SCIENCE AND SOCIETY

Misleading media reporting? The MMR story

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The well publicised controversy about the safety of the MMR (measles, mumps and rubella) vaccine in 2002 could have real consequences for public health, as the drop in take up of the vaccine has increased the risk of disease. What role has the media had in this process? To what extent — as some have claimed — did the media mislead the public about the risks of MMR, and precipitate the decline in public confidence? We try to answer these questions, exploring the relationship between media coverage and the public understanding of MMR.

The MMR (measles, mumps and rubella) vaccine was introduced into the United Kingdom in 1988, and is now used widely throughout the world (in more than 90 countries, including most industrialized countries such as the United States). In 1998, Andrew Wakefield and colleagues[1] from the Royal Free Hospital, London, UK, published a paper in *The Lancet* based on a study of 12 children with an unusual bowel syndrome. The paper presented findings that indicated a link between the measles virus and autism and/or bowel syndrome. This happened during a period of growing concern about possible environmental causes of autism owing to reports that it was increasing in prevalence, which increased the 'newsworthiness' of the paper. At a subsequent press conference, Wakefield proposed that giving children individual vaccines for measles, mumps and rubella in three separate doses at annual intervals would be a safe alternative to the MMR vaccination. This proposal was not endorsed by his twelve co-authors. Indeed, there are, so far, no empirical data that establish a link between MMR and autism, or that indicate that single vaccines are safer (BOX 1).

In June 2003, the British Medical Association (BMA) Board of Science and Education published a report in which they endorsed the MMR vaccine, pointing out that no country in which MMR is available recommends three separate vaccines. Indeed, the World Health Organization advises against single vaccines because they leave children vulnerable to disease for longer, fewer children will complete the course of injections and, although there has been a great deal of research on MMR, giving vaccines separately to children has never been properly tested[2]. It is not clear, for example, at what interval the three separate vaccines should be given. Wakefield's suggestion of annual intervals clearly increases the period of time during which infants are at risk from infection.

So, why did the MMR vaccine become so controversial in the spring of 2002? A measles outbreak in a middle-class London suburb, together with a BBC *Panorama* programme entitled 'How safe is MMR?' broadcast on

Box 1 | **The measles, mumps and rubella (MMR) vaccine and autism**

Much is known about the risks of catching measles, mumps and rubella[14]. Measles is highly contagious; in developing countries, it accounts for 10% of global mortality for children under the age of five[15]. The World Health Organization estimated that in 2000, 777,000 people died from measles[16]. In the United States, before vaccines were introduced, more than 90% of the public were infected with measles by the age of 15 (REF 17). Before the mumps vaccination was introduced in 1988, mumps was the most common cause of viral meningitis[14]. Rubella's main threat is to the unborn child[14].

The MMR vaccine was introduced in the United Kingdom in 1988. In 1996, a second booster against measles was introduced after research showed that it reduced outbreaks, boosted waning immunity and increased the total level of immunity in the vaccinated population[18]. The first dose is given at 12 months of age and the second at 4–6 years, and it is provided free of charge by the National Health Service. Single vaccines are available from private health care clinics at the cost of hundreds of pounds.

In 1998, Andrew Wakefield described a possible link between autism, bowel disease and the MMR vaccine[1], which has since been refuted by a substantial body of research. Peltola *et al.*[19] examined records over a 14-year period and found that only 31 children developed gastrointestinal symptoms after approximately three million vaccinations. Another large epidemiological study looked at the cases of more than 580,000 children, 82% of whom had received the MMR vaccine. The authors found that the risks of autism and autistic-spectrum disorders were similar in vaccinated and unvaccinated children[20]. Brent Taylor of the Royal Free Hospital and Elizabeth Miller of the Public Health Laboratory Service have authored several papers challenging Wakefield's allegations, looking specifically at Wakefield's hypothesis and rejecting it[21,22]. Anna Donald and Vivek Mutha have reviewed the research concerning the allegations against the MMR vaccine[23] (see Further information website, MMR The Facts, for a full list of reviews).

Wakefield's assertion that the increase in autism coincides with the introduction of the MMR vaccine has been refuted by several other researchers[20,21,24–26].

3 February, 2002, taking up Wakefield's case against the MMR vaccine, brought the MMR vaccine to the forefront of the British news agenda. Wakefield, O'Leary and colleagues[3] also pre-published a paper in *Molecular Pathology* to be available when the *Panorama* programme on MMR was broadcast.

