the newspaper stories. IET = Irish Times, DML = Daily Mail, GDN = The Guardian. CA, AU, NZ = Canada, Australia and New Zealand; IE = Ireland; EUR29 = European Union plus Iceland, Norway and Switzerland but minus Ireland and the UK; RoW = rest of the world.
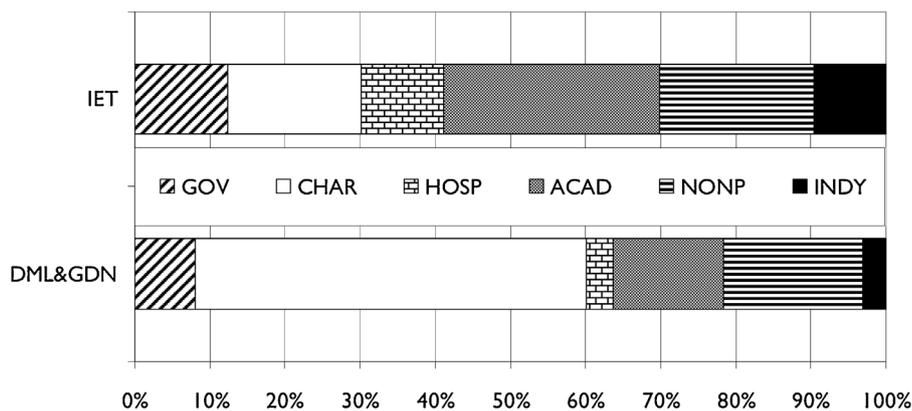

Fig. 4. The sectors of the commentators on the mental disorder research stories from the Irish Times (IET) and two UK newspapers, Daily Mail (DML) and The Guardian (GDN). GOV = government; CHAR = collecting medical charities; HOSP = hospitals; ACAD = universities and medical schools; NONP = other non-profits; INDY = industry.

IET is statistically significant with p < 0.05 on the Poisson distribution with one degree of freedom]. Fig. 4 shows that the largest source for the IET was academics, notably Trinity College Dublin and Dublin City University. However, for both the DML and the GDN collecting charities dominated, and in particular the Alzheimer's Society in London and Alzheimer's Research UK (formerly the Alzheimer's Research Trust) in Cambridge. Governmental commentators included the Medicines and Healthcare Regulatory products Agency (MHRA), the UK National Institute for health and Care Excellence (NICE) and the Department of Health for the DML and the GDN; and the Food Safety Authority of Ireland, the Irish Medicines Board, and the Department of Health and Children for the IET.

4. Discussion

This paper examined the reporting of research in mental disorders in three newspapers from the UK and Ireland, for the period 2002–2013, and the degree to which they reflect the relative burdens of different disorders. Two previous studies examined the reporting of news about mental disorders in newspapers [19,20]. However, both of them only covered the relatively short time period of one year. There was also a study on the coverage of mental disorders research by the British Broadcasting Corporation (BBC) from 1999 to 2008 which showed that dementia was over-reported, and depression and alcohol misuse under-reported [24]. The present study differs from previous studies because it covered 12 years and investigated the coverage of a wide range of mental disorders,

as well as the relevant research domains, in two popular British newspapers and a third, Irish, newspaper.

4.1. Mental health disorders

Our main finding, that the coverage of the two main disorders in the two countries mirrored the burden, is encouraging, as it shows that the press takes account of the relative importance of the different disorders for their readers. As newspapers are still an important source of news for the public, decisions on coverage will have a significant effect on public opinion [25]. They also have an effect on politicians, whose decisions will affect the provision of healthcare, and on senior researchers, who will be involved in the selection of research proposals to be funded, policies and clinical guidelines development [26]. Fig. 2 does not reveal any significant changes with time, except for the sharp reduction in coverage of suicide and self-harm after 2005, and the reduction in stories about schizophrenia.

