Title: 'Black magic' and 'gold dust': The epistemic and political uses of 'evidence tools' in public health policy-making.

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Abstract: Concerns about the limited influence of research on decision-making have prompted the development of tools intended to mediate evidence for policy audiences. This article focuses on three examples, prominent in public health: impact assessments; systematic reviews; and economic decision-making tools (cost-benefit analysis and scenario modelling). Each has been promoted as a means of synthesising evidence for policymakers but little is known about policy actors' experiences of them. Employing a literature review and 69 interviews, we offer a critical analysis of their role in policy debates, arguing that their utility lies primarily in their symbolic value as markers of 'good' decision-making.

1. Introduction:

Over the past twenty years, there have been repeated commitments by policymakers working in a variety of high-income settings to increase the use of evidence in decision-making, most notably Australia, Canada, New Zealand and the UK (Smith, 2013). Under 'New Labour' governments (1997-2010), the UK's commitment to 'evidence-based policy' (EBP) was particularly overt, with policy statements often suggesting that research could both drive policy change or respond directly to the policy concerns of the day (e.g. Blunkett, 2000; Cabinet Office, 1999). More recently, 'science advocates', such as Ben Goldacre and Mark Henderson, have continued to promote the idea that scientific research can provide clear and utilisable guidance to complex policy problems (Haynes et al., 2012; Henderson, 2013). The commitment to using evidence in decision-making has been particularly strong in public health, where it is linked to the idea of 'evidence-based medicine' (Smith, 2013).

This EBP movement has yielded a range of strategies to translate academic research into utilisable policy recommendations, including methodological guidelines for collating, synthesising and

communicating particular types of evidence. Some of these have been formally institutionalised into policymaking processes, becoming part of "governance architecture". 'Evidence-tools' are often promoted as a potential 'solution' to the difficulties in trying to achieve evidence-informed decision-making in policy settings (Gough et al., 2013; Moat et al., 2013; Welch et al., 2012). Yet, paradoxically, there is little, if any, evidence to indicate that the use of such tools actually does improve the use of evidence in policy (or, more importantly, lead to better outcomes). In fact, we know very little about how, in the complex and contested world of policymaking, policy actors perceive and experience 'evidence tools' such as systematic reviews, impact assessments or economic decision-support tools (Katikireddi et al., 2013; Smith, 2013). Moreover, there is growing awareness of the limitations of such tools in policy contexts (Driesen, 2006; Krieger et al., 2003; Petticrew, 2007, 2003; Siegerson, 2013; Tenney et al., 2006).

This article seeks to address this gap by examining the perspectives of a broad range of policy actors on three distinct 'evidence tools' that have been promoted and employed within public health policymaking: systematic reviews; impact assessments; and economic decision-support tools (specifically, cost-benefit analysis and scenario modelling). We argue that public health is a particularly appropriate policy area in which to explore policy actors' views and experiences of these tools, given both the strong support for EBP within public health and the active promotion of 'evidence tools' as a means of achieving EBP (see Smith, 2013). In **Box 1**, we provide a brief explanation and definition of each of these tools.

Systematic reviews, at least in their traditional form, are the archetypal example of a positivist, instrumental approach to evidence although, as **Box 1** notes, there have recently been some attempts to develop more methodologically inclusive approaches to systematic reviewing. Impact assessments, on the other hand, are a spectrum, or family, of approaches to gathering and synthesising evidence to inform decision-making. As **Box 1** explains, some forms of impact assessment share the positivist, instrumental foundations of traditional systematic reviews, whilst others are more eclectic and participatory in nature. Other tools intended to improve the use of evidence in policymaking include various forms of economic assessment, the most well-known of which is perhaps 'cost-benefit analysis'. More recently, however, there has been a growing interest

in rather more sophisticated economic tools within public health policy debates, notably scenario modelling, which has played a prominent role in debates about minimum unit pricing for alcohol (Katikireddi et al., 2013).

