

Does media coverage of research misconduct impact on public trust in science? A study of news reporting and confidence in research in Sweden 2002–2013

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Abstract

Over the past decade, there has been a gradual decline in public trust in science in Sweden. Questions have been raised as to whether or not this decline is the result of news media reports on research misconduct. Taking off in a theoretical discussion about the news media agenda-setting function, this study examined the extent to which, if any, there really is a connection between public trust and news content. It did so by drawing empirical support from a content analysis of the largest Swedish news media reporting on research misconduct in the years 2002–2013 and also from annual surveys of Swedes' media consumption and trust in science, conducted over the same time period. Using news consumption, i.e. media exposure, as a proxy variable in the analysis, this study came to the conclusion that exposure to this type of news reporting had a positive rather than negative effect on public trust in science. The article discusses why this is so and also identifies some important questions that require to be further researched in order to understand public trust in science.

Key words: Media and science, media effects, agenda setting, public understanding of science, research misconduct, public trust

Introduction

Science is undoubtedly important and necessary for society in general as well as for individuals. Justifying the investments — monetary and non-monetary — in scientific research requires broad public support, not least when considering the funding that is supplied by public contributions (Wilsdon, Wynne, & Stilgoe, 2005). One basic prerequisite for this kind of support is that people feel that they have confidence in scientists and their research activities. Over the past decade, there has been a decrease in how citizens perceive the public value of science, a change that has sometimes been described as a "crisis of trust" (Wilsdon & Willis, 2004:16; Wynne, 2006; INRA, 2000). As a means of bridging the gap between science and the public, researchers have been inching their way toward involving the public in their work. In this process, information, education, dialogue, and participation have been important steps to regaining public trust (Wilsdon & Willis, 2004). In recent years, there has also been a stabilisation of, and even a slight increase in, the level of public trust in science in the European Union (European Commission, 2010).

Nevertheless, this development has not fully impacted on Swedish conditions. Peaking in the early 2000s, public trust in science has since gradually declined among the Swedish population (Andersson, 2014). This shift in attitude has percolated into all research areas such as medicine, science, technology, social sciences and humanities. Questions have been raised as to whether this change is the result of a general

decline in trust in societal institutions, or, rather, the effect of an altered knowledge about research. Since public trust in higher education and educational institutions has remained high over the years (Oscarsson & Bergström, 2014), some researchers have argued that increased awareness of research misconduct and fraud — springing from news media coverage of research — may have caused citizens to reevaluate their perceptions of research (Holmberg & Weibull, 2013; Vetenskap & Allmänhet, 2011b).

The question as to whether this particular assumption is true or not has not yet been examined. There have indeed been studies on how research and scientists are presented in news media (e.g. Finer, 2005; Hargreaves, Lewis, & Spears, 2003; Ideland, 2002; Parker, 2002; Bauer, 1995; Nelkin, 1995) and some research has further focused on the linkage between news reporting on specific research controversies and public perception of these controversies (e.g. Ten Eyck, 2005; Hargreaves, Lewis, & Spears, 2003; Mazur, 1981). These studies, however, did not fully reveal if news media reports on research affect public trust in research and, if so affecting, how this was occurring.

This study, therefore, explored the linkages between public trust in science and news media reports on research misconduct in Sweden during the years 2002–2013. It did so by examining how news publicity about research plagiarism, falsification, and fabrication appeared to affect public attitudes toward science while controlling for other variables such as demographics. It was expected that those citizens that were highly exposed to news media would be more inclined to express distrustful attitudes toward science as they were more likely to have heard or read news stories about research misconduct. At the same time, it was also expected that citizens most familiar with research would be more likely to express greater confidence in research than those unfamiliar with research (Andersson, 2014; Holmberg & Weibull, 2003). Prior studies have shown that news media have had an important agenda-setting function, particularly in areas where people tended to lack their own experience (Preiss, Gayle, Burrell, Allen, & Bryant, 2007; McCombs, 2004). Given that relatively few people in Sweden have direct personal experience of science and scientists — in Sweden, for example, only about 1 per cent of the population possesses a doctoral degree (Andersson, 2014) — media reporting on research must therefore be considered as an important source of knowledge for many individuals. When a random sample of the Swedish public was asked in 2010 about the source of information they perceived to be the most important for discovering what was happening in science, most people cited the news media as their answer (Vetenskap & Allmänhet, 2011a). There are therefore sound reasons for assuming that there is a correlation between media reports on science and public trust in science. Given the decreased level of public trust in science, this correlation is expected to be negative; in other words, as news reports on research misconduct increase, public trust in science decreases. Two research questions were thus proposed in this study:

RQ1: Is there a negative connection between public trust in science and news media reports on research misconduct in Sweden?

RQ2: Is public trust in science primarily affected by news media or rather explained by other independent variables such as gender, age, educational level and political interest?

Approach: Media effects on public opinion

News media influence on public opinion has long been the focus of enquiry by social scientists. Initiating the debate at the beginning of the twenty-first century, Walter Lippman (1922/1977) argued that what really mattered to public opinion was not the reality, as such, but rather the image of the reality as it appeared in the minds of the public. This pseudo reality was, according to Lippman, dependent to a great extent on the impact of news media reports in different areas, and was, later on, described by researchers as a mediated reality (Nimmo & Combs, 1990). The dynamic and shifting relationships between reality, the image of reality, and public reactions to the image of reality, as presented by the news media (Lippman, 1922/1977:11), have for long been a central starting point in scholarly debate on media effects and their consequences. However, the perceptions of how great the effect of news media really is on public attitudes and behaviours have varied over time, as well as between researchers.

