

VIEWS & REVIEWS

Why promote the findings of single research studies?

PERSONAL VIEW Paul Wilson, Mark Petticrew

Scientists have known about biases in single observations for centuries. A wealth of empirical evidence amassed across many disciplines tells us that single studies can be biased, are often seriously methodologically flawed and highly time and context dependent, and have findings that are likely to be misinterpreted and misrepresented (sometimes by the authors themselves). Increasingly it is accepted that decisions should not be based on the findings from single primary studies but rather informed by actionable messages derived from synthesised evidence based on systematic reviews. Over the past decade there has been substantial public funding of synthesised evidence and guidance to support healthcare decision making. In the United Kingdom this investment has been described as NHS research and development's main contribution to the global science base.

Despite this investment the evidence indicates that although the transfer of research knowledge is possible its success can be variable. There is now renewed interest and emphasis on the gaps between research and policy and practice, nationally and internationally. This emphasis on bridging the gap may be viewed as encouragement to strive even harder to promote research to ever wider audiences—to be seen to be providing a return on investment. But it may be worth pausing to consider the benefits and costs of such activity and ask why the research community continues to place such emphasis on the promotion of the primary research study.

The emphasis on the single study drives submissions to the current UK Research Assessment Exercise (RAE). Although the RAE does recognise that original research may include systematic reviews, the practice of many academic organisations is to prioritise—or sometimes only include—primary research, under the assumption that systematic reviews are not relevant or are less important.

Most bodies that commission research also expect and demand some commitment or effort on the part of grant holders, regardless of study design, to disseminate in ways that go beyond the traditional medium of academic publication. The emphasis is on communicating and interacting with wider policy and health service audiences in ways that will facilitate uptake of research results in practice and policy. The rationale, appropriate conditions, and contexts for such interactions are rarely provided by the funding body, and nor is any acknowledgment that evidence set in context is of most value to decision makers.

Some medical journals encourage researchers to discuss their findings in the context of the existing and relevant evidence base. But research suggests little progress has been made by researchers and journal editors in ensuring that single studies are set in context or that the consolidated standards of reporting trials (CONSORT) recommendation is adhered to. Furthermore, every week journals issue press releases aimed at generating publicity for the most “newsworthy” studies and for the journal itself. There is some evidence that primary research studies are proportionally more likely to be included in press releases than systematic reviews.

The emphasis on newsworthy research promotion is not restricted to academic journals. Universities, research centres, funders, and councils all use the media to promote research. Rather than representing an attempt to explain new findings in the context of existing knowledge, media strategies are used to build the corporate image of the host institution or funder, for agenda setting, and to attract and secure future funding.

Using the media to promote the results of primary research can have harms and can erode trust

in and understanding of science generally. More often than not the latest breakthroughs, miracle cures, and wonder drugs are based on single studies. Often buried within the press release are notes of caution and suggestions that further research is needed and that a viable treatment is actually years away. We all know that these disclaimers are rarely if ever reported prominently; and the research community, while quick to raise concerns about media accuracy, rarely questions the appropriateness of media dissemination.

The renewed interest and emphasis on the knowledge translation is to be welcomed. But more than ever there is a need for researchers, especially those conducting primary research, to consider carefully the costs and benefits of dissemination. Not every study needs wide dissemination. Most primary research needs to be set in context, verified, and built on, moving the field forward incrementally before it can then have wider application. Rather than being encouraged to find ever more creative ways to get research noticed, funders should encourage researchers to show they have considered carefully the appropriateness of their plans for dissemination.

Medical journals can do more to ensure that researchers actually do discuss the findings of primary studies in the context of the existing and relevant evidence base. The Academy of Medical Sciences in London has recently argued that researchers, funders, and institutions should take greater responsibility for the accurate communication of non-experimental research. In truth, the research community as a whole needs to be more circumspect when it comes to the active promotion of primary research. Although all research has an audience, and should be made accessible, not all research can or should have an impact on practice or policy.

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[A longer version of this article with references and contributors is on *bmj.com*](#)



**Reports of
miracle cures and
wonder drugs are often
based on single studies**



The surgery book that was apparently inspired by frozen pigs' carcasses at the meat market in St Petersburg in winter, p 725

REVIEW OF THE WEEK

Food to die for?