This paper focuses first on making the case for collectively considering the distinct approaches to synthesising evidence defined **Box 1**. We then briefly explain the methods, before presenting our findings, where we focus, first, on policy actors' perceptions of the impact and value of different kinds of 'evidence tools' and then on the key features of different 'evidence tools' that appear to have informed policy actors' perceptions of them. In the conclusion, we argue that the utility of research-informed advocacy tools lies primarily in their symbolic value as a marker of 'good' ('evidence-informed' and 'transparent') decision-making, rather than as a means of employing evidence in the more instrumental terms that many supportive public health researchers perhaps intended.

<Please insert Box 1 here>

2. Conceptualising impact assessments, systematic reviews, economic decision-making tools as 'evidence tools'

The definitions of systematic reviews, impact assessments, cost-benefit analysis and modelling are not unanimously agreed upon (as discussed further below) but parallel "epistemic cultures" (Knorr Cetina, 2009; see also Wallenburg, this issue) exist around each. This is evident in their "knowledge machineries" of tool-specific email groups, conferences and journals (Knorr Cetina, 2009), with each requiring/acquiring its own particular skill sets. Indeed, some of our interviewees referred to distinct "industries" growing up around each of these tools. It is, therefore, important to acknowledge differences between the 'evidence tools' described in this paper. Hence, this paper highlights where particular points seemed only to apply to specific tools. We also consider what our data suggest about policy actors' preferences for particular tools over others. Nonetheless, despite their differences, there are striking similarities in the goals and epistemic functions of each of the tools listed in **Box 1** and we argue that understanding these tools as a family of technologies ('evidence-tools') intended to synthesise evidence in ways which support evidence-informed policymaking is analytically valuable.

All are examples of initiatives that have been promoted with the intention of making policy decisions more evidence-based. They do this by assembling and presenting various pre-existing data (although some forms of Health Impact Assessment also include additional data collection, such as gathering stakeholder/community views). Crucially, they all include some assessment of the 'quality' of pre-existing data, and therefore operate in part as 'quality assurance'; not merely assembling and synthesising data for policy purposes but also approving or accrediting it in some way. Moreover, all have been positioned as offering a means of enabling policy actors to predict the likely outcomes of a decision-making process (although systematic reviews are perhaps less likely to explicitly attempt to predict future outcomes). In an example of standardisation (Lampland and Star, 2009), specific manifestations of some of these tools have also been accredited or promoted via guidelines produced by influential organisations such as the Cochrane Collaboration, the World Health Organisation, and national organisations such as the NHS (NHS Health Development Agency, 2003; The Cochrane Collaboration, 2013; World Health Organisation, 1999). Finally, all tend to be led by researchers (whether academic, public sector, or private sector consultants) and are therefore often perceived as a form of 'expert' knowledge (even though some tools, notably Health Impact Assessments, may also incorporate participatory aspects).

While we have not identified other literature which analyses these tools together, there are clear parallels with other conceptual approaches to the science-policy interface, such as the study of policy instruments and regulatory instruments (Busch et al., 2005; Lascoumes and Le Gales, 2007; Radaelli, 2009). Some of the functions of 'evidence tools' that we identify are reminiscent of what researchers in science and technology studies have described as 'boundary objects'. For example, all of the 'evidence tools' possess "interpretive flexibility" (Star and Griesemer, 1989; Star, 2010) to enable them to meet the diverse needs and standards of different communities who interact with them (notably, academic and policy actors). Indeed, Bekker (2007) has already employed the concept of 'boundary objects' to describe Health Impact Assessments. In this paper, however, we focus less on how such theoretical concepts might help us understand these tools and more on extensive empirical data exploring policy actors' views and experiences of these tools. In doing so, we explore the tensions involved in the hybrid (research-policy) role expected of these tools and the ensuing compromises that result in practice, an analytical approach that is informed by sociological studies of science (e.g. Knorr Cetina, 2009; Latour, 2005; Star and Griesemer, 1989).