Contemporary approaches to media effects are commonly based on the perception that the news media constitute a powerful factor that influences parts of public perceptions of society. The general argument most often advanced by researchers is that media effects are shaped by a number of factors operating at societal as well as at individual levels (Strömbäck, 2008). The theory of the agenda-setting function of news media, originating in the 1970s, is often taken as a starting point in studies of how news media affect public opinion in matters such as political beliefs and commitments (Preiss et al., 2007). In its simple form, the theory of agenda-setting posits that priorities in the news media focus on political issues are reflected in the public's priorities with respect to these issues (McCombs & Shaw, 1972). In this regard, there are factors that facilitate and restrict the news media agenda. For example, media coverage tends to be more extensive for issues of which people do not have direct and personal experience, whereas it appears to attach less significance to issues with which people are familiar.

Some studies, for example, have identified issues over which news media may have a significant influence: the political issues that people think are important in the context of election campaigns (Wanta & Ghanem, 2007; McCombs, 2004; McCombs & Shaw, 1972); the criteria people tend to focus on in their evaluation of political leaders (Iyengar & Kinder, 2010; Roskos-Ewoldsen, Klinger, & Roskos-Ewoldsen, 2007); how people perceive the political reality (Callaghan & Schnell, 2005; Shanahan & Morgan, 1999; Iyengar, 1994); and public trust in democratic institutions (Moy, Pfau, & Kahlor, 1999).

Examples of how news media affect public trust are found in studies of how trust in the police was influenced by news reports of lawsuits against police officers who had been accused of overstepping their authority (Chermak, McGarrell, & Gruenewald, 2005; Lasley, 1994). The results from these studies revealed that, despite the news reporting, public trust in police authority appeared to remain unchanged. However, public perceptions of whether the officers in the individual cases were liable or not depended on how the media had chosen to frame the reporting. Furthermore, research has shown that media description of mental illness in connection with violent incidents tended to reinforce public stereotypes of people with mental illness (Diefenbach & West, 2007; Thornton & Wahl, 1996).

Nevertheless, there has been somewhat mixed perceptions among scholars on which particular media form accounts for the greatest impact on public perceptions. Some researchers have primarily emphasised the importance of printed newspapers (McCombs & Shaw, 1972) whereas others have emphasised the

power of television (Iyengar & Kinder, 2010; Moy, Pfau, & Kahlor, 1999; Shanahan & Morgan, 1999; Iyengar, Peters, & Kinder, 1982). It should be said that most of these studies focus on specific events and essentially look for the short-term effects caused by the news media agenda-setting function.

In recent years, some scholars have argued that changes in the complexity of the media infrastructure have increased audience fragmentation and that the individualisation in media consumption has contributed to the weakening of news media influence on the social issues that people should perceive as important (Bennet & Iyengar, 2008; Takeshita, 2005; Chaffee & Metzger, 2001). According to this line of argument, news media are heading into an era of minimal media effects.

Not everyone agrees with this conclusion, however; several scholars have argued, for example, that the media still contribute to exercising influence in a variety of ways, despite the profound technological and socio-economic changes that have occurred in society in general as well as in the media business over the past 10–15 years (Shehata & Strömbäck, 2013; Holbert, Kelly, & Gleason, 2010).

Although the effects of news media may not be as powerful as scholars first believed in the early 1900s, much of the research from the past 30–40 years points to the conclusion that media reporting has at least some effect — although there may be other explanatory factors — on public perceptions, cognitions, attitudes, trust, and behavior.

Methods

This study utilised two types of quantitative research methods: firstly, a content analysis of national news media reports on research misconduct, and, secondly, a longitudinal survey of Swedish peoples' media consumption and confidence in science. Both studies were conducted at the SOM Institute (Society Opinion Media) at the University of Gothenburg.

The content analysis focused on the news coverage of research misconduct during 2002–2013 in the nine largest Swedish newspapers and the largest broadcasting news service in Swedish public service TV. The group of newspapers consisted of four morning papers (*Dagens Nyheter*, *Svenska Dagbladet*, *Göteborgs-Posten*, *Sydsvenskan*), four evening tabloids (*Aftonbladet*, *Expressen*, *Göteborgs-Tidningen*, *Kvällsposten*), and the largest free daily (*Metro*). Along with the broadcasting news service *Rapport* from the Swedish public service television (*Sveriges Television*), these news media reach a vast majority of the Swedish population. All news articles and news spots dealing with research misconduct were included in the study, making a total sample of 359 coded units. It should be mentioned that, in the selected news media, the total amount of news reports on research and researchers was about 12,000 units. Thus, news reports about research misconduct constituted about 3 per cent of all articles. For this study, variables such as research area, type of research misconduct, accused researcher/university, consequences flowing from misconduct, geographical level, and article size, were coded. Most variables were coded according to a principle of main representation, which means that the misconduct or researcher given the largest space in the article also represented the full article.

In addition, comparisons were made with results from the national SOM survey, conducted annually between 2002 and 2013. The survey, originating in 1986, targeted a random sample of Swedish citizens, aged 16–85 years, and explored, among other things, media habits, confidence in societal institutions, and

political interests. In 2013, the data sample consisted of 12,000 citizens who received a postal questionnaire, of which 53 per cent completed and returned it. The average response rate during 2002–2013 was 56 per cent, ranging from a low of 53 per cent in 2013 to a high of 66 per cent in 2003. The distribution of responses equaled the proportion of the Swedish population in terms of age, gender, social class, education and so on. By international standards, the response rate was exceptionally high. All surveys have been well documented and analyses based on the survey data have, since 1987, been published annually in the form of edited books (Vernersdotter, 2014).