4.2. Research domains

The three newspapers gave varying amounts of space to the different types of research, reflecting their different reader profiles. The GDN is a broadsheet with an educated readership, so it reports complex topics such as genetics and pharmacological drugs, while the DML is a tabloid and attracts a wider readership with a lower average reading age with stories on lifestyle choices. These are easier to explain as factors that may contribute to mental disorders. However, the three papers gave little space to

treatment by non-drug means, such as cognitive behavioural and electroconvulsive therapy. Although these are now consistently (and successfully) used to treat some mental disorders, notably pharmacological treatment-resistant schizophrenia, eating disorders, anxiety and post-traumatic stress, the paucity of newspaper reportage is likely to lead both the public and politicians to ignore their advantages and so fail to demand them, or to facilitate their wider use [27–30]. Since drugs often fail to affect an improvement in patients with mental disorders, this field remains stigmatised in the minds of some readers, and the absence of a balanced coverage may not help [31–37]. In this respect, the newspapers do not reflect the amount of research of different types that was published by British scientists in these years, although the *Irish Times*, with seven stories out of 23 concerned with treatment, did reflect the Irish presence in the field.

4.3. Country contributions to the cited papers

As expected, the newspapers gave space to news of research carried out in the USA [24] and also to that from their own countries which was over-cited compared with its presence in mental disorders research. This over-citation is not surprising because scientifically small countries' researchers are more likely to know the whole community [39]. Journalists are even more likely than scientists to over-report research from their own country, as it is likely to be of greater interest to their readers [18]. Press coverage of clinical research work amplifies the dissemination of medical information, and indeed outreach to the public is an important means for awareness, which can also lead to higher citation counts [40,41].

The popularity of reporting research from the USA is probably not solely a reflection of the common language shared between the USA, the UK and Ireland, but also a common culture since the rest of the world contributed relatively little despite this including countries who routinely use English in their publications. For example, the *Indian Journal of Psychiatry* is published in English. Although it is understandable that epidemiological studies taking place in these areas of the world are not considered newsworthy in the UK and Ireland, research about pathology of mental disorders as well as pharmacological and non-pharmacological treatments may be relevant and hence important findings may be missed by UK and Irish readers. Nevertheless, this small number may reflect the lack of mental disorders research in these areas of the world when compared to the output of Western researchers. For example, a systematic review of Indian research in anxiety found a lack of research and that most studies tried to replicate findings from the West [42].

4.4. Commentators

Newspaper stories about medical research often give an over-optimistic view of the speed at which new developments will benefit patients [43], so many journalists (but perhaps not the sub-editors who write the headlines) like to provide a cautionary note for their readers by the inclusion of quotations from well-respected scientists. Both the British papers and the IET used commentators frequently, compared with those from other countries [44], but they depended on very different sources (see Fig. 4).

None of the papers used government scientists much, perhaps because of an ingrained fear of daring to speak to the press. Civil servants, including government scientists, are expected not to display any political allegiance and hence should not criticise ministerial decisions [45]. This makes it difficult for government scientists to speak out at all and thus many seem reluctant to engage with the mass media lest they fall foul of these rules. Some notable exceptions have included Professor David Nutt who, although not a civil or public servant, was sacked as Chairman of the Advisory Council

on the Misuse of Drugs by Alan Johnson, the then Home Secretary, in 2009 in response to a press release arguing for an evidence-based approach to drug classification policy.

The IET primarily quoted academics, many from Ireland, but the DML and the GDN relied extensively on collecting charities. They thereby gained a significant amount of publicity. This may partially explain why donations to medical research charities are relatively so much higher in the UK than in Ireland. Mental disorder charities do exist in Ireland; they include the Alzheimer Society of Ireland, St John of God Research Foundation and St Patrick's Mental Health Services. Although all three are members of the umbrella organisation, the Medical Research Charities Group, their primary function is advocacy and patient care and not research. This contrasts with the situation in the UK, where there are eight mental disorder research charities who are members of the corresponding umbrella body, the Association of Medical Research Charities, including four that specialise in dementia.