Such an approach acknowledges that policymaking and research are extremely complex, intertwined processes, involving diverse actors, each of whom is embedded within particular networks (disciplinary, ideological, institutional, etc). In contrast to traditional, rational studies of knowledge 'diffusion', this approach focuses attention beyond processes and mechanisms of 'transfer' between 'research' and 'policy' to instead explore how and why particular ideas/tools are constructed, promoted and translated by different actors (Latour, 2005; Smith, 2013). So, rather than positioning 'evidence tools' as metaphorical batons in a relay race, helping to transfer evidence from researchers to policymakers, our starting point is to ask how actors working in policy settings perceive and experience what we are calling 'evidence tools'.

3. Methods:

This paper is based on: (i) a review of available evidence concerning policymakers' experiences of using the 'evidence tools' listed in **Box 1** in public health policy contexts; and (ii) 69 qualitative interviews with policy actors involved in public health debates. The literature review sought to answer the question: What is already known about how policymakers perceive and experience tools and systems designed to increase their use of public health evidence? Four electronic databases (Proquest (Social Sciences); Web of Knowledge; PubMed; Medline) were searched between 10th and 17th May 2013. After testing various filters, the following terms were selected and used in each database: *"health policy" AND (policymaker* OR decisionmaker* OR "civil servant*") AND ("research synthes*" OR "impact assessment" OR "systematic review" OR "cost-benefit analysis" OR model*)*. We also contacted experts in each of the types of tool to ask for further suggestions of literature, conducted internet searches to identify relevant grey literature and attended training courses on each of the tools (which provided a further opportunity to identify potentially relevant literature). We only included studies based on empirical research (i.e. not papers presenting only the author's opinions or experiences) which included data relating to policy actors' perceptions, or experiences, of using one or more of the 'evidence tools' listed in **Box 1**. Beyond this, we did not apply any criteria based on study design. We also chose not to apply geographical/political inclusion criteria. However, the resources available to us meant we were only able to search for studies published in English (hence, we are most likely to have identified literature produced in the English-speaking parts of the world). The total number of publications identified through this search process is presented in **Table 1**.

<Please insert Table 1 here>

In addition, 69 individuals involved in public health research, policy and advocacy in the UK were interviewed between 2011 and 2013. Table 2 provides an overview of the professional affiliation of these individuals. Whilst many of these individuals would not traditionally be labelled as 'policymakers', they were selected on the basis that they had experience of working in policy settings and engaging in policy debates. Multiple interviewees, but particularly academic researchers, had worked in more than one sector, and brought first-hand knowledge of research and policy contexts to the interview. We also included staff working at public health campaigning organisations (e.g. large health charities and representatives of health professionals). Although these individuals are not formal policy actors, they are active in policy debates and can play an important 'mediating' role between research and policy (see Katikireddi et al., 2014; and Smith, 2013). We note, at this point, that whilst we have tried to be clear about the kinds of actors we included in our primary research (whilst maintaining the anonymity of interviewees), one problematic aspect of much of the published literature on 'evidence tools' that we identified employed less sector-specific terms to describe interviewees (such as 'Health Impact Assessment practitioner'), making it difficult (and sometimes impossible) to ascertain the professional location of interviewees. We excluded studies where it was unclear that participants occupied policy roles.

All of the interviews were conducted by the same researcher [KS] and were semi-structured, employing a themed interview schedule which included a range of questions concerning public health research, policy, advocacy and knowledge exchange and some more specific questions relating to the evidence tools discussed in this paper. The majority took place in a private room where, for the duration of the interview, only the interviewee and the researcher were present (one interview was a joint interview involving two interviewees and three others were conducted by telephone, at the request of interviewees). The interviews varied in length, lasting between 45-150 minutes (most were around 50-70 minutes). All interviewees were asked to sign written consent forms enabling the interviews to be digitally recorded and employed as data in

publications. Recorded discussions were transcribed by a professional company, before being anonymised. All transcripts were then coded in NVivo 10 using a thematic coding framework which was developed iteratively, via analysis and re-analysis of the transcripts. This process helped identify perceptions and accounts of 'evidence-tools' that are currently being used in some public health policymaking debates in the UK. The research was conducted in line with University of Edinburgh School of Social and Political Science's research ethics guidelines.