Although this was not the first time the MMR vaccine had been under media scrutiny, the spring 2002 controversy threw the vaccine back into the public spotlight. We examine that coverage in detail, exploring how the story of MMR has been told and to what effect.

The MMR controversy

The media coverage of MMR has been of great concern to health professionals, most of whom remain firmly committed to the MMR vaccine but are worried by the declining vaccination rates, which, since 1998 (when Wakefield's study was first published), have fallen from a high of 92% to below 80% in the first quarter of 2003 (see Further information websites). Several attempts to explain this fall have blamed the media. Evans *et al.*[4], for example, found that "the media reports about MMR had affected most parents' immunization decisions, except for those few who were already committed to their views".

Indeed, research on MMR coverage before 2002 indicated a direct relationship between the level of media coverage and public concern — a finding that is in line with a large body of research into the media's agenda-setting effects[5]. Ramsey *et al.*[6] suggested that the perceived safety of the MMR vaccine fell after significant periods of media interest in October 2000 and March 2001, but rose again once media interest declined. What is notable about the coverage in 2002, however, is that it seems to have had a role in the vaccine's public image, denting public confidence for some time to come. (Kitzinger[7] has written about the importance of these defining moments in shaping public understanding of an issue).

Some have come to the media's defence, arguing that the media coverage of MMR was both reasonable and, in most cases, responsible. And it is not only journalists who have defended the MMR coverage — in the journal *Current Biology*, Dixon[8] took a fairly sanguine view of the press that MMR received, arguing that "most newspapers have at least tried to produce rational and balanced coverage, and … most have succeeded rather well". We should note, however, that Dixon's analysis focused on the *Mirror, The Guardian, The Times* and the *Express* — a sample that does not address the impact of the two most popular daily newspapers, *The Sun* and the *Daily Mail*, both of which campaigned strongly for single vaccines.

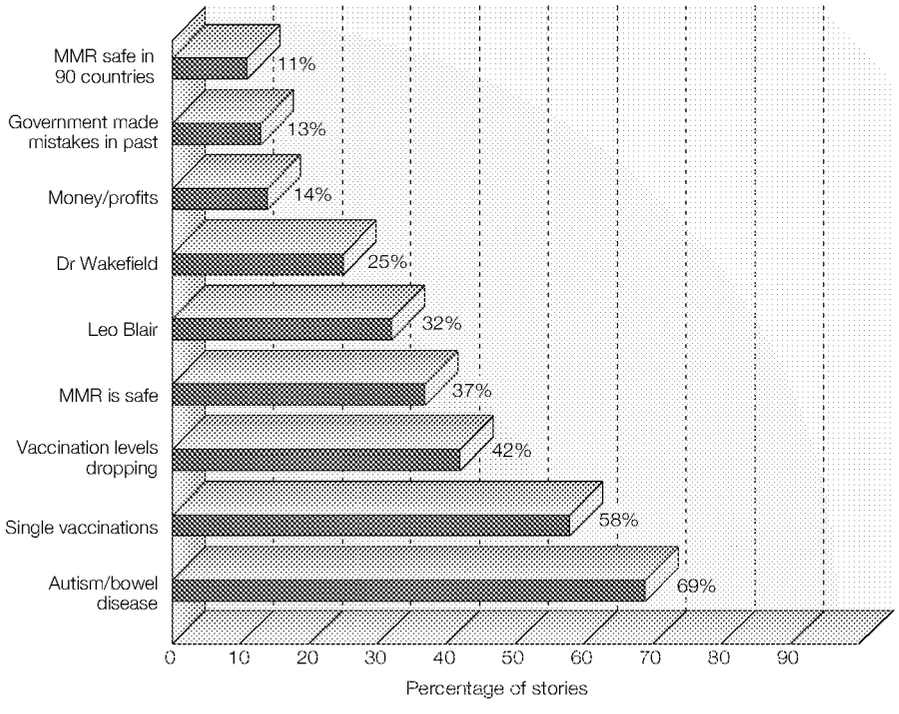

Figure 1 | **Frequency of messages in MMR stories.** This figure shows the presence of key messages in television, radio and press reports about the measles, mumps and rubella (MMR) vaccine in national media in the United Kingdom from January to September 2002. Data from REF. 9.