4.5. Limitations

The main limitation of our study was that we could not locate all of the mental disorders research papers cited by the relevant newspaper stories in the WoS and hence, we had to exclude these particular stories from our study. Although this only applied to a very small number of stories (e.g. 12 exclusions from the IET for this reason compared to 333 inclusions), these exclusions may have affected our results. However, we believe excluding these stories was correct as the information provided by the WoS about each paper was objective, and provided quantitative data, and thus was superior to subjective data that would have been collected by ourselves about any research paper that was not a part of this database. Similarly, an even smaller number of stories reported the findings of mental disorders research papers but did not provide any relevant information for us to be able to identify the cited paper, such as the scientist, institution or journal of publication. These stories were also excluded from our study, which may also have affected our results.

Another limitation of our study was that we investigated two UK newspapers, with different political leanings, but only a single newspaper from Ireland, due to restrictions of time. Without these pressures, we would have liked to investigate a higher (and equal) number of newspapers from each country in order to build a more comprehensive picture of how mental disorders research is being communicated to the public in each of these nations.

4.6. Future work

Our study covered the time period of 2002–2013. The conversation around mental disorders has significantly changed in the last five years, with many celebrities coming forward to speak about their personal experiences with mental disorders [46]. Most recently, the Duke and Duchess of Cambridge and the Duke of Sussex launched the Heads Together campaign to encourage more conversation about mental health [47]. It would be interesting to investigate whether these interventions have had any tangible benefits and whether they resulted in increased reporting of mental disorders research by newspapers.

5. Conclusions

Mental health diseases have the third highest disease burden of all non-communicable diseases in Europe. The coverage of diseases in newspapers is important as it affects the public perception of those diseases and influences policies and clinical guidelines. The most frequently reported mental health disorder was depression for the *Irish Times* while Alzheimer's was the most prevalent for

both the UK *Daily Mail* and *the Guardian*. Both the Irish and British newspapers matched the health burden of their populations for these two disorders, and accurately portrayed their relative importance, in terms of raising public health awareness of the different disorders for their readers, although the differences from the mean expected values were not statistically significant. We also found that the research type most commonly reported in the *Irish Times* was epidemiology, with few stories about behavioural or lifestyle choices, but in the UK *Daily Mail* these were extensively featured, while in *the Guardian* drug treatments were given prominence. [All these differences in research type reportage were statistically significant at p < 2% on the Poisson distribution with one degree of freedom]. These differences reflect the different priorities for the three newspapers and the different readerships that they are attempting to attract. However, we found that research on both electroconvulsive therapy and cognitive behavioural therapy were under-reported by the two UK newspapers, relative to the amount of research on them in the UK, and despite their consistent use as treatments for many mental health disorders. This may reflect a misunderstanding of the safety and efficacy of these treatments, by either British journalists, the public, or both. Any bias or misrepresentation of major health issues is important to identify as they have significant consequences on the public and their understanding of key treatment options.

We found that the country with the greatest research presence in all three newspapers was the United States, which probably reflects bias on a common language as well as a common culture with the UK and Ireland. For all three newspapers, we found that there was a bias towards research from their own country, with the *Irish Times* having a 42 times higher citation of Irish research than Ireland's presence in mental disorders research. The *Irish Times* and the *Daily Mail* had a significantly higher number of commentators than *The Guardian*. This may be because the former two papers relied more than the latter on commentators who could explain complex concepts to lay readers. The most common type of organisation that commentators quoted in the *Irish Times* belonged to was universities, while charities were the largest source of commentators in both the UK *Daily Mail* and *The Guardian*. These organisations were thus given the opportunity for publicity and wider exposure to the public, and hence, the potential for securing more funding for, and more public awareness of, their research.

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Conflict of interest statement

GL holds shares in AstraZeneca plc, GlaxoSmithKline plc and Takeda. The other authors have no conflicts of interest to declare.

Acknowledgements

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