<Please insert Table 2 here>

4. Findings

4.1 Perceptions about the value and impact of 'evidence tools' in policy settings

Much of the existing literature that we identified focuses on advising readers how the influence/impact of particular kinds of 'evidence tools' might be increased within public health policy contexts (see **Table 3** for a summary of such suggestions). These recommendations are underpinned by an assumption (often unexamined) that the use of such tools in decision-making contexts will necessarily improve policy outcomes (from a public health perspective).

<Please insert Table 3 here>

Our interviewees often supported these kinds of recommendations and there was particularly widespread support for the notion that researchers ought to invest more effort into developing succinct, policy-appropriate summaries of the outputs from 'evidence tools'. For example:

> Knowledge broker: "There were about three civil servants that were all sitting there and they were all talking about systematic reviews and about abstracts and I can't remember the name of this one systematic review which was apparently the best systematic review ever because the summary of it was just absolutely spot on and all the information that they really needed."

The emphasis placed on means of increasing the use of evidence tools within policy settings in both the existing literature and our interview data reflects the fact that the perceived impact many of these tools had, to date, often been less than desired by those involved. This was particularly true, in both the existing literature and our interview data, for Health Impact Assessments. For example:

> NHS researcher: "Within government I think [Health Impact Assessment] has no traction… or very limited traction. It's the level of people will say, 'oh yes, we know,' and 'yes, we will do some more,' but because [other kinds of impact assessment are mandatory in] government, I think that still trumps all."

The literature on Health Impact Assessment tends to be reflexive and is often concerned to question the tool's impact (Kemm, 2013; Kemm et al., 2004; O'Mullane, 2013). One specific feature of impact assessments, as opposed to the other tools, is that the onus is often on government to initiate, or even institutionalise impact assessments (Signal et al., 2006; Wright et al., 2005). Hence (and in contrast to systematic reviews, for example), responsibility for the utility of Health Impact Assessments was perceived by most actors to be shared between researchers and civil servants, both of whom tended to be enthusiastic about the potential for Health Impact Assessments to make a difference, whilst acknowledging that there were few examples of policy traction having been achieved to date (at least in national policymaking settings).

Reflecting this assessment, actors involved in policy campaigning work were often fairly cynical about the potential for impact assessments to feed into decision-making processes, with nearly all of the interviewees in this category suggesting that, where impact assessments were produced by policymakers, this happened *after* a policy decision had been reached:

> NGO: "I think it [the impact assessment process] is very much justification. I think once a decision has been made, the impact assessment is done […] I think their purpose definitely is just to justify a policy. And what you'll see is when you get the consultation or the proposal put forward, you'll get the impact assessment published at the same time. And they've just done that so that they have the figures, or some more of the evidence to stick into their proposal, so it's not just [perceived as] ideological or a minister's whim or whatever. They've got something a bit more robust."

It was largely for this reason that interviewees based in campaigning organisations said they did not generally analyse or respond to the government's impact assessments (or produce their own alternatives). In other words, contesting the information within impact assessments, or the recommendations made in an official impact assessment, did not generally (at least at the UK / English national level) appear to be perceived as a valuable use of resources in efforts to influence policy decisions (there was some evidence to suggest impact assessments may play a more significant role in policy debates in Wales).