For this particular study, questions about media consumption were used as measures of potential exposure to news reporting on research misconduct. Individuals with a high consumption of one or more of the news media included in the quantitative content analysis were also assumed to be more likely to come into contact with news about research misconduct than individuals who rarely or never accessed such media. Media exposure thus functioned as a proxy variable in the analysis of whether news reporting on research misconduct really affected public trust in science. The questions about news media consumption were worded “How regularly do you take part in the following news services?” and “How regularly do you read any kind of daily newspaper?”. Each question was followed by a number of news providers to consider and the respondents were asked to estimate their average consumption per title, from 1 to 7 days a week or less frequently.

Also, the public’s trust in science was researched in the annual SOM survey. The question about trust in science was worded “In general, what confidence do you have in research that is carried out in Sweden in the following areas?”. This question was followed by the given response set — “very high”, “rather high”, “neither high nor low”, “rather low”, “very low”, and “no opinion”. It should be noted that the question about trust in different research areas was excluded in 2011. The analysis of public trust in science and the analysis of how such trust corresponded to the media reporting on research misconduct was, therefore, confined to the results from the years 2002–2010 and 2012–2013.

In order to control for factors other than media consumption, independent variables such as age, gender, educational level, and political interest were included in the study. Measurements used in the analysis below were based on frequencies, percentages, and significant tests.

Results, part I: News reporting on research misconduct 2002–2013

Research misconduct, or research fraud, is a quite complex and seldom well-defined concept. Distinction is often made between three different forms of misconduct: plagiarism, fabrication, and falsification (Freeland Judson, 2004). For behaviour to be considered misconduct, the researcher must have had either a deliberate intention to deceive those who availed of the results or a reckless disregard for orthodox scientific practice (Freeland Judson, 2004). In Sweden, few cases of research misconduct have been reported to the expert group for misconduct in research at the Central Ethical Review Board in Sweden. During 2002–2013, about twenty reports of suspected misconduct were reviewed by the expert group, from which only one was regarded as severe research misconduct (Andersson, 2014). The low number of reports transmitted to the Central Ethical Review Board is explained by the fact that most cases of misconduct remained within the university where they were reviewed by local expert groups. The exact

number of such internal reports is, along with the number of suspected cases left without actions, so far, unknown: there are no reliable data from the Swedish universities in this matter.

The result from the quantitative content analysis shows that the number of news articles and reports about research misconduct varied heavily from one year to another during the years examined. It is also evident that the news media focus on research misconduct had not increased over time; rather, there was a decrease in the news reporting during 2012–2013 (Table 1). The highest number of articles was found in 2005 and 2006, when, respectively, 70 and 56 items on misconduct were reported in the newspapers and broadcasting news services referenced in this study. The majority of these articles were about suspected research misconduct in medical research, a circumstance that was given further attention in the analysis (see below).

Misconduct in medical research was also the most common area of research in news media reporting. Of the total reported cases, 188 articles (52 per cent) dealt with some kind of misconduct in medicine (Table 1); social sciences followed in second place with 60 articles (17 per cent); and issues related to general research misconduct came in at third place with 39 articles (11 per cent). Examples of the latter included misconduct arising from reviews of prior research made in connection with an article addressing some contemporaneous event and articles about the shortcomings of, or improvements in, the scrutinising functions available for reporting and assessing suspected misconduct in research. Science and technology appeared with less frequency in overall reporting, although there were some exceptions in certain years.

One of the most highly profiled cases of misconduct in medicine in the period examined was the accusation of falsification against a group of Swedish researchers studying children with a hyper activity syndrome, formerly called DAMP (Deficits in Attention, Motor Control and Perception). Although all researchers were cleared of the misconduct allegations in 2004, there followed a lengthy legal penalty phase which continued up to 2011, fuelling continuing public interest. Therefore, this particular case featured in the news reports until the final closing in 2011, albeit with diminished frequency compared with the period of intense reporting during 2002–2004.

Table 1. Number of news reporting on research misconduct in years 2002–2013

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | Total |
|------------------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| Medicine | 1 | 27 | 17 | 33 | 35 | 6 | 23 | 1 | 14 | 23 | 5 | 3 | 188 |
| Social science | 0 | 1 | 2 | 6 | 5 | 11 | 0 | 16 | 1 | 10 | 6 | 2 | 60 |
| Humanities | 0 | 2 | 0 | 25 | 3 | 2 | 1 | 0 | 0 | 2 | 0 | 4 | 39 |
| Technology | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 0 | 0 | 2 | 17 |
| Science | 2 | 3 | 0 | 0 | 2 | 2 | 0 | 0 | 2 | 0 | 1 | 3 | 15 |
| Other | 0 | 2 | 4 | 6 | 11 | 6 | 6 | 1 | 1 | 0 | 0 | 3 | 40 |
| Total no. of articles | 8 | 36 | 23 | 70 | 56 | 27 | 30 | 19 | 26 | 35 | 12 | 17 | 359 |

Another case particularly highlighted concerned a Norwegian scientist who, in 2006, fabricated a study on correlations between the use of certain painkillers and oral cancer. In the civil courts, he also pleaded

guilty to fraud. Accusations of falsification were also made against a Swedish professor with respect to a study of a fetal monitoring method that had a short time before then been introduced to hospitals all over the world. Although the Central Ethical Review Board acknowledged that the study in question suffered from a number of scientific flaws, the professor was, in 2010, cleared of all suspicions of misconduct.

