Publication trends in newspapers and scientific journals for SSRIs and suicidality: a systematic longitudinal study

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ABSTRACT

Background: In the period 2003—2008, the regulatory authorities issued several warnings restricting the use of selective serotonin re-uptake inhibitors (SSRIs) in paediatrics, in reaction to safety concerns regarding the risk of suicidality. In this study, the SSRIs and suicidality controversy serves as a template to analyse the long-term publication trends regarding the benefit/risk profile of medications. The aim is to ascertain differences (in terms of numbers, categories and timing) between negative and positive newspaper and journal articles on SSRIs and suicidality and to ascertain correlations between changes in the reports and regulatory warnings.

Methods: A systematic review of scientific articles (Embase) and the Netherlands (NL) and the UK newspapers (LexisNexis) was performed between 2000 and 2010. Categorisation was done by ‘effect’ (related treatment effect), ‘type of article’ and ‘age group’. The articles’ positive-to-negative effect ratio (related treatment effect), ‘type of article’ and ‘age group’. The articles’ positive-to-negative effect ratio was determined. Differences in distribution of effect categories were analysed across sources, type of article and age group using the Mann–Whitney (two subgroups) or Kruskal–Wallis test (three or more).

Findings: In total, 1141 articles were categorised: 352 scientific, 224 Dutch and 565 British newspaper articles. Scientific articles were predominantly on research and were positive, whereas newspaper articles were negative (ratios=3.50—scientific, 0.69—NL and 0.94—UK; p<0.001). Articles on paediatrics were less positive in scientific journals and more negative in newspapers (ratios=2.29—scientific, 0.26—NL and 0.20—UK; p<0.001), while articles on adults were positive overall (ratios=10.0—scientific, 1.06—NL and 1.70—UK; p<0.001). In addition, negative-effect reporting trends were exacerbated following regulatory warnings and were generally opinion articles, both in scientific journals and in newspapers (2003/2004 and after 2007).

Interpretation: The authors found a positive publication tendency inherent in journal research articles. This apparent positive publication bias present in scientific journals, however, does not seem to prevent the dissemination of ‘bad’ news about medications. The negative tendency present in Dutch and British newspapers was perceivable in the

INTRODUCTION

The news media are an important source of information about therapeutic drugs and health.1 Coverage varies from
communicating the benefits and risks of medications to drug regulation and litigation, among others. Scientific journals are a significant source of information for journalists writing about medicine. However, this does not necessarily mean that 'good' or 'bad' news about medicines in the news media is determined by the scientific literature. The good and bad news in both news media and scientific and medical journals may be in agreement but may also differ dramatically depending on the situation. Healthcare providers and consumers alike seek medical information from the news media and act on it accordingly, changing their perceptions and behaviour. Coverage of medical news exemplifies how information from the news media and scientific journals can have a significant impact, yet be confusing. Most newspapers' coverage studies of the benefits and risks of medications, although valuable, are short-term and lack a comparative perspective among countries.

In this study, we analysed the long-term publication trends regarding the benefit/risk profile of medications in the context of the selective serotonin re-uptake inhibitors (SSRIs) and suicidality controversy. In the Netherlands (NL) and in the UK. The aim is to ascertain the differences (in terms of numbers, categories and timing) between negative and positive newspaper and scientific journal articles on SSRIs and suicidality.

**METHODS**

**Time frame**

Content analysis was performed on articles published in the period January 2000 to December 2009, including the period in which the regulatory warnings were repeatedly enforced, that is, 2003/2004 and 2007.

**Data sources**

Scientific articles were extracted from Embase (compilation of Medline and 2000 extra journals not covered by Medline) using two sets of keywords, that is, first: 'serotonin uptake inhibitor' NOT 'serotonin noradrenalin reuptake inhibitor' AND 'suicidal behavior' or 'auto-mutilation' or 'aggression' AND 'depression'; and second: 'serotonin uptake inhibitor' NOT 'serotonin noradrenalin reuptake inhibitor' AND 'suicide'. The search was limited to 'humans' and 'Dutch' and 'English' language. Newspaper articles were extracted using the Lexis-Nexis database from a selection of high-circulation newspapers in NL (n=6) and in the UK (n=4). The newspapers analysed were De Telegraaf, Algemeen Dagblad, De Volkskrant, NRC Handelsblad, Trouw and Het Parool for NL and The Sun, Daily Mail, The Daily Telegraph and The Times for UK. The newspapers' circulation figures (per country) covered 11% of each total resident population. Search queries were performed in the language of the papers (Dutch and English). Dutch articles were retrieved using the terms 'antidepressiv!' or 'anti-depressivi!' or ‘SSRI!’ or ‘serotonine!’ AND ‘zelfmoord!’ or ‘aggressi!’ or ‘geweld!’ or ‘kwaad!’ or ‘suicid!’ AND ‘depressiv!’ British articles were extracted using the terms ‘antidepressiv!’ or ‘anti-depressivi!’ or ‘SSRI!’ or ‘serotonine!’ AND ‘zelfmoord!’ or ‘aggressi!’ or ‘geweld!’ or ‘kwaad!’ or ‘suicid!’ AND ‘depressiv!’.