Where policy actors did describe Health Impact Assessments as of value, this did not tend to be because it was claimed the process had introduced new research evidence or changed outcomes of decision-making; rather, policy actors often attached value to the *process* of being involved in an Health Impact Assessment (Finer et al., 2005, p. 281; see also Mathias and Harris-Roxas, 2009; Signal et al., 2006). This kind of more process-orientated contribution is reflected in the following interviewee's account:

> Senior academic, Health Impact Assessment practitioner and policy advisor: "I've got a vested interest in saying, 'of course it's fantastic and it does work' but the advantage of Health Impact Assessment is that it can ensure that you bring different people round the table so they're forced to think in a different way..."

It may be that taking part in a consultative, reflective process, as part of a Health Impact Assessment, allows policymakers to find rare space for contemplation and/or enables them to engage more directly with other actors than they otherwise might. As policymakers involved in a Health Impact Assessment in New Zealand said, the process did not introduce new evidence, but simply allowed space for 'under-considered' evidence to be given greater attention (Harris-Roxas et al., 2011).

Of the various 'evidence tools' in Box 1, *researchers* have been particularly supportive of the notion that systematic reviews can help channel research evidence into decision-making processes (see Lavis et al, 2005). Yet, on the whole, policy actors were dismissive about the potential for systematic reviews to support the flow of evidence into policymaking. Only one interviewee, a policy campaigner, directly claimed that systematic reviews functioned to bring new ideas onto the policy agenda:

NGO: "Systemic reviews, alongside any new evidence, really can be a driving force for something new."

Six other interviewees claimed that, despite having a limited impact to date, the rise of systematic review methodologies was an important development in the context of efforts to improve the use of public health evidence in policy. Likewise, one Canadian study which surveyed Ontarian policymakers on several occasions during a 5 year period, concluded that organisational culture had become more supportive of systematic reviews (Dobbins et al., 2004). This suggests that some policy actors are open to the idea that systematic reviews have the *potential* to play a greater role in public health policymaking. However, 13 interviewees, including the following two, said they perceived systematic reviews to be an essentially academic endeavour, better suited to identifying gaps in existing research than to providing tangible answers to policy questions:

Former civil servant (England): "I think you always come to systematic reviews thinking its core message is going to be, 'more research is needed…' [Perhaps] that's a bit hackneyed but…"

Knowledge broker: "People were talking about systematic reviews and how fabulous they are, but actually a lot of the time […] there's just not enough evidence to say one way or the other [which] can be extremely frustrating."

In this context, eight interviewees suggested that the value of systematic reviews for policymaking purposes might have been 'oversold' by academic researchers. This included the following academic interviewee (who had experience of working as a policy advisor on public health issues and who had also personally undertaken systematic reviews):

Senior academic: "I suppose part of the problem is that […] users don't know what it is they're asking for, so if it's just a topic area then I guess the risk is that you just think, 'oh, we want a systematic review' but it might not be appropriate, it might not be necessary, there might be nothing to review. I think some of that's researchers' fault as well, that you go round saying, well, 'systematic reviews for everything,' but not everything needs a systematic review."

Where interviewees did claim that systematic reviews had been useful in policy debates, this tended to be in the context of reviews that had been commissioned to support policy positions that had already been decided-upon (rather than to inform those positions). For example:

> NGO: "In the [blank] campaign, we commissioned… a report [systematic review] on the impact [a particular policy change] might have on [public health outcome] because it was clearly an argument that was being used against that measure by the [relevant] industry. So within the policy debate we really needed to marshal the evidence to rebut their argument. So… you're trying to commission reports that will help you have the debate by producing strong evidence when they [those opposed to the measure] are making different claims against you."

Similarly, several policy actors suggested the decision of the UK government to commission a systematic review of evidence relating to the potential impacts of introducing standardised packaging of cigarettes stemmed from a desire to provide support for a policy position that was, at that time, already favoured (rather than to inform a decision-making process as to what kinds of policy options might be most effective).

Overall, whilst many of the policy actors (in both the literature and our primary data) felt that impact assessments and systematic reviews offered *potential* means of improving the use of research in policy, there was little evidence to suggest that either tool has so far had the kind of *instrumental* influence on decision-making that some public health researchers appear to have anticipated (i.e. where these tools inform policy positions and choices).