In 2007, the news media focused on a social science researcher who had plagiarised the work of her undergraduate students and, in 2009, the media also reported that a professor at the National Defense College had engaged in extensive plagiarism throughout his research career.

Most of the articles on research misconduct during 2002–2013 related to suspicions against Swedish researchers. In 2011–2012, however, there was an increased reporting of misconduct in other European countries. The reports concerned allegations against several European politicians and ministers who were found to have plagiarised their dissertations in the social sciences and humanities.

The type of research misconduct that was most commonly reported related to different forms of plagiarism. Approximately a quarter of all articles involved scientists who, in one way or another, consciously or unconsciously, used material or findings from other researchers and presented the material as their own (Table 2). In the majority of cases, the misconduct was concerned with pure theft of text collections which, at times, were very extensive. There were also incidences of plagiarism touching on patent theft.

Another quarter of the news reporting concerned misconduct where the researcher in question was accused of having falsified research data in order to obtain results that better confirmed his or her hypothesis. Such accusations were primarily associated with medical research. Yet another quarter of the articles which were analysed concentrated on research misconduct in general. These articles focused mainly on efforts being made, both by universities and the government, in developing new guidelines for scrutinising misconduct as well as in developing a national authority with responsibility for managing the reviewing process.

About one sixth of the articles concerned fabrication, e.g. cases where researchers had concocted the full study, or the study subjects, or the results. Finally, one out of ten of the articles involved the somewhat vague accusation of scientific dishonesty. Such accusation included cases where researchers were criticised for being insufficiently explicit in their explanation of the methodology of, or the background to, their study. It also included instances where the researcher had presented misleading information about his or her competence or had greatly exaggerated his or her own role in a research program.

The news content also conveyed a picture of professors as having the strongest inclination to engage in research misconduct. Sixty per cent of all individuals or groups that had been accused of some type of misconduct were professors (Table 2). This statistic may, in fact, have been somewhat understated as about six per cent of all allegations addressed research groups where the participants' academic positions were unstated. It is reasonable to believe that at least some of these individuals were professors. About twenty-five per cent of all researchers accused of misconduct had been profiled as PhDs, MDs, or associate professors. During the year 2011–2012, there was a steep rise in the number of politicians being accused of research misconduct, a situation that was linked to the case of several European politicians who, as a result of plagiarism, were stripped of their academic titles.

Table 2. Type of research misconduct and groups accused of misconduct in the news reporting in years 2002–2013 (per cent)

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | Total |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Type of misconduct | | | | | | | | | | | | | |
| Plagiarism | 25 | 14 | 9 | 34 | 14 | 33 | 7 | 63 | 8 | 31 | 42 | 71 | 26 |
| Falsification | 0 | 61 | 35 | 7 | 4 | 0 | 68 | 17 | 39 | 54 | 33 | 6 | 25 |
| Misconduct in general | 0 | 23 | 35 | 34 | 43 | 48 | 30 | 5 | 3 | 3 | 8 | 12 | 26 |
| Fabrication | 75 | 0 | 0 | 13 | 34 | 19 | 7 | 5 | 8 | 9 | 17 | 12 | 14 |
| Scientific dishonesty | 0 | 3 | 22 | 11 | 5 | 0 | 0 | 11 | 42 | 3 | 0 | 0 | 9 |
| <i>Sum (per cent)</i> | <i>100</i> |
| <i>No. of articles</i> | <i>8</i> | <i>36</i> | <i>23</i> | <i>70</i> | <i>56</i> | <i>27</i> | <i>30</i> | <i>19</i> | <i>26</i> | <i>35</i> | <i>12</i> | <i>17</i> | <i>359</i> |
| Groups being accused of misconduct | | | | | | | | | | | | | |
| Professor | 14 | 86 | 26 | 80 | 53 | 33 | 50 | 65 | 85 | 59 | 33 | 25 | 60 |
| Associate professor | 0 | 0 | 16 | 2 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Ph.D./M.D. | 86 | 7 | 16 | 8 | 29 | 48 | 15 | 24 | 15 | 12 | 25 | 63 | 22 |
| Research group | 0 | 3 | 32 | 2 | 0 | 27 | 6 | 0 | 0 | 0 | 0 | 0 | 5 |
| Politician | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 6 | 0 | 24 | 25 | 6 | 5 |
| Other | 0 | 3 | 11 | 6 | 17 | 0 | 8 | 0 | 0 | 6 | 16 | 6 | 6 |
| <i>Sum (per cent)</i> | <i>100</i> |
| <i>No. of articles</i> | <i>7</i> | <i>29</i> | <i>19</i> | <i>64</i> | <i>45</i> | <i>21</i> | <i>26</i> | <i>17</i> | <i>26</i> | <i>34</i> | <i>12</i> | <i>16</i> | <i>311</i> |

Note: The disparity between the number of articles regarding different types of misconduct and the groups being accused of such conduct is because the lower part of the table focus only on those articles where one or more of the individuals alleged to have engaged in misconduct were identified, i.e. general articles about research misconduct, where no individual, group, or institution was named, were excluded from the analysis.

According to news media reports, a common approach for dealing with suspicions of research misconduct is the performance of some kind of internal reviewing process at the university in question. Sometimes this scrutinising is made by the university administration or by a university ethics committee — already existing or newly established — or by an external researcher or reviewer purposefully hired to assess the issue. Given that the expert group for misconduct research at the Central Ethical Review Board has examined rather few instances of misconduct, it appears that the news media have provided citizens with a quite accurate picture of the situation.