**Data classification**

All articles addressing SSRIs, depression, suicidal thoughts or suicide as the main topic were eligible for analysis. If that was not the case, such an article was categorised as ‘out of context’, for example, articles reporting the use of SSRIs to treat premature ejaculation or neuralgia. All scientific and newspaper articles were analysed on the content of full-text, except for scientific articles where the abstract information was regarded as sufficient for categorisation. The ‘effect’, ‘type of article’ and ‘age group’ categories were independently determined for these articles by two researchers. The ‘effect’ category was divided into positive, neutral and negative. Articles reporting on positive therapeutic outcomes with no mention of an association between SSRIs and an increased risk on suicidal behaviour were classified as positive. Consequently, articles affirmatively reporting on the association between SSRI use and suicidality, with no mention of positive therapeutic outcomes, were classified as negative. Articles with a balanced message (positive and negative effects) were classified as neutral. The ‘type of article’ category was defined within scientific journals as: case study.

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**Box 1 The SSRIs and suicidality controversy**

In the period 2003–2008, regulatory authorities (Food and Drug Administration (FDA), Medicines and Healthcare products Regulatory Agency (MHRA) and European Medicines Agency (EMA), among others) issued several warnings restricting the use of SSRIs in paediatrics, in reaction to safety concerns regarding suicidal ideation. While some scientists adulated the warnings, others expressed their concerns about the implied consequences. The safety issue arose following GlaxoSmithKline’s (GSK) request for a 6-month market exclusivity extension with the FDA for the use of paroxetine (an SSRI) to treat paediatric depression in response to the Food and Drug Administration Modernization Act. Consequently, GSK submitted the results from unpublished paediatric clinical data to the FDA. Meanwhile, the BBC aired a documentary entitled ‘The secrets of Seroxat’ on 13 October 2002 in which it was alleged that internal documents of GSK showed that the dissemination of trial data on paroxetine in childhood depression was spun ‘to minimise any negative commercial impact’. GSK was accused of underplaying the association between SSRIs and suicidality. The ensuing worldwide media exposure played a role in driving the SSRI suicide controversy. In the process, confidence in the pharmaceutical industry and regulatory authorities decreased significantly. To date, the controversy remains unsettled, albeit evidence also suggests that SSRIs are useful first-line treatments for depression and most anxiety disorders but exhaustive monitoring is recommended during the initiating phase.
Publication patterns of the ‘effect’ category

Of all 1141 articles (scientific and newspapers), the positive-effect category (39%) was significantly larger than the negative-effect (31%) or the neutral-effect category (30%; p<0.001). The differentiation of the ‘effect’ category by source showed that scientific journals were predominantly positive (ratio = 3.5), whereas Dutch and British newspapers coverage of effect was mainly negative (ratios=0.69—NL and 0.94—UK, table 1). Statistically significant differences were observed in effect classification for scientific journals and newspapers (both p<0.001) but not between NL and the UK dailies (p=0.116, table 2).

Although the overall coverage of effect was generally positive in scientific journals, temporal changes were observed in the positive-to-negative effect ratio per year, indicating a less positive-effect trend during 2003/2004 and after 2007. Newspaper reporting revealed a similar trend as scientific journals. However, the

Figure 1 Scheme of the search process performed in the scientific and medical literature and in the Netherlands (NL) and the UK newspapers.

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Table 1 Characteristics of the 1141 articles in NL and the UK newspapers and in scientific journals (2000—2009)

| Characteristics | Scientific journals (n=352) | NL newspapers (n=224) | UK newspapers (n=565) |
|-----------------|-----------------------------|-----------------------|-----------------------|
| **Effect**      |                             |                       |                       |
| Positive        | 191 (54)                    | 65 (29)               | 192 (34)              |
| Neutral         | 106 (30)                    | 66 (29)               | 169 (30)              |
| Negative        | 55 (16)                     | 93 (42)               | 204 (36)              |
| Positive-to-negative ratio | 3.5 | 0.69 | 0.94 |
| **Type of article** |                       |                       |                       |
| Case study      | 13 (4)                      | NA                    | NA                    |
| Research        | 210 (60)                    | NA                    | NA                    |
| Opinion         | 121 (34)                    | 25 (11)               | 107 (19)              |
| Policy          | 8 (2)                       | 11 (5)                | 10 (2)                |
| Interview       | NA                          | 38 (17)               | 77 (14)               |
| News report     | NA                          | 110 (49)              | 291 (52)              |
| Science journalism |                           | 40 (18)               | 80 (14)               |
| **Age group**   |                             |                       |                       |
| Adults          | 89 (25)                     | 128 (57)              | 313 (55)              |
| Paediatric      | 108 (31)                    | 30 (13)               | 92 (16)               |
| Both            | 80 (23)                     | 32 (14)               | 66 (12)               |
| Unspecified     | 75 (21)                     | 34 (15)               | 94 (17)               |