In contrast, both the (limited) literature we could identify concerning economic tools for decision-making and our interview data suggest that scenario modelling is widely perceived by policy actors to be highly influential, even fashionable, in a UK context:

> Academic with policy experience: "So like this minimum pricing thing, I don't think the Scottish government or the UK government would be talking about minimum pricing without [modelling], because they can say, 'we want to do this because it will save this many thousand lives', and that is *gold dust* for policymakers - that's the number they all want. So for that reason they're incredibly, incredibly important."

Senior civil servant (England): "So there's a Sheffield study on pricing of alcohol for example [i.e. the modelling]. Now that is a clear example of people are arguing the toss, probably many of them in complete ignorance of what it actually says but it's got a real profile. So that kind of thing has a real impact."

Almost all of the examples of policy actors reflecting on the impact of economic modelling (including the above two quotations) relate to recent debates around introducing a minimum price per unit of alcohol in England and/or Scotland and all suggest that economic modelling played an important role in these debates (Katikireddi et al., 2013; 2014). Despite the enthusiasm of interviewees, however, it remains hard to discern whether this influence has been instrumental (shaping the policy idea itself) or whether it has simply been used by those already supportive of the idea in their efforts to attract wider support for this policy proposal. Whatever the case, it is clear that policy actors found the kinds of projections provided through economic scenario modelling highly appealing. This is despite the fact that, as the second of the above quotations implies, policy actors were often conscious that they did not fully understand the processes and assumptions involved in modelling. The attraction, as the first interviewee quoted above notes, was explained by the ability of this kind of tool to provide "the number they all want". This suggests that the credibility of this 'evidence tool' in research/scientific terms may be relatively less important for achieving policy influence in policy debates than its ability to provide concrete answers to policy questions (see also Stevens, 2011). In the following section, we explore in more detail which features of evidence-tools appeared to inform policy actors' perceptions and experiences of them.

Key features of evidence tools

In both the literature we reviewed and our interview data, several key features of the evidence tools were repeatedly mentioned as helping to explain the varying impacts of different kinds of 'evidence tool'. In this section, we describe each of these, concentrating on the extent to which the features appear to enable/achieve scientific credibility and/or political utility. The value of these different features will undoubtedly vary in different policymaking contexts: for example where action is deemed urgent, the time-saving credentials of a tool (see section 'a') are likely to hold particular appeal.

a. Time-saving opportunities

One of the key advantages of 'evidence tools' referred to in the public health literature (particularly where systematic reviews are being promoted for policy purposes) is the potential for saving time and other resources. Policy actors working in time-pressured environments (and not always with sophisticated research skills) may be unable to systematically locate and critically assess large numbers of relevant studies. The assurance that appeared to be provided by the 'evidence tools' this paper focuses on were attractive in so far as they enabled policy actors to take shortcuts to understanding and appraising the available research. This was most apparent when interviewees were discussing systematic reviews, where interviewees referred to their ability to provide 'the status of evidence' without requiring time-consuming 'trawling'. In contrast, impact assessments (more often conducted within policy settings) tended to be perceived as unhelpfully time-consuming (a point that the emergence of rapid forms of Health Impact Assessment is intended to address - see Harris-Roxas et al., 2011; Ward, 2006). Nonetheless, as the following civil servant reflected, once produced, impact assessments could also provide time-saving opportunities:

> Senior civil servant (Scotland): "The current one [we're] dealing with […], my lord, people sweated blood to produce it, and it's a great big, thick thing. But we're actually using it for multifarious purposes - a lot of questions that come in [and] a lot of them we can either just send them the impact assessment or point them towards it [...]. So they are good things."