Obesity could be solved if only we returned to the non-processed foods of our great grandmother's days. This is naive in the extreme, argues **Benjamin Caballero**

There is no question that the general public has been increasingly frustrated by the advice it receives about diet and health. The perception is that, instead of clarifying things, new research only adds confusion by contradicting previous "evidence." For example, we were told to avoid butter because of its saturated fat content and use vegetable oil instead, only to learn later that vegetable oils contain trans fatty acids, which are as bad as saturated fat. Scientists blame the media for this confusion, because they hype "hot" results, regardless of their quality or relevance, and cite partial results out of context. In turn, the media blame scientists, and some journalists accuse them of "nutritionism"—of having reduced food to lists of chemicals, in the process providing justification to a food industry that is eager to create more, ever changing products that end up having little resemblance to natural foods. This is why Pollan, clearly in the anti-nutritionist camp, feels the need to defend "real" food.

Pollan, however, cannot avoid going a step further, developing a full conspiracy theory, in which scientists and the food industry deliberately avoid mentioning whole foods, focusing instead in their advice on individual nutrients (saturated fat, cholesterol, and so on). Why? To protect producers of "bad" foods, Pollan claims. Thus, instead of saying, "Don't eat meat," scientists say, "Don't eat saturated fat," hoping that by the time the average person has figured out the difference between saturated and unsaturated fat they will have finished that quarter pounder with cheese. He calls this a "great Conspiracy of Scientific Complexity" (his capitals).

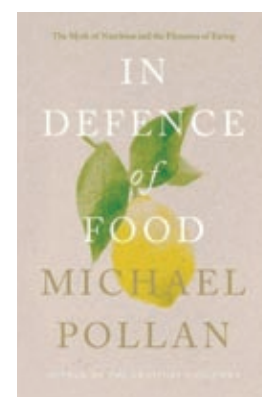
In fact, there is no need to invoke a conspiracy: some corporations have always used scientific facts to sell more and to gain market share by justifying new "unique" products, from cars to snack bars. Many of these new products have no demonstrable advantage to consumers. The food industry, not immune to this trend, has used discoveries in nutrition science to sell more products by using questionable claims or taking advantage of inconclusive (and confusing) scientific evidence. However, that supermarkets are full of unnecessary processed foods does not mean that food should never be processed or that non-processed foods are inherently better, as Pollan implies throughout his book.

Pollan believes that as far as food is concerned we have strayed way off course and that we should return to a path

of pure and natural food. He recommends "not to eat anything that your great-grandmother would not approve of" (in this book grandma is often called on to support an argument). But this is meaningless advice. The challenge for nutrition science, just as for nuclear physics, genetics, and science in general, is not to bury our discoveries and dream about a simpler past but to apply new knowledge in a positive way to improve our lives. Pollan believes that the only way we can resolve food related problems such as obesity is to ignore discovery and reinstate an idyllic food paradise that never existed. He may be lucky enough to have a great grandmother who is alive and well enough to go with him to the supermarket, but the truth is that our great grandmothers had 15 years less life expectancy than we do know, and this advance came about in part thanks to (initially confusing) scientific discoveries, including in the area of nutrition. In spite of the contradictory nature of discovery in progress, advances in the science of nutrition have greatly enhanced our ability to provide a better, stable food supply to the population. Pollan believes the opposite: that the lack of change in a pattern of diet is proof of its quality. This is naive at best. Traditional dietary practices have plenty of examples that are detrimental to health. Regretfully, grandma's dietary advice sometimes can be wrong.

Pollan starts with sound advice: "Eat food, not too much, mostly plants." He may not like it, but this is the same advice given for decades by scientists whom he puts in the nutritionism camp. The 1995 Dietary Guidelines for Americans recommend that "most of your calories should come from fruits, vegetables, and grains." The 2000 guidelines state: "Build your eating pattern from a variety of plant foods." All these guidelines emphasise control of energy intake and maintaining body weight, and the most recent include guidance on portion size. But there is no question that following these simple recommendations is daunting. Pollan emphasises the respect for natural foods and for the act of eating as an important social and cultural part of life. I could not agree more. But these goals may be elusive for most people unless we as a society also demand fundamental changes in the production, marketing, and regulation of our food.

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In Defence of Food

Michael Pollan

Allen Lane, £16.99, pp 242

ISBN 978 1 846 14096 9

Rating: ★★☆☆☆

Pollan recommends "not to eat anything that your great-grandmother would not approve of." But this is meaningless advice

Computer says yes

FROM THE
FRONTLINE
Des Spence



In the west of Scotland, where it rains continually, many people have red hair and freckles. You could conclude, perhaps, that high rainfall causes red hair and freckles. But mere association is not causation, however plausible the link might seem. This is the fundamental flaw within all observational data: that an unknown alternative explanation (confounding factor) is responsible.

Often I sit looking at lab results on the computer. A message from our nurse reads, "The computer says they need to be treated, but I can't believe they are at risk!" Numbers have been pumped into an electronic spreadsheet to estimate cardiovascular risk over the next 10 years. For a risk of 20% the computer suggests medical intervention.