Most of the articles that have been examined within the study were based on an account of the sequence of events, i.e. according to the order in which things had happened, naming the accused, and identifying the person who had levelled the accusations. Every third article also discussed the possible outcomes for the accused researcher if he or she were to be found guilty by the University Ethical Review Board or by the Swedish Central Ethical Review Board.

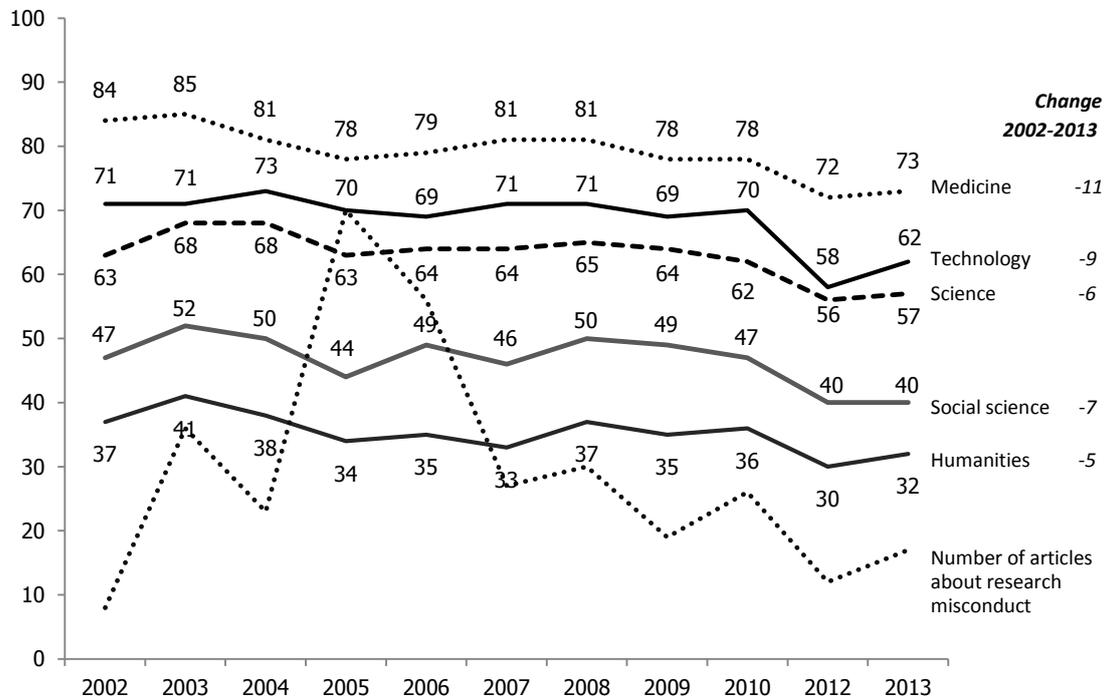
About 72 articles (20 per cent) mentioned that the researcher assessed had been found guilty of some type of misconduct in research. Approximately half of these articles concerned plagiarism, about a quarter dealt with fabrication, and the remaining quarter were connected with scientific dishonesty or falsification. Researchers in medicine and social science were overrepresented among those reported culpable of misconduct and about half of this group was composed of professors. Furthermore, it was reported that some of those who were found to have engaged in misconduct lost their academic title whereas others were reported to have been dismissed from their jobs at the university. In total, 45 articles referred to the actual solution in the case – i.e. what type of consequences the individual researcher had incurred arising from his or her misconduct.

Results, part II: Public trust in science in years 2002–2013

Shifting focus from the news content to the public perception, the result from the national SOM surveys 2002–2013 revealed a gradually declining trust in science among the Swedish population. This change was not, however, due to an increase in the number of Swedes expressing a lower level of confidence in science; rather, it was explained by a steep rise in the number of uncertain citizens. The group of Swedes that failed to express an opinion on confidence in science thus increased over this period, reaching a peak in 2010.

The highest level of public trust was found in relation to medicine, followed by research in technology and science. A majority of the Swedish population averred that it had a very high, or at least a rather high, level of trust in these research areas. Only a small proportion — about 2 per cent — claimed to have little or no trust in either medicine, or technology, or science. As for the social sciences and humanities, the Swedish population expressed a significant lower degree of confidence. Less than one in two Swedes claimed to have confidence in the social sciences, and only one third of the population had trust in research in the humanities. The lower level of confidence did not, however, mean that the average Swede distrusted the social sciences or humanities to a greater extent than medicine, science, or technology. The explanation was attributable, rather, to the number of respondents who claimed to lack an opinion in the matter: every third Swede claimed to be unable to express an opinion about his or her confidence in the humanities whereas the comparable proportion with respect to medicine was one in ten.

Figure 1. Public trust in science and number of news reports about research misconduct in the years 2002–2010 and 2012–2013 (Per cent; Number)



Notes: The question was worded: In general, what confidence do you have in research that is carried out in Sweden in the following areas? The given response set was: very high confidence, rather high confidence, neither high nor low confidence, rather low confidence, very low confidence, and no opinion. The figure deals with those respondents who responded that they had very high or rather high confidence in science in specific areas. The average number of respondents per year was 1,518. It should be noted that the question about trust in different research areas was excluded in 2011. All changes during the period 2002–2014 were significant at the level of $p=0.00$. The figure also shows the annual number of news reports on research misconduct in the news media analysed.