Both the literature and interview data suggest that all of the 'evidence tools' considered in this paper can serve to collate and appraise existing evidence in ways which, once produced, save policy actors time. However, the time-saving potential of these tools was generally dependent on the provision of (human or financial) resources to support their production, which was perhaps why none of our interviewees suggested time-saving opportunities alone informed their use of 'evidence tools'.

b. 'Interpretive flexibility'

The accreditation and/or promotion of impact assessments and systematic reviews within health contexts by influential organisations such as the Cochrane Collaboration and the World Health Organisation suggests that there is a consensus (if not uniformity) around the particular process

and benefits offered by these tools. The implication is that these are standardised, even mechanistic, devices which will generate unequivocal, 'objective' findings to inform policy. Yet, it is clear from the literature we identified (Boaz et al., 2006; Drummond et al., 1993; Drummond and Jefferson, 1996; Harris-Roxas and Harris, 2011; Hoffmann, 2000; Kemm et al., 2004) that there are, in reality, multiple ways to approach each evidence tool. From the perspective of political utility, the potential to 'flex' to suit particular decisions and contexts, "interpretive flexibility" or "plasticity" in Star and Griesemer's (1989) terms, appears to be an advantage. After all, (as we discuss further below) the purpose of policy actors' search for evidence might vary. However, this flexibility also challenges the idea that 'evidence tools' provide coherent, objective (or replicable) summaries of the available evidence, as the following academic interviewee reflected:

> Senior academic (with policy experience): "The mistake is thinking that anybody who does a systematic review will come up with the results of somebody else that does a systematic review. [...] The idea of a neutral systematic review's silly... I don't think they necessarily hurt, but it hurts when you present these things as if they're somehow neutral."

The above interviewee's comments reflect broader critiques of the notion that research can ever be neutral or objective, being always (to some extent) a process of interpretation (Hacking, 1999). Yet, as we discuss in the following sub-section, in order for it to be meaningful to have conducted, or employed, 'an' impact assessment, economic evaluation or systematic review in policy contexts, our data also suggest that it is necessary for the labels to continue to convey some degree of technical consistency. Indeed, were this not the case, all of the processes could simply be described as 'evidence-gathering' or 'synthesising'. Hence, although civil servants and politicians both stressed the need for research to adapt to policy 'needs', the sense of coherence implied by the various labels of the particular evidence tools in **Box 1** also seemed important to their political utility.

c. Conveying credibility to external audiences

Our data suggest that this is partly because the perceived external coherence of 'evidence tools' enables such tools to provide some sense of 'quality assurance', reassuring policy actors as to the quality of the research evidence they are employing and serving to demonstrate this to broader, public audiences:

Academic (with policy experience): "So reviews, particularly systematic reviews, I don't think policymakers often understand the difference between them but what they want is a review that they can trust, and trust […] is a big issue in research."

Senior academic (with policy experience): "I think that they do make a difference because if policymakers see that the review is systematic and they understand what that means they're more likely to trust it than just some literature review or a single paper. Hence why they commissioned the systematic review of plain packaging [for cigarettes], because they want the public to think that that's a comprehensive assessment of the evidence."

Reinforcing the above quotations, many of our interviewees suggested some sense that the outputs from 'evidence tools' could be *trusted* was extremely important. Whilst the literature and interviews both contain some examples in which policy actors were depicted as being engaged in high level methodological debates regarding particular outputs from 'evidence tools' (see, for example, Katikireddi et al., 2013), there are rather more references to 'evidence tools' representing accepted indicators of quality which operate as means of reassurance for policy actors who may not have the time, or the training, to engage in detailed methodological discussions. Nonetheless, it is also clear from our interview data that the labels of the various 'evidence tools' outlined in **Box 1** are not, in themselves, usually a sufficient basis for trust. Rather, interviewees highlighted *authorship* as a crucial aspect of policy actors' faith (or not) in the outputs from particular 'evidence tools'.