*Statistically significant differences in effect classification were observed between scientific journals and newspapers (p<0.001) but not between NL and the UK dailies (p=0.116). NL, the Netherlands.
positive-to-negative effect ratio per year in newspapers shifted to the negative side from 2003 to 2005 and after 2007 (figure 2B).

**Publication patterns of the ‘type of article’ category**

Scientific journals published generally research articles (60%), carrying a positive-effect message (ratio = 8.5, table 2). To a lesser extent, scientific journals published opinion articles (34%), which conveyed an overall positive-effect message (ratio = 1.2, table 2). However, scientific opinion articles displayed major temporal changes in the positive-to-negative effect ratio following regulatory warnings, showing more negative-effect articles. Differences of ‘effect’ distributions related to ‘types of article’ were statistically significant (p < 0.001, table 2).

Newspapers published mainly news report articles (50.5%) and carried an overall negative-effect message (ratio = 0.5, table 2). Articles on adults were notably more positive concerning effect compared with paediatric articles (ratios = 10 and 2.3, table 2). Significant differences were found between effect distributions in newspapers related to age group (p < 0.001). Reporting patterns between NL and the UK dailies were comparable in all three categories (p = 0.116, table 2).

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**Table 2  Allocation of effect categories related to types of article and age groups and differentiated by source (NL and the UK newspaper articles combined)**

| Categories                        | Positive | Neutral | Negative | Positive-to-negative ratio | p Value |
|-----------------------------------|----------|---------|----------|-----------------------------|---------|
| **Type of article**               |          |         |          |                             |         |
| **Scientific journals**           |          |         |          |                             |         |
| Case study                        | 4        | 4       | 5        | 0.80                        | <0.001  |
| Research                          | 144      | 49      | 17       | 8.47                        |         |
| Opinion                           | 39       | 49      | 33       | 1.18                        |         |
| Policy                            | 3        | 5       | 0        | 3.00                        |         |
| **Newspapers**                    |          |         |          |                             |         |
| Interview                         | 69       | 30      | 16       | 4.31                        | <0.001  |
| News report                       | 88       | 125     | 188      | 0.47                        |         |
| Science journalism                | 38       | 30      | 52       | 0.73                        |         |
| Opinion                           | 60       | 43      | 29       | 2.07                        |         |
| Policy                            | 2        | 7       | 12       | 0.17                        |         |
| **Age group**                     |          |         |          |                             |         |
| **Scientific journals**           |          |         |          |                             |         |
| Adults                            | 70       | 12      | 7        | 10.0                        | <0.001  |
| Paediatric                        | 48       | 39      | 21       | 2.29                        |         |
| Both                              | 33       | 29      | 18       | 1.83                        |         |
| Unspecified                       | 40       | 26      | 9        | 4.44                        |         |
| **Newspapers**                    |          |         |          |                             |         |
| Adults                            | 176      | 145     | 120      | 1.47                        | <0.001  |
| Paediatric                        | 18       | 20      | 84       | 0.21                        |         |
| Both                              | 22       | 33      | 43       | 0.51                        |         |
| Unspecified                       | 41       | 37      | 50       | 0.82                        |         |

*Statistically significant differences in effect distributions related to types of article were also observed in the UK newspaper articles (p < 0.001) and in NL newspaper articles (p = 0.011). NL, the Netherlands.
journals and newspapers also showed a similar pattern. Thereafter, newspaper articles on adults continued to increase until 2010, while their scientific counterparts remained more or less stable (figure 3).

**DISCUSSION**

This study assessed the characteristics and dynamics of SSRIs and suicidality coverage by scientific and medical journals in general and newspapers in NL and the UK from 2000 to 2010. Scientific journals published predominantly research articles about positive therapeutic outcomes with little mention of an association between SSRIs and suicidality, particularly in adults. Despite different ethnic backgrounds (eg, tabloid culture in the UK, among others) and language, newspaper reporting trends in NL and the UK were comparable and were overall negative regarding the therapeutic effect of SSRIs in paediatrics, while positive-effect reporting prevailed for adults.