An analysis of media coverage

Our study of media content[9] is more comprehensive, incorporating a broad range of broadsheet and tabloid press, BBC and ITV News and Radio 4's *Today* programme. Our sample covers a period of 197 days from 28 January to 15 September 2002, and includes a total of 561 reports. Although the MMR story lingered for some time, 56% of the entire sample appeared in a single month (between 28 January and 28 February 2002), indicating that, like many other news stories, the main framework for understanding MMR was established in a fairly intense period of media scrutiny.

Our content analysis indicates that the story was told in similar ways by different media, and revolved around a series of themes. The main focus of the story was the possibility of a link between the MMR vaccine and autism (or bowel disease linked to autism), something that was mentioned in more than two thirds (69%) of MMR stories (FIG. 1). The idea that the MMR vaccine might be unsafe was, after all, the most obviously 'newsworthy' element of the story. The main source of these claims — Andrew Wakefield — is mentioned in only a quarter of these stories, with the broadsheet newspapers accounting for most of these references. The fact that Wakefield's call for single vaccines was not supported by any of his 12 co-authors went more or less unreported.

Although aspects of the large body of evidence indicating the safety of MMR were also widely reported, they did not have the same level of prominence, featuring in only 37% of stories. This research was often used to 'balance' concerns about the vaccine. The following examples are typical: "The government has mounted campaigns to persuade parents the MMR jab is safe after some research linked it to autism and bowel disorders in children"[10] and "Ministers continue to insist the MMR jab, which some doctors have linked to autism, is the best way of protecting children" (ITV News, 5 February 2002).

This 'balancing act' is a time-honoured convention of journalistic good practice. The impression created by this balancing is that of two conflicting bodies of evidence. What the coverage generally failed to convey was the fact that evidence as a whole was not finely balanced, as most of it clearly indicates that MMR is safe.

The other main element in the story — mentioned in 58% of all of the MMR reports — was Wakefield's proposal for three single vaccines. Although single vaccines remain largely untested (there is no empirical evidence to indicate this is a safer option), this alternative

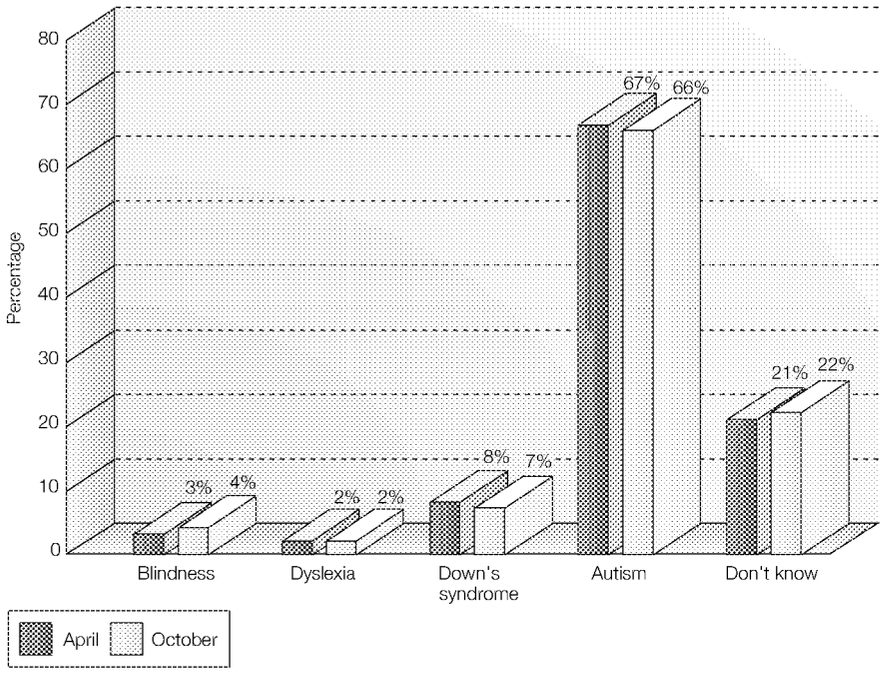

Figure 2 | **Perceived link between the MMR vaccine and medical disorders** This figure shows the results of two national representative surveys carried out in April and October 2002 in response to the question 'some recent research has indicated there might be a link between the measles, mumps and rubella (MMR) vaccine and which medical condition?' Data from REF. 9.

clearly had a 'common-sense' appeal. If parents have doubts about MMR, the logic ran, why not at least give them the choice? Although the case against single vaccines was sometimes reported, it is a multi-layered argument that cannot be made with anything like the quick rhetorical force of a simple appeal to parental choice. An extract from ITV News (4 February 2002) shows that even when those arguing against single vaccines were given a little more time to state their case, it was not enough to dent the common sense appeal to parental choice.