Our computer spreadsheet is the joint British societies guidelines (JBS2) on cardiovascular risk, a modification of the Framingham observational data. Our patient is a fit, slim, non-smoking man in his 70s with no diabetes and normal blood pressure and cholesterol concentration. His only obvious risk factor is a family history of ischaemic heart disease, but the computer calculates his

cardiovascular risk as 21%. The computer always seems to say yes to intervention, especially in elderly people. But as I print out the prescription, my inner nerd whispers, "Remember the PROSPER study."

The prospective study of pravastatin in the elderly at risk (PROSPER), which was based in the west of Scotland, gave a 40 mg dose of the drug to elderly patients over three years. With an average age of 75, blood pressure of 154/83 mm Hg, and a cholesterol concentration of 5.7, and with 43% of them with established vascular disease, these patients were at much higher risk than my patient. So what was the study outcome? No protection from stroke, a staggering 0.23% annual reduction in vascular mortality, but overall no change in all cause mortality (the pravastatin group was no more likely to be alive at the end of the study). So on the basis of this interventional study it doesn't seem plausible that my patient will benefit from a statin. The JBS2 numbers simply don't stack up.

Never confuse observation with causation.

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Avatars

THE BIGGER
PICTURE
Mary E Black



Avatar is a lovely word—it conveys a slinky tapestry of the mystical and the technical. It conjures up both blockbuster and friendly pet. It means my online image or presence.

When I teach I have efficient plans and outcome measures. I like small group learning for medical students. It is no loss; those endless hours of sitting in badly prepared lectures in badly heated rooms, going through the formality of learning. When I learn, materials are now all on line. My MD thesis is coming along nicely, based on global health databases discussed in occasional emails to my supervisor and administered by the mostly intelligible online university support system. I adore virtual reality as it makes my world of teaching and of learning bigger and more efficient.

I Skype my retired doctor mother to catch up and discuss her various ailments. Google is my first point of call on finding out what her treatment options are and she scans me her results.

I telecommute part time with UNICEF in New York. I have working relationships around the world with people I have never actually met—I have only encountered their emails or a photo or two online. I am part owner of an IT company, and we have virtual management meetings between three countries every week.

We all exist online these days; our electronic selves are purposeful and busy. Our case files, radiographs, and data stream from place to place and we expect so much more—lost patient notes are passé (unless some government agency catastrophically loses the entire electronic file). My financial identity was stolen last year, but I retrieved it with some online detection.

But oh, don't I miss people sometimes. Humans seek order and they seek to gather together. Calendars are not just to mark tasks, monitor objectives, tick off the to-do list, and plan trips abroad—they provide meaning

and the rhythm of the seasons. Gatherings are an important ritual; to sit in a room full of real people conveys sense and purpose well beyond the expected outcome of the moment. When lost in the electronic nightmare of MTAS, it is people who will soothe shattered nerves and lost self esteem. We need our strangers and acquaintances glimpsed across a crowded room as much as we need our close friends and families . . . or avatars.

One day, when my avatar meets yours in some virtual meeting space, buttons will be pushed to deliver the consensus opinion, underline the diagnosis, accept the degree, or award the accolade. We will celebrate the interconnectedness of our efficient global world, sure in the knowledge that our interaction has been effective, efficient, and up to date. The electronically submitted applause will be sincere.

But won't we be lonely?

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Modern love

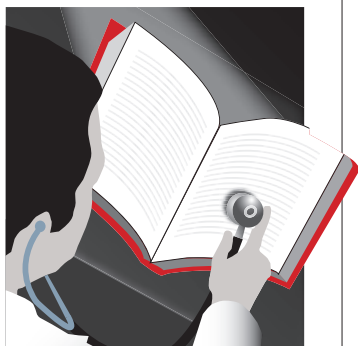
When I was a senior house officer, in those happy, distant days before the Reform of the Reorganisation of the Reform of the Reorganisation of the Reform of the NHS, I had a colleague who, in her spare time, wrote hospital romances. She produced four of them a year under a pseudonym that she would not reveal to the rest of us, and was reputed by this means to earn £15 000 a year, which was a small fortune at the time.

The genre was as tightly controlled by the publishers as Glavlit controlled Soviet literature. There were things that couldn't be said, and (far worse for an author) things that had to be said. At least, that is what my colleague told me. Having intellectual ambitions, she was rather ashamed of her literary activities.

Hospital romances are still popular and the formula hasn't changed much in 30 years, at least if *A Consultant Claims His Bride*, by Maggie Kingsley, is anything to go by. At 20 pence in a junk shop, it melted into my arms.

