Key concepts for making informed choices

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Key Concepts for Informed Choices

A consortium of researchers lays out a framework for critical thinking about claims, comparisons and choices.

Whether interventions are proposed by advertisers, agony aunts, or others, they are almost always accompanied by claims about their effects – both wished for and unwanted. Claims are made across a huge range of proposed interventions, from those to tackle global threats like climate change to treatments for a child's sore throat. Unfortunately, people often fail to think critically about the trustworthiness of the claims made, including those made by scientists. When they do try to think critically about claims, they may struggle to assess whether the supporting evidence is trustworthy. And as a consequence, they may not make well-informed choices.

Most people believe that critical thinking skills are important and that schools do not do enough to prepare young people to think critically [1]. As a contribution to addressing this deficit we have drawn on the expertise of two dozen researchers to adapt a framework developed for use in healthcare [2] (Box 1) to try to create a more general tool - *Key Concepts for Informed Choices* (Table 1) - designed to help people think critically about intervention claims. We hope this will provide a starting point for people working across fields to design and evaluate effective ways to teach the Key Concepts, communicate research findings, and support well-informed choices. To ensure that citizens, professionals, and policymakers use the best available evidence to make decisions, we call on scientists and professionals in all fields that promote interventions to use and adapt these Key Concepts. Ideally, the Key Concepts for Informed Choices should be embedded in education for citizens of all ages.

Trustworthy evidence

People are already flooded with information, so simply giving them more of it is unlikely to be helpful unless its value is understood. A recent survey in the UK showed that only about a third of the public trust evidence from medical research, while about two-thirds trust the experiences of friends and family [3].

Not all evidence is created equal. Yet people often don't appreciate which claims are more trustworthy than others; what sort of comparisons are needed to evaluate different proposed interventions fairly; or what other information needs to be considered to inform good choices.

For example, many people continue to fail to recognise that outcomes can be associated with an intervention without necessarily being caused by it. The media sometimes perpetuates this problem by using language suggesting that cause-and-effect has been established when it hasn't [4], using statements such as "coffee can kill you", or "drinking one glass of beer a day can make you live longer". Journalists aren't the only ones at fault here; such exaggerated causal claims often originate in similarly exaggerated claims made in university and journal press releases [5].

Studies that compare different interventions fairly are vital to amassing trustworthy evidence, yet people often don't know how to assess study validity. Syntheses (also called systematic reviews) of well-designed studies relevant to clearly-defined questions are more trustworthy than haphazard observations; they are less susceptible to biases (systematic distortions) and

the play of chance (random errors). Yet results from single studies are often reported in isolation, as facts. This results in confusing, flip-flopping headlines in newspapers such as "chocolate is good for you", followed a week later by a headline declaring that "chocolate is bad for you".

To make good choices, other types of information in addition to research evidence are needed— for example, about costs and feasibility. Judgements must also be made about the relevance of information from research (its applicability or transferability), and about the balance between the likely desirable and undesirable effects of interventions. For example, there is substantial variation in the design of carbon taxes, including the tax rate, the tax base, the use of the tax revenues, and exemptions. In addition to considering evidence from evaluations of the effects of carbon taxes and making judgements about the validity and applicability of that evidence, policymakers need to make judgements about administrative difficulties, the distribution of tax burdens across income groups, and acceptability in their jurisdictions.

Examples illustrating the key concepts for claims, comparisons and choices are shown in Box 2.

Critical thinking

Individuals and organisations across a wide variety of fields are working to enable people to make evidence-informed decisions. These efforts include synthesizing the best available evidence in systematic reviews; making it more accessible, for example, by preparing plain language summaries and removing paywalls; and teaching people to make evidence-informed choices. For example, international organisations such as the Cochrane Collaboration, the Campbell Collaboration, and the Collaboration for Environmental Evidence produce and promote the use of systematic reviews. Organisations such as the International Society for evidence-Based Health Care, the Center for Evidence-Based Management, the Africa Centre for Evidence, and the International Initiative for Impact Evaluation promote the generation and use of research evidence to inform decision-making internationally; and organisations such as the What Works Centres in the UK encourage and enable the use of research evidence within countries. But academics in this sphere tend to work in silos within their own fields, sometimes missing opportunities to learn from others. In this article we have drawn on the expertise of co-authors working in 14 different fields: agriculture, economics, education, environmental management, international development, healthcare, informal learning, management, nutrition, planetary health, policing, social welfare, speech and language therapy, and veterinary medicine.

We have identified many key concepts that apply across fields (Table 1), and some that were more relevant in some fields than others (Table 2). For example, it is often important to consider potential placebo effects when assessing claims about medical treatments and nutrition, but these are rarely important when assessing claims about the effects of interventions on the environment.