The present study has several limitations. It covered 11% of the total population per country based on newspaper circulation figures. Nevertheless, the random sample is representative (n=789 newspaper articles) given the aim to ascertain differences (in terms of numbers, categories and timing) between negative and positive newspaper and journal articles on SSRIs and suicidality. The categories ‘effect’ and ‘type of article’ might be limited by our definition, and their interpretation could differ between readers. We attempted to avoid subjectivity by analysing the data independently by two researchers. We achieved >95% agreements during article categorisation (effect, type of article and age group categories). We did not, however, ascertain the context of the articles in terms of construction of the newspaper and opinion articles from its original source. Neither did we explore other forms of media coverage (television, radio, magazines or the internet). The content analysis method used in this
study does not allow for these additional more complex queries.

Our results showing a positive publication tendency in scientific journals are consistent with the previous work, which demonstrated that antidepressant trials with a positive outcome were published more often than those with negative outcomes. This positive publication tendency continued even after the regulatory warnings and could potentially leave physicians with a biased view of the medications they are prescribing to patients. Studies questioning these warnings and the possible disservice they did to public health (e.g., the possible inverse association between SSRIs prescriptions and suicidality or the decline in treatment of depression in paediatrics) contributed to this post-warning positive-effect trend.

On the other hand, this positive publication tendency in scientific journals does not seem to prevent the dissemination of bad news about medications. For instance, science journalism articles (newspapers) that presented a negative publication tendency regarding SSRIs (ratio \(= 0.7\)) could not be related to the positive publication tendency found in scientific journals. These findings indicate that either newspaper journalists may selectively report scientific outcomes to the public, as also stated in the CHMP assessment report on antidepressants, or that controversial topics might be selected to increase readership and improve the journal's visibility. However, such practices might generate confusion, since the translation of evidence-based medicine to the public is not uniform, and may have implications for patients' compliance with medications, willingness to see physicians and trust in the doctor-patient relationship. However, scientific and medical journals might also do disservice to the scientific community by favouring positive outcome studies, thus limiting the journalists' sources of accurate and critic information to communicate to the public new scientific and medical evidence.

The uncertainties regarding the SSRIs' benefit/risk balance, primarily in paediatrics, have led to the restriction of almost all SSRIs under 18-year-olds in 2003 and further restrictions for young adults (18–24-year-old) in 2007. In the same periods, our data revealed shifts towards negative-effect reporting trends in scientific and newspaper articles on paediatrics and opinion articles. The timing between the warnings and the observed increase in articles substantiate the possible influence of warnings on media publication trends. Moreover, this increment in the number of articles suggests that newspapers informed the public about this particular drug safety event in a timely fashion. Studies have underlined the relevance of informing the public about medical news within a suitable time frame. However, these studies only focused on a subset of scientific journals, whereas we did not discriminate among scientific journals. A balance between timely coverage, consistent and adequate information is fundamental when reporting on drug safety controversies. Ideally, this balance should be the result of an open dialogue between healthcare practitioners, academia, governmental agencies, the pharmaceutical industry, journalists and the public. However difficult, educating the public properly and on time about the benefits and the risks of medicines will help to maintain public trust during unsettling periods.

Finally, the possible implications of the discovered tendencies in scientific journals and newspapers for patients and doctors have not been addressed in this paper. It has been shown that news media reports (on suicide or related to suicide) have an influence on suicidal behaviour and on drug usage. It might be valuable in this regard to determine the long-term influence of media coverage and the regulatory warnings on prescription patterns.

CONCLUSIONS

Our study of the SSRIs and suicidality controversy showed several publication tendencies in scientific journals and newspapers. We identified a positive publication...
tendency inherent in journal research articles, which could potentially affect doctors’ assessment of the safety and effectiveness of the medications that they are prescribing to patients. This apparent positive publication bias in scientific journals, however, does not seem to prevent the dissemination of bad news about medications. The occurrence of good or bad news in scientific journals and newspapers was found to be dependent on the news category or type of article. Opinion reports in scientific journals did not differ significantly in the nature and timing of reporting from opinion articles in Dutch and British dailies. Differences between the Dutch and British newspaper reporting patterns were minor. The negative tendency present in Dutch and British newspapers was perceivable in the paediatrics group and during the warnings, indicating that newspapers have informed the public about this drug safety controversy on time. It also shows that a proactive and transparent risk communication strategy of regulatory offices and the pharmaceutical industry might pay off in the long run for reporting on the benefits and risks of medications.

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Contributors All authors were involved in the design of the study, review of earlier versions of the manuscript and providing final approval for submission. JFH was responsible for the collection, analysis (also statistical) and earlier versions of the manuscript and providing final approval for submission. TP was responsible for the analysis and interpretation of the data, drafting supervision and revision. JAMR provided support with the statistical analyses, as well.

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