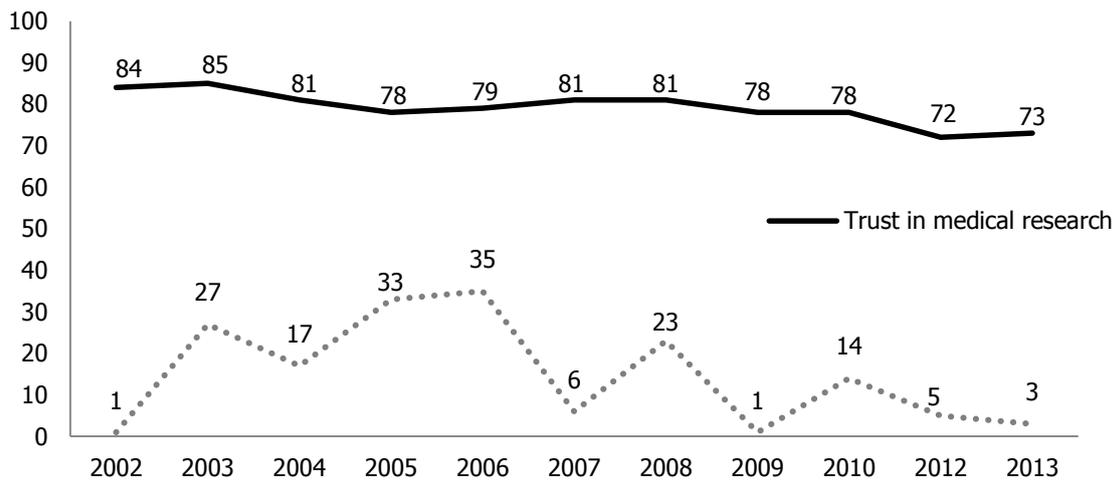
Source: The National SOM surveys 2002–2010 and 2012–2013.

Given the starting point of this study — i.e. that public trust in science is related to media reporting on research misconduct — there should have been a decline in public trust in 2005. This is because of the considerable increase in the reporting of research misconduct during that year. There may also have been a certain decline in public trust in the years 2003, 2006 and 2010, since these years showed a small increase in the reporting of research misconduct. The result revealed that there was a slight visible decrease in public trust in some of the research areas in 2005. During the other years, however, the public trust seemed rather to increase despite the news media increased focus on research misconduct.

When taking a closer look at the news reports on misconduct in medicine and public trust in this field of research, the result clearly shows that there was no apparent connection between a negative reporting on a particular research field and people's general trust in research in that field (Figure 2). The result for the other five research areas clearly revealed a similar pattern.

With respect to the analysis to follow, it should be noted that, in order to make the analysis and presentation as clear and concise as possible, I focused solely on trust in medical research and media reporting on medical research misconduct.

Figure 2. Public trust in medical research and number of news reports on research misconduct in medicine in years 2002–2010 and 2012–2013 (Per cent; Number)



Notes: For question wording and given response set, see Figure 1. The figure deals with those respondents who responded that they had a very high or rather high confidence in science in specific areas. The average number of respondents per year was 1,518. It should be noted that the question on trust in different research areas was excluded in 2011. The change in trust recorded during 2002–2014 was significant at the level of $p=0.00$. The figure also shows the annual number of news reports on research misconduct in medicine in the news media analysed.

Source: The National SOM surveys 2002–2010 and 2012–2013.

Up to this point, the analysis had dealt with the Swedish public as a joint group. When comparisons were made between different groups, however, this produced different results. A revealed pattern in the study was that confidence in science decreased in all groups from 2002, regardless of gender, age, educational level, level of political interest, or media consumption. This change was also evident for medical science, as shown below (Table 3). The decreased confidence was, nevertheless, most evident among young adults (aged less than 30 years) and among those who seldom or never consumed news media.

As prior research showed (Holmberg & Weibull, 2013; Einsiedel, 1994; Fox & Firebaugh, 1992), the public's trust in science was primarily explained by age, education, and political interest (Table 3). Some prior studies also showed a significant difference between men and women's trust in research (Einsiedel, 1994; Fox & Firebaugh, 1992), but this divergence was not reflected in Sweden.

Table 3. Public trust in medical research in different groups in years 2002–2013 (Per cent)

| | 2002 | 2013 | Difference 2002– 2013 (percentages) |
|----------------------------------|------|------|---|
| All respondents | 84 | 73 | -11 |
| Women | 82 | 73 | -9 |
| Men | 86 | 74 | -12 |
| 16–29 years | 81 | 66 | -15 |
| 30–64 years | 85 | 72 | -12 |
| 65–85 years | 87 | 79 | -8 |
| Low educational level | 81 | 69 | -12 |
| High educational level | 89 | 79 | -10 |
| Low level of political interest | 79 | 69 | -10 |
| High level of political interest | 88 | 77 | -11 |
| Low/no news consumption | 81 | 66 | -15 |
| Regular news consumption | 86 | 78 | -8 |

Notes: For question wording and given response set, see Figure 1. The table deals with those respondents who stated that they had a very high or rather high level of confidence in medical science. The smallest group of respondents consisted of 225 individuals. Regular news consumption means that the respondents either read local or urban newspapers, or otherwise availed of broadcasting news services at least 3 days a week. Those respondents who claimed to have seldom or never availed of these types of news media were characterised as having low or no news consumption at all. The change in trust between 2002 and 2014 was significant at the level of $p=0.00$.

Source: The National SOM survey 2002 and 2013.

With regard to the effect of media consumption, the results reveal that there were no significant differences found in the level of trust between those who were regular news consumers in 2002 and those who randomly or never availed of news media (Table 3). As shown below, this scenario changed over the following decade. Both groups showed a decrease in their level of trust in medical research; however, this change was even greater among those who seldom consumed news media as compared with the group of regular news consumers. It should be said that, in the media survey, consumption was used as a proxy variable for exposure to news reports on research misconduct. The result clearly revealed that there was no correlation between exposure to, and trust in, science. On the contrary, those who were most likely to avail of news reports about research misconduct expressed higher levels of confidence in science than those who never exposed themselves to these types of news media.