> "In tonight's poll … 80% also want alternatives to MMR. This Liverpool clinic does just that — offering single jabs for each disease to worried parents."
>
> A parent (holding child); "You should be able to have your children vaccinated singly at your own doctors. I object strongly to being told what and when to inject into my children."
>
> Dr Pat Troop, Deputy Chief Medical Officer; "We have no concerns about our current vaccine. I think it will send a very strong signal that parents will say, hang on we think that maybe there is a problem around this vaccine — why else would you offer us a single vaccine — and confidence would go."

The assumption here was that the MMR vaccine had become a problem, and yet the lack of evidence looking at the safety of single vaccines — either in terms of disease prevention or any link between single vaccines and autism — went largely ignored.

The government put its weight behind the decision not to offer a programme of single vaccinations on the National Health Service (NHS) (for the reasons we outlined earlier). This pushed the Prime Minister into the spotlight — leading reporters to ask, reasonably enough, whether Leo Blair (the Prime Minister's youngest son) had been given the vaccine. The Prime Minister's insistence that this was a private matter did little to ease speculation about the vaccine's safety, and his role in the story was, unsurprisingly, highly newsworthy — featuring in one third (32%) of the reports we looked at.

Tony Blair was not the only parent to receive coverage, and parents as a whole were widely quoted (parents were, after scientists, the second most quoted group in MMR stories). Although the evidence indicated that most parents were still choosing the MMR vaccine, parents quoted were five times more likely to be shown speaking against it than for it. This fed the idea that take up of the vaccine was falling markedly — a point made in 42% of MMR reports. At the time, there were few data to support this claim, although there is a strong case that it became a self-fulfilling prophecy, as repeated reports of a loss of confidence in the MMR vaccine can, in themselves, lead to a loss of confidence in the vaccine (as discussed later).

In summary, the MMR story began with the alarm created by reports of Wakefield's fears, giving a more general impression of a divided medical and research community, followed by a sense of growing parental concern — which was increased by the Prime Minister's coyness on the subject — and a 'solution' offered in the form of single vaccines.

Lurking behind this coverage was the 'ghost' of bovine spongiform encephalopathy (BSE) — a story that had made journalists suspicious of the assurances offered by health professionals and the government. Although this idea was only mentioned in 13% of the stories we looked at, it clearly provided a template for journalists, many of whom saw the MMR controversy in the light of past failures by the government and the scientific establishment to prove their case.

What did the public learn?

We know from a large body of 'agenda-setting' research that the media have considerable power to increase levels of public concern about an issue. Studies have also shown that the media are instrumental in providing information to people, and that "one's store of information shapes one's opinions"[11]. In this context, what did the public learn from the MMR coverage, and how has this information influenced their opinion of the vaccine?

We conducted two national surveys — in April and October 2002 — to examine this question (both surveys involved interviews with a nationally representative sample of 1,000 adults). Past research has indicated that people tend to recall the dominant themes and overall frameworks of news coverage, rather than the detail[12], and our study indicated a similar pattern. In brief, most of the key themes of the coverage did seem to get across, whereas many of the nuances of the story were lost.

The most prominent theme — the link between MMR and autism — clearly registered with most people. In both our surveys, most individuals (67%) were not only aware of research indicating that MMR might be unsafe, but could recall the specific condition (autism) that provided the focus of Wakefield's research (FIG. 2). Most people also recalled the Prime Minister's role in the story. Although there were several reported rumours that Leo Blair had received the MMR vaccination, it was his father's refusal to comment that remained in the public mind (66% of individuals recalling this in April, increasing to 70% in October)