Our collaboration has already prompted the co-authors of this article to develop more specific frameworks for their respective fields and to suggest improvements to the original Informed Health Choices framework [2]. There is power in identifying an issue that resonates across different fields; it provides the potential to develop momentum by aligning efforts.

The Key Concepts for Informed Choices should not be seen as a simple checklist for critical thinking, but as a starting point for identifying and developing resources to help people to understand and apply important concepts. Although we have organised the Key Concepts in three groups (claims, comparisons and choices), the list can be used to develop learning resources that include any combination of the concepts, presented in any order. We hope it will prove useful to those helping others to think critically about what to believe and what to do, including those teaching critical thinking and those responsible for communicating research findings.

There has been a groundswell of calls for evidence-based or evidence-informed decisions within and across fields over the past few decades, as evidenced, for example, by over 80,000 references in Google Scholar with "evidence based" in the title, and over 75 million hits for a Google search for "evidence based". Evidence-informed practice is now explicitly taught to professionals in many different fields, and it is important that these efforts should continue. However, it is also important that the Key Concepts be taught to school children, rather than delaying acquisition of this knowledge until adulthood. Children who have been explicitly taught critical thinking make better judgements than children who have not been helped to acquire these skills [6]. Early education helps to set an important foundation for teaching time-pressed adults to think critically about interventions.

An important part of the work of encouraging critical thinking is learning and sharing strategies for promoting healthy scepticism while avoiding unintended consequences. Possible unwanted consequences include inducing nihilism; allowing for disingenuous claims that uncertainty is a defensible argument against acting on climate change; or encouraging false beliefs that competing interests renders all research untrustworthy.

Competing interests take different forms in different fields, but the challenges and remedies are similar across fields: recognition of competing interests, transparency, and independent evaluations. Achieving these depends on improved public understanding of the need for evaluation, and public demand for investment in independent evaluation, as well as unbiased communication evaluation findings.

Further development and specialization of the *Key Concepts for Informed Choices* is needed, and we welcome suggestions. To facilitate further development, we have created a website (www.thatsaclaim.org) where the Key Concepts can be adapted to different fields and target audiences, translated to other languages, and linked to learning resources.

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Box 1. The Informed Health Choices Project

The Key Concepts for Informed Choices are based in part on the work of the Informed Health Choices (IHC) Project. This was initially developed between 2012 and 2017 by a collaboration including co-authors of this comment (Andy Oxman, Astrid Dahlgren, Iain Chalmers, and Matt Oxman). That project's ongoing goal is to help people assess healthcare claims and make well-informed health choices. It has developed learning resources based on the IHC Key Concepts [2], and a database of multiple-choice questions to assess how well users can apply the concepts. In 2016, a randomized trial involving 120 schools and over 10,000 school children in Uganda showed an important effect on the ability of 10 to 12 year-old children to apply 12 of the Key Concepts [7], for example, recognising that personal experiences or the opinions of experts alone are an unreliable basis for claims about the effects of treatments; that evaluating the effects of treatments requires appropriate comparisons and that small studies can be misleading; and that treatment decisions require judgements about the balance between the expected benefits and harms. In the intervention schools, 3967 (69%) of 5753 children achieved a predetermined passing score (≥13 of 24 correct answers) compared with 1186 (27%) of 4430 children in the control schools (adjusted difference 50%, 95% CI 44–55).

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Box 2. Examples

Claims

Key Concept: *Beliefs alone about how interventions work are not reliable predictors of the presence or size of effects of intervention.*

Most people would intuitively say that it is hard to influence parents' engagement with their children's education. The common-sense assumption is therefore that more intensive (and more costly) interventions would be more likely to be effective. However, studies of intensive interventions have often failed to show effects on pupils' attainment, as measured with standard tests [8]. Meanwhile, a recent evaluation of the effects of simply texting parents weekly with updates about their child's schooling had positive effects on children's attendance, homework submission, and mathematics attainment [9]. These effects were small, but the cost was very low. These examples illustrate that - contrary to intuitive reasoning - inexpensive interventions can be helpful, and expensive ones can fail.

Comparisons

Key Concept: *Comparison groups (or conditions) should be as similar as possible.*

"Scared Straight" programmes take young offenders on prison visits on the assumption that this experience and listening to inmates' descriptions of life in prison will deter juvenile delinquency. Before-after comparisons found that the prison visits were followed by large reductions in delinquent behaviour. But a lot can change within a group of youngsters over time, including becoming older and more mature. Without comparable comparison groups it is hard to know whether these before-after comparisons were fair comparisons. Fairer comparisons of prison visits were done in which youths were randomly assigned either to visit prison or not to visit prison, thus creating groups of youths who were comparable in characteristics other than prison visits. Comparisons between these two groups showed greater subsequent delinquent behaviour in the youngsters who had been exposed to prisons [10, 11].