Discussion and conclusion

Public trust in science is an important pillar for the position of research in society. As the Swedish public's confidence in research declined during the years 2002–2013, both researchers and academic institutions

have raised questions about the main reason for this crisis of confidence. This study focused on the question of whether or not the news media reporting on research misconduct played a part in the gradually declining trust in science that has been seen among the Swedish public during the past decade. The initial assumption underlying this study was therefore that the news media focus on research misconduct — i.e. the agenda-setting function of news media — should have had a negative effect on people's trust in science. The result from the study, however, showed that people who were frequent consumers of news media — and thus more likely to be exposed to news reporting on research misconduct — in fact expressed higher trust in science than those groups who either never or seldom consumed news media.

One possible explanation for this outcome is that the groups of high news consumers also availed of other types of news items on research such as, for example, important progresses and findings in research, and thereby received a positive view of the importance of science. The exposure to articles on research misconduct may also have led to the conclusion that science was subject to an efficient control system that was able to detect any type of misconduct or fraud. From this point of view, both scientists and science in general may have appeared trustable to this part of the public. The character of the news reporting therefore seemed to have a limited influence on public trust in science. It should be said that news reports on research misconduct constituted only a small part of the overall reporting on research in Swedish news media — about 3 per cent. The result thus indicates that, regardless of whether the news is about misconduct or not, it is of greater importance to be exposed, than not to be exposed, to news about research — at least when it relates to the public's trust in science. This also means that the generally decreased level of trust in science that has been seen in Sweden over the past ten years is mainly explicable by factors other than media effects.

Although this study cannot explain why public trust in science has decreased, it certainly does point to the fact that the presence of science and scientists in news media is of importance for the public's trust in science. By increasing the presence of science in the general news flow as well as in other public channels, part of the public insecurity about what scientists really do, and how science really contributes to society, may indeed be resolved (Russel, 2010). Such change may bring an increased public knowledge of science and, accordingly, increase the public's ability to assess the potential benefits or drawbacks of research. This should be considered as especially important for those research areas that suffer from a lower level of trust, such as the social sciences and humanities. Such measures could also provide a potential solution to the question of how to regain some of the lost public trust in science.

Finally, there is an urgent need for further studies on what trust in science is really about. Examples of important questions falling to be considered concern the types of values and the types of meanings people invest in the concept of trust and, also, how people reason about their own personal trust in science. It is also of relevance to try to identify the key factors that affect people in their assessment of different research areas. Previous research has shown that the perceived utility of science impacts on how much trust an individual puts into different types of research fields (Einsiedel, 1994). In this regard, it necessarily falls to be considered as to what really counts as useful and what counts as less useful. These are some of the questions that need to be resolved in order to provide the research community with

answers as to why the public expresses a higher level of trust in certain research areas while other areas tend to suffer from a crisis of trust.

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References

- Andersson, U. (2014). Forskningsfusk och allmänhetens förtroende för forskning [Research misconduct and public trust in science]. In A. Bergström & H. Oscarsson (Eds.) *Mittfåra & marginal* [Mainstream & Fringe] (pp. 137–149). Gothenburg: SOM Institute.
- Bauer, M.W. (1995). *Science and technology in the British press: 1946 to 1986*. London: Science Museum, PUS Research Unit.
- Bennett, W.L., & Iyengar, S. (2008). A new era of minimal effects? The changing foundations of political communication. *Journal of Communication* 58(4), 707–731.
- Callaghan, K., & Schnell, F. (2005). *Framing American politics*. Pittsburgh, PA: Pittsburgh University Press.
- Chaffee, S.H., & Metzger, M.J. (2001). The end of mass communication? *Mass Communication and Society* 4(4), 365–379.
- Chermak, S., McGarrell, E., & Gruenewald, J. (2005). Media coverage of police misconduct and attitudes toward police. *Policing: An International Journal of Police Strategies and Management* 29(2), 261–281.
- Diefenbach, D.L., & West, M.D. (2007). Television and attitudes toward mental health issues: Cultivation analysis and the third-person effect. *Journal of Community Psychology* 35(2), 181.
- Einsiedel, E.F. (1994). Mental maps of science: Knowledge and attitudes among Canadian adults. *International Journal of Public Opinion Research* 6(1), 35–44.
- European Commission (2010). *The Europeans and biotechnology in 2010. Winds of change?* Brussels: European Commission.
- Finer, D. (2005). *Fokus forskning – vetenskapsjournalistikens olika roller* [Focus on research – The different roles of scientists]. Stockholm: SIMO.
- Fox, M.F., & Firebaugh, G. (1992). Confidence in science: The gender gap. *Social Science Quarterly* 73(1), 101–113.
- Freeland Judson, H. (2004). *The great betrayal – Fraud in science*. Orlando, FL: Harcourt Inc.
- Hargreaves, I., Lewis, J., & Spears, T. (2003). *Towards a better map: Science, the public and the media*. Swindon: Economic and Social Research Council.