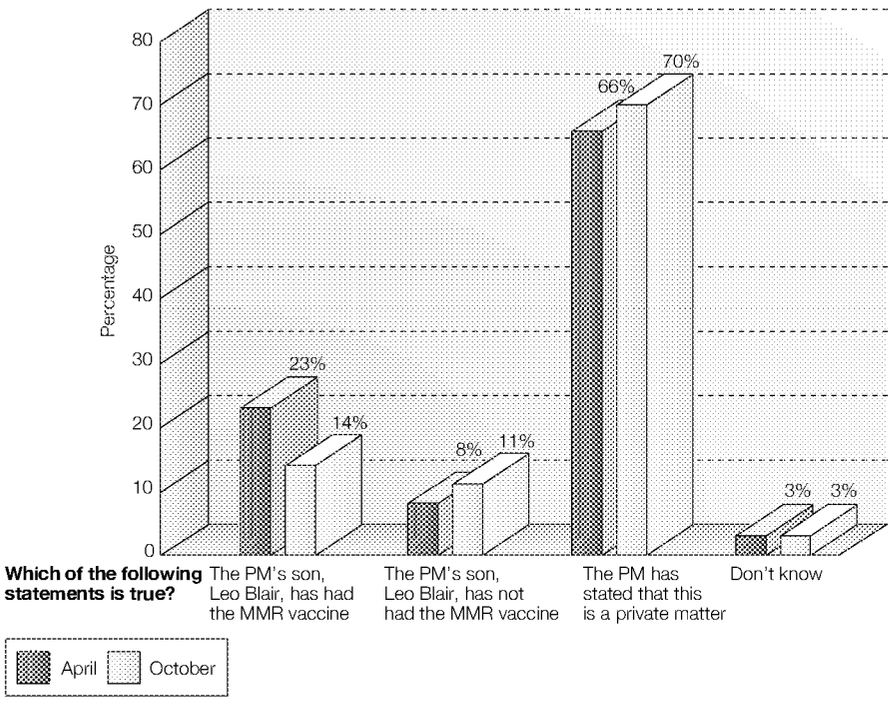

Figure 3 | **Public awareness of the Prime Minister's position on the vaccination of his son.** This figure shows the results of two national representative surveys carried out in April and October 2002 in response to a question testing the awareness of the Prime Minister (PM) Tony Blair's position on the vaccination of his youngest child, Leo. Data from REF. 9. MMR, measles, mumps and rubella.

(FIG. 3). The Prime Minister's apparent coyness would therefore seem to be a powerful factor in people's understanding of the story — one that stayed with them even after the story died down. It seems probable that this would have contributed to a sense of uncertainty about the vaccine.

The key question, however, is how people weighed up the evidence that had been presented to them for and against MMR. As we have seen, the fact that most of the research was in support of MMR got lost in the coverage, which tended to simply balance claims for and against the vaccine. Our study indicates that the influence of this balancing act on people's perceptions was to create the impression that science was split down the middle on this issue. Indeed, this idea seems to have strengthened over time — by October, most (53%) of the respondents said they thought there was equal evidence on both sides of the debate, whereas fewer than one in four were aware that the weight of scientific evidence indicates that there is no link between MMR and autism (FIG. 4).

This is a good example of the way that people absorb a dominant media framework, and then use it to draw conclusions. Although some reporters did spell out the relative weight of evidence, "parents … have to decide who to trust — either the vast array of medical experts here and abroad who are convinced MMR is safe or Dr Wakefield who has the vocal support of a minority of parents" (BBC News, 7 February 2002), this did little to dislodge the simple idea that there are two bodies of evidence. In the case of MMR, the generally laudable concept of journalistic balance worked to inflate the relevance of Wakefield's claims and diminish the volume of evidence against them.

Most of our respondents also took their cue from media coverage in over-estimating the decline in take up of the MMR vaccine, with less than one in six people giving the correct response. What people had learnt here is, once again, information that increases uncertainty about the vaccine.

Given the coverage afforded it, it is not surprising that the 'three separate vaccines' option, the second most recurrent theme in media coverage, became the most popular alternative to MMR — one favoured by around one third of the respondents in both surveys (FIG. 5).

This question is, of course, hypothetical for most people. And yet given that many respondents would have had an unproblematic experience with the MMR vaccine (either directly or as parents and family members), the popularity of an untested cycle of vaccinations is remarkable.

Together, our surveys indicate that the media coverage of the MMR controversy has powerfully communicated a range of concerns about the vaccine, while promoting the idea of three single vaccines as a popular alternative. Although a more complex picture was certainly available for those paying close attention, the MMR story is a classic example of a dominant media framework influencing public consciousness in ways that mislead as much as they inform[12].