Choices

Key Concept: *When there are important uncertainties about the effects of interventions, those uncertainties should be reduced by (further) fair comparisons.*

"Pay for performance" refers to the transfer of money or material goods conditional on taking a measurable action or achieving a predetermined performance target. This is also sometimes referred to as results-based financing, performance-based funding and output-based aid. These policies are promoted as an important tool for improving the delivery of effective health care and the effectiveness of development aid, and motivating patients to comply with recommended health interventions. However, there is substantial uncertainty about the beneficial and adverse effects of paying for performance, particularly in low- and middle-income countries [12]. Decisions to implement these schemes should therefore include rigorous evaluation of both intended effects on performance and unintended effects, such as excluding high risk people from care in order to obtain better performance, inaccurate or false reporting, and ignoring important tasks that are not rewarded with incentives.

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Key Concepts for Informed Choices

Claims

Claims about the effects of interventions should be supported by evidence from fair comparisons. Claims that are not supported by such evidence are not necessarily wrong, but there is an insufficient basis for believing them.

Claims should not assume that interventions are completely safe, effective, or certain.

- Interventions can cause harms as well as benefits.
- Large, dramatic effects of interventions are rare.
- We can rarely, if ever, be completely certain about the effects of interventions.

Seemingly logical assumptions are not a sufficient basis for claims.

- Beliefs alone about how interventions work are not reliable predictors of the presence or size of intervention effects.
- An outcome may be associated with an intervention but not caused by it.
- More data is not necessarily better data.
- The results of a single study considered in isolation can be misleading.
- Widely used interventions or interventions that have been used for decades are not necessarily beneficial or safe.
- Interventions that are new or technologically impressive may not be better than available alternatives.
- Increasing the amount of an intervention does not necessarily increase its benefits and may cause harm.

Trust in a source alone is not a sufficient basis for believing a claim.

- Competing interests may result in misleading claims about the effects of interventions.
- Personal experiences or anecdotes (stories) alone are an unreliable basis for most claims.
- Opinions of experts, authorities, celebrities, or other respected individuals do not alone provide a reliable basis for claims.
- Peer review and publication by a journal do not guarantee that comparisons have been fair.

Comparisons

Studies assessing interventions should be fair comparisons, designed to minimize the risk of systematic errors (biases) and random errors (the play of chance).

Comparisons of interventions should be fair.

- Comparison groups (or conditions) should be as similar as possible.
- Indirect comparisons of interventions (comparing across different studies) can be misleading.
- The people, groups or conditions being compared should be treated similarly, apart from the interventions being studied.
- Outcomes should be assessed in the same way in the groups or conditions being compared.
- Outcomes should be assessed using methods that have been shown to be reliable.
- It is important to assess outcomes in all (or nearly all) the people or subjects in a study.
- When random allocation is used, people's or subjects' outcomes should be counted in the group to which they were allocated.

Reviews (syntheses) of studies should be reliable.

- Reviews of studies comparing interventions should use systematic methods.
- Failure to consider unpublished results of fair comparisons may result in biased estimates of effects.
- Comparisons of interventions may be sensitive to underlying assumptions.

Descriptions of the effects of interventions should clearly reflect the size of effects and the risk of being misled by the play of chance.

- Verbal descriptions alone of the size of effects can be misleading.
- Small studies may be misleading.
- Confidence intervals should be reported for estimates of effects.
- Deeming results to be "statistically significant" or "nonsignificant" can be misleading.
- Lack of evidence of a difference is not the same as evidence of "no difference".

Choices

Well-informed choices about what to do depend on judgements about the problem, the relevance (applicability or transferability) of the available evidence, and the balance of expected benefits, harms and costs.

What is the problem (or what are the goals) and what are the options?

It is important that

- the problem is diagnosed or described correctly; and
- the goals and options are acceptable and feasible.

Is the available evidence of the effects of the options relevant?

- Attention should focus on important, not surrogate, outcomes.

The results of studies may not be applicable or transferable if

- the people or subjects in studies are very different from those of interest;
- the interventions compared are very different from those of interest; or
- the circumstances in which the interventions were compared are very different from those of interest.

Do the expected benefits and savings outweigh the expected harms and costs?

- Decisions about interventions should not be based on considering only their benefits.

Additional considerations include

- potential harms;
- what opportunities we give up by using resources to provide an intervention;
- baseline risks;
- how the benefits, harms, and costs are valued;
- the distribution of the benefits, harms and costs (when more than one person or subject is affected); and
- certainty about an intervention's benefits, harms, and costs.

- When there are important uncertainties about the effects of interventions, those uncertainties should be reduced by (further) fair comparisons.