- Holbert, R.L., Kelly, G.R., & Gleason, L.S. (2010). A new era of minimal effects? A response to Bennett and Iyengar. *Journal of Communication* 60(1), 15–34.
- Holmberg, S., & Weibull, L., (2003). Mer forskning [More Research]. In S. Holmberg, & L. Weibull (Eds.) *Fåfångans marknad* [Vanity fair] (pp. 109–115). Gothenburg: SOM Institute.
- Holmberg, S., & Weibull, L., (2013). Fallet för forskningsförtroendet fortsätter [Public trust in science continues to decrease]. In L. Weibull, H. Oscarsson, & A. Bergström (Eds.) *Vägskäl* [Crossroads] (pp. 247–256). Gothenburg: SOM Institute.
- Ideland, M. (2002). *Det gäller livet – mediernas roll i stamcellsdebatten*. [It's about life — Media's role in the stem cell debate]. Stockholm: SIMO.
- International Research Associates (INRA). (2000). *Eurobarometer 52.1: The Europeans and biotechnology*. Brussels: INRA.
- Iyengar, S. (1994). *Is anyone responsible? How television frames political issues*. Chicago, Ill: University of Chicago Press.
- Iyengar, S., & Kinder, D.R. (2010). *News that matters. Television and American opinion*. Chicago, Ill: University of Chicago Press.
- Iyengar, S., Peters, M.D., & Kinder, D.R. (1992). Experimental demonstrations of the “not-so-minimal” consequences of television news programs. *The American Political Science Review* 76(4), 848–858.
- Lasley, J.R. (1994). The impact of the Rodney King incident on citizen attitudes toward police. *Policing and Society* 3, 245–255.
- Lippman, W. (1922/1997). *Public Opinion*. New York: The Free Press.
- Mazur, A. (1981) Media coverage and public opinion on scientific controversies. *Journal of Communication* Spring, 106–115.
- McCombs, M.E. (2004). *Setting the agenda. The mass media and public opinion*. Cambridge: Polity Press.
- McCombs, M.E., & Shaw, D.L. (1972). The agenda-setting function of mass media. *Public Opinion Quarterly* 36(2), 176–187.
- Moy, P., Pfau, M., & Kahlor, L. (1999). Media use and public confidence in democratic institutions. *Journal of Broadcasting and Electronic Media* 43, 137–158.
- Nelkin, D. (1995). *Selling science: How the press covers science and technology*. New York: Freeman.
- Nimmo, D., & Combs, J.E. (1990). *Mediated political realities*. New York: Longman.
- Oscarsson, H., & Bergström, A. (2014). *Swedish trends 1986–2013*. Gothenburg: SOM Institute.
- Parker, N. (2002). *Biotech bias on the editorial and opinion pages of major United States newspapers and news magazines*. Food First.
- Preiss, R.W., Gayle, B.M., Burrell, N., Allen, M., & Bryant, J. (Eds.). (2007). *Mass media effects research. Advances through meta-analysis*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Roskos-Ewoldsen, D.R., Klinger, M.R., & Roskos-Ewoldsen, B. (2007). Media priming: a meta-analysis. In R.W. Preiss, B.M. Gayle, N. Burrell, M. Allen, & J. Bryant, (Eds.) *Mass media effects research. Advances through meta-analysis*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Russel, N. (2010). *Communicating science – professional, popular, literary*. Cambridge: Cambridge University Press.

- Shanahan, J., & Morgan, M. (1999). *Television and its viewers. Cultivation theory and research*. London: Cambridge University Press.
- Shehata, A., & Strömbäck, J. (2013). Not (yet) a new era of minimal effects: A study of agenda setting at the aggregated and individual levels. *The International Journal of Press/Politics* 18, 234–255.
- Strömbäck, J. (2008). Medialisering och makt: En analys av mediernas politiska påverkan [Medialization and power: An analysis of media's political influence]. *Statsvetenskaplig Tidskrift* 110(4), 385–405.
- Takeshita, T. (2005). Current critical problems in agenda-setting research. *International Journal of Public Opinion Research* 18(3), 275–296.
- Ten Eyck, T.A. (2005). The media and public opinion on genetics and biotechnology: mirrors, windows or walls? *Public Understanding of Science* 14, 305–312.
- Thornton, J.A., & Wahl, O.F. (1996). Impact of a newspaper article on attitudes toward mental illness. *Journal of Community Psychology* 24, 17–25.
- Vernersdotter, F. (2014). Den nationella SOM-undersökningen 2013 [The National SOM Survey 2013]. In A. Bergström & H. Oscarsson (Eds.) *Mittfåra & marginal* [Mainstream & Fringe] (pp. 521–559). Gothenburg: SOM Institute.
- Vetenskap & Allmänhet (2011a). *Slitsamt förvärvat och snabbt fördärvat?* [Backbreaking labor, that is quickly blighted?]. Stockholm: Vetenskap & Allmänhet.
- Vetenskap & Allmänhet (2011b). *Varför sjunker förtroendet för forskningen?* [Why does the public confidence in science decrease?]. Stockholm: Vetenskap & Allmänhet.
- Vetenskap & Allmänhet (2013). *VA-baremetern 2013/14*. [The VA Poll 2013/14]. Stockholm: Vetenskap & Allmänhet.
- Wanta, W., & Ghanem, S.I. (2007). Effects of agenda-setting. In R.W. Preiss, B.M. Gayle, N. Burrell, M. Allen, & J. Bryant (Eds.) *Mass media effects research. Advances through meta-analysis*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Wilsdon, J., & Willis, R. (2004). *See-through science: Why public engagement needs to move upstream*. London: Demos.
- Wilsdon, J., Wynne, B., & Stilgoe, J. (2005). *The public value of science. Or how to ensure that science really matters*. London: Demos.
- Wynne, B. (2006). Public engagement as a means of restoring public trust in science — hitting the notes, but missing the music? *Public Health Genomics/Community Genet* 9, 211–220.

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