Interestingly, negative media attention and the resulting decline in public confidence in the MMR vaccine remains largely a British phenomenon. Despite the widespread use of the vaccine around the world, fears about its safety have been most conspicuous in the United Kingdom. The fact that Wakefield's research has not created the same level of concern elsewhere indicates that scientific communities around the world remain convinced of the safety of the MMR vaccine.

Discussion

In many ways, journalists can reasonably argue that they were only doing their job in covering the MMR story as they did. Uncertainty about the MMR vaccine is undoubtedly more 'newsworthy' than research indicating otherwise, and many journalists pride themselves on the need to question 'officialdom' in the public interest. If MMR does turn out to be unsafe, surely the public have a right to know?

In fact, when our survey — having asked people about a range of scientific issues — asked whether the media should report scientific claims before they have been confirmed by subsequent research ("if a scientist makes claims that go against the great majority… how do you think the media should approach these claims?") 48% said they would prefer to wait, against only 34% who felt it should be covered "because it is news". This indicates that, in a media climate that is well populated by various health scares, many people would prefer to have solid, reliable information or none at all.

The other problem with the 'right to know' argument is that it displays a certain naivety. There are any number of ideas that are promoted by the government or the medical establishment that go unquestioned. The reason why MMR became controversial is not simply a matter of journalistic judgement. Andrew Wakefield's research was not just newsworthy because of what it said (about which, after all, we heard very little), but because of his skill at public relations (unlike most medical researchers, he has employed a well known public relations advisor) and because there were well organized

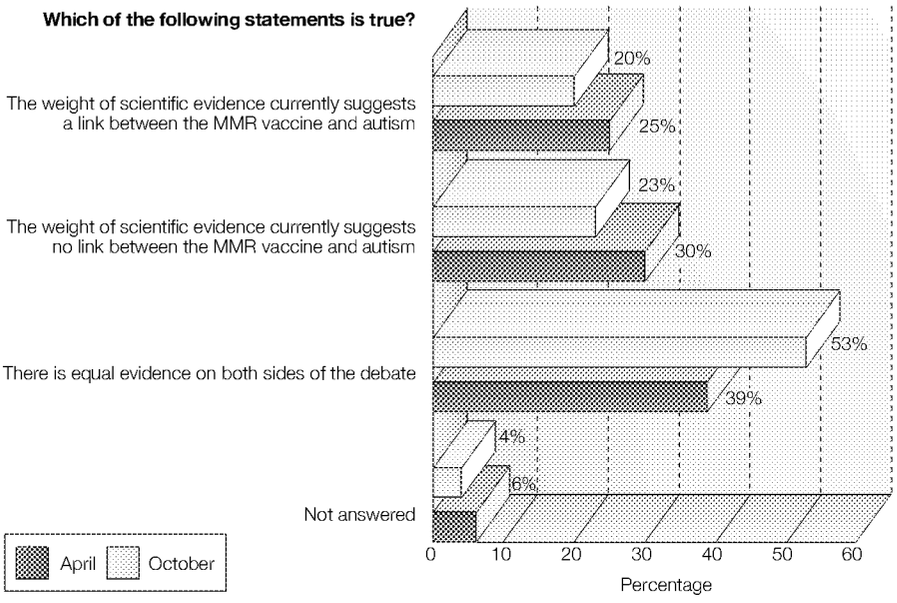

Figure 4 | **Public opinion on the amount of research for and against the link between the MMR vaccine and autism.** This figure shows the results of two national representative surveys carried out in April and October 2002 in response to a question testing the awareness of the volume of research evidence for and against the link between the measles, mumps and rubella (MMR) vaccine and autism. Data from REF. 9.

anti-vaccination lobby groups that were keen to provide moving testimonies from parents who made themselves available to journalists.

It is also naive to suppose that creating uncertainty about a routine aspect of contemporary disease prevention will have no consequences for public health. Scare stories about the risk of BSE or genetically modified foods might have economic consequences, but the stories themselves do not have implications for people's well being (our health is not going to suffer if we avoid beef or genetically modified foods). The MMR story, by contrast, involves a loss of confidence in a vaccine that prevents verifiably dangerous diseases, in favour of an untested and risky alternative. What most journalists failed to do, in this case, was to interrogate Wakefield's claims or to examine the risks associated with the single vaccines option.