On close reading, however, one can detect social changes that have taken place since the days when my SHO colleague wrote her romances. Although the blurb to *A Consultant Claims His Bride* begins, "In the boss's arms . . . at last," the protagonist, an overweight ward manager called Nell Sutherland, gets drunk early in the proceedings and has to be put to bed by the "gorgeous" consultant Jonah Washington, whom she is destined to marry, as she murmurs, "Make love to me, Jonah, I want you to make love to me." This precipitate sexuality wouldn't have been allowed 30 years ago. It is far too indecorous; and even the language

BETWEEN THE LINES Theodore Dalrymple



Women doctors! Male doctors with illegitimate sons! O brave new novelette, that has such people in it!

now employed in the writing has become a shade less genteel.

When, for example, Nell hears by email in the first paragraph of the book from her former boyfriend, the anaesthetist Brian ("tall, blond, with deep blue eyes and a devastating smile") that he has decided to separate from her, she reflects, "not even in a phone call or a letter, but in a sodding email sent to her at work." Vulgarity like that was impermissible thirty years ago.

The last paragraph of the book, though, could have been written then: "Oh, Nell," he said huskily, and as he wrapped his arms around her, and kissed her, and the snow kept falling, she knew that she'd finally come home." The comforting predictability of it in an uncertain world is precisely what people like in these novelettes.

In the blurbs for other romances in the series at the rear of the book, however, one can detect further signs of social change. For example, in *The Surgeon's Family Miracle*, "Ben Blyden arrives on the exotic island of Kapua and is stunned to find that the island's doctor is Lily Cyprano, the girl he loved at medical school . . . and that she has a seven year old son—his son—Benjy!" And, in *The Doctor's Baby Surprise*, "Gorgeous doctor Toby Sinclair has a reputation as a carefree playboy. But when his baby son—who he never knew existed—lands on his doorstep, Dr Annie Arnold can't refuse Toby's plea for help."

Women doctors! Male doctors with illegitimate sons! O brave new novelette, that has such people in it!

Theodore Dalrymple is a writer and retired doctor

MEDICAL CLASSICS

Ice Anatomy By Nikolai Pirogov

First published 1851-9

Nikolai Pirogov (1810-1881) is considered to be the greatest Russian surgeon. He introduced the teaching of applied topographical anatomy in Russia, founded military surgery, implemented ether anaesthesia on the battlefield, suggested the use of plaster casts for fractures, and championed nursing care for the wounded during the Crimean War. Born in Moscow, Pirogov graduated in medicine at the age of 18 and then spent two years in surgical clinics of continental Europe. In 1841 he was elected a professor of Imperial Medico-Surgical Academy in St Petersburg, where he stayed until his retirement in 1856.

An Illustrated Topographic Anatomy of Saw Cuts Made in Three Dimensions across the Frozen Human Body (Anatome topographica sectionibus per corporis humanum congelatum triplici directione ductis illustrate, often referred to in modern medical literature as "Ice Anatomy") was published in Latin in four volumes. The volumes cover saw cuts of head, neck and spine, thorax, abdomen, and arms and legs. Pirogov wanted to investigate the "normal and pathological position of different organs and body parts by sections made in three main directions (transversal, longitudinal and anteroposterior) throughout all regions." In order to reveal true representation of organs' position Pirogov decided to freeze corpses below -18.75°C "to the density of the thickest wood" and then cut them by a special mechanical saw (similar to that used at furniture



Pirogov: pioneer

factories) into thin plates. A painter then transferred figures and contours of cuts onto paper ruled with squares, using a ruled glass. Pirogov suggested another method of frozen body investigation which he called the sculpture method: "Different internal organs such as stomach, heart etc, position of which had to be defined with previously unattainable accuracy, were chiseled out of adjacent frozen tissues with chisel and hammer similar to exposure of antique remains from lava in Herculaneum," he wrote.

"Ice Anatomy" apparently came to Pirogov's mind at the meat market in St Petersburg in winter, where he noticed cuts across frozen pigs' carcasses.

The original use of frozen sections for anatomical illustration is ascribed to Dutch anatomist Pieter de Riemer (1760-1831), but Pirogov's atlas is striking because of its grandeur. It has 995 black and white pictures of saw cuts of the human body and four books of comments. It took eight years and the enormous sum of 35 000 silver rubles (more than £5500 in 1850s) to publish. By the turn of the 20th century the book became a rarity. "Ice Anatomy" was reprinted in 1997 and translated from Latin into Russian and English for a limited edition of 500 copies. One set includes four volumes of pictures and two volumes of comments in a special case weighing about 20 kg—surely one of the heaviest medical books ever.

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