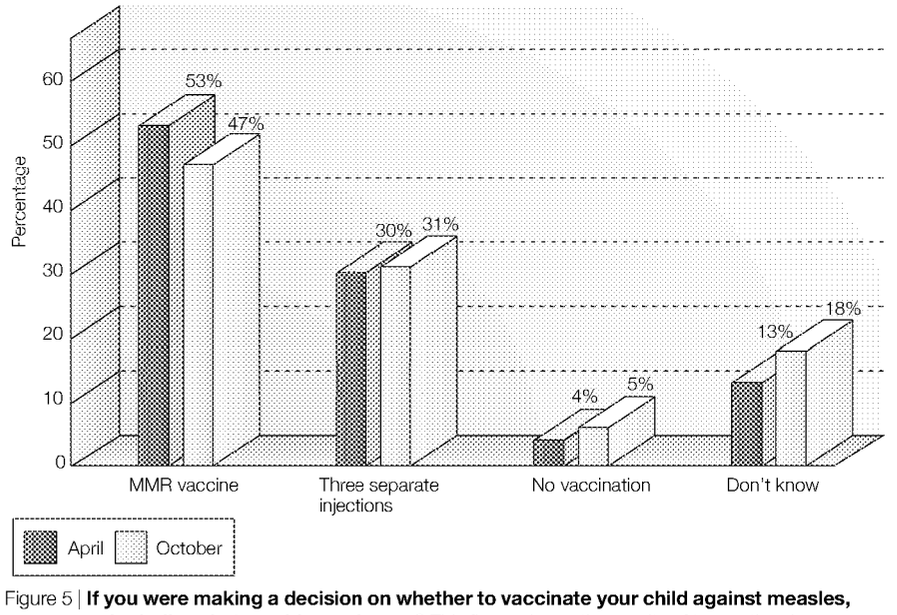

Figure 5 | **If you were making a decision on whether to vaccinate your child against measles, mumps and rubella, what would you choose?** This figure shows the results of two national representative surveys carried out in April and October 2002 in response to a question asking how/if they would vaccinate their child against measles, mumps and rubella (MMR). Data from REF. 9.

What is the broader public interest here? Clearly people need to know if there are risks associated with a routine medical practice, but how are we to assess the level of risk and compare it with the risks of an alternative? As far as MMR is concerned, its risks are highly speculative, whereas the risks of non-immunization are not. For example, a recent report in *Science*[13] indicated that outbreaks of measles in England and Wales are increasing due to a decline in vaccination levels. So, when it comes to public health issues, the lesson journalists might learn from this is to begin with the well-worn principle of 'first, do no harm'.

For scientists and public health professionals, the MMR coverage is something of a failure to communicate two simple messages. First, to expose the limits of Wakefield's claim, which was speculative about the role of MMR, while those researchers who have attempted to test his theory have all refuted it. Second, to stress the risks of instituting an untested programme of three separate vaccines (when there is no evidence that this would be safer, and yet tangible evidence of the risks of increasing the period of non-vaccination).

But our study also indicates that there is a danger in health professionals relying on government or establishment bodies to make the case for MMR. By doing so, they make comparisons with the BSE crisis more plausible, especially when those representing the government's case find themselves pitched against parents of children with autism. If the public have lost some trust in scientists, it is generally because people are suspicious that they might have links with vested interests — such as drug companies or government agendas — rather than a more general loss of faith in scientific or medical expertise[9]. The best people to defend MMR, in this sense, might be ordinary general practitioners or clearly disinterested academics. How such people gain access to the media is, of course, another question, but this is partly an issue of organizations becoming media savvy: so, for example, a survey showing that most doctors regard MMR as safer than three single vaccines would have been a telling and newsworthy intervention. The battle for public trust, in other words, can no longer be won by straightforward appeals to authority: it needs to be based on an understanding of the nature of public concern and an awareness of media frameworks.

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Online links

FURTHER INFORMATION
Economic and Social Research Council: http://www.esrc.ac.uk
Public Health Laboratory Service (PHLS): http://www.hpa.org.uk/infections/topics_az/vaccination/vac_coverage.htm
MMR The Facts: http://www.mmrthefacts.nhs.uk
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