Civil servants, politicians and actors working in campaigning organisations all emphasised the importance of feeling able to trust particular researchers and, therefore, to trust the outputs they produced. In most cases, interviewees suggested that they themselves, or others in their organisation, had applied a number of criteria to assess whether or not they deemed a researcher (and, by implications, the outputs they produced) credible and trustworthy. However, the institutional location of researchers also seemed to be important and it was clear that public health research outputs originating from researchers in academia or the public sector tended to be deemed more trustworthy than research outputs from commercial sources. One MSP, for example, dismissed a synthesis of evidence which challenged some of the economic modelling of minimum unit pricing on the basis that "it was paid for by the industry," arguing that this constituted "a kind of inappropriate relationship." Yet, although researchers' *affiliation* with academic institutions

seemed to enhance the credibility of 'evidence tools', our data also suggest that the factors informing the political credibility of 'evidence tools' was distinct from, and occasionally at odds with, academic interviewees' assessment of a tool's scientific/academic credibility. This was most apparent with *economic* approaches to synthesising evidence, with several academic interviewees questioning the legitimacy of such approaches in public health contexts:

> Academic with policy experience: "Cost benefit analyses conceal too much. […] As soon as you add up everything into a single number you are concealing far more than you are actually illuminating. And it's when you just get numbers that are completely meaningless, you know, I've been involved with them. I think at one stage I estimated the social cost of [blank – health issue] I believe is however many hundred billion dollars, but what does that number mean? And I don't think ever bundling these things up - there's so many value judgements involved and it just becomes black magic."

> Senior academic: "So much of that stuff [economic analysis of potential policy changes] is just based on plucking numbers out of the air, and I do think we should worry about [that]. I totally understand the desire to put a monetary value on something, or to quantify, if we build this motorway how many more lives will be saved or lost? But usually we don't have the quality of data, let alone understanding of the relationships, just the quality of data to support it."

The single paper we identified on policymakers' perceptions of cost-benefit analysis (in road safety policy in European countries not including the UK) suggests concerns about the ethical and emotional issues involved in attaching monetary value to health-related outcomes (including lives saved/lost) can also be identified in other policy contexts (Bax et al., 2009). In our data, however, most interviewees suggested that economic approaches to decision-making were attractive to policymakers, even where such calculations were deemed 'spurious' in research-focused settings, as the following section explores.

d. *Providing clear, quantifiable answers to policy questions*

As the following quotation illustrates, several interviewees indicated that they felt economic approaches to decision-making were valued by policy actors because of the clarity and specificity of

the answers they appear to provide to policy questions, even where the process of calculating a specific figure seemed questionable to researchers:

> NHS researcher: "We aren't always able to quantify, sometimes because it's unhelpful or impossible, but that's not great, and we don't always monetise things, and again the dominance of that approach, cost-benefit or other forms of financial calculation, however spurious they often are, has, I think, great power in some sort of policy and decision making."

This was true for references to the modelling of minimum unit pricing for alcohol undertaken by Sheffield University researchers:

> Academic (with policy experience): "The sort of policy modelling that Sheffield have done, you know, if we introduce a minimum price of 40p, what will be the impact on different groups in a whole range of different domains? That's fantastic and has been massively, massively influential."

In the case of modelling, the (limited) available literature and our interview data both suggest that policymakers are attracted by the ability of this kind of 'evidence tool' to provide very specific answers to policy questions (Katikireddi et al., 2013), whilst enabling them to 'try out' different scenarios (Taylor-Robinson et al., 2008). However, one study concluded that the clarity offered by modelling can be "a double-edged sword", noting that models which try to mirror the complexities of real life are often "clouded by methodological considerations" whilst "simple, understandable models are criticised for being over-simplistic and unreal" (Taylor-Robinson et al., 2008, p. 214). This was to some extent evident in our interview data; many of the interviewees who spoke positively about economic modelling were extremely critical of the rather simpler approach of undertaking cost-benefit analysis precisely because they perceived it to be 'over-simplistic' and unrealistic. However, rather than being put off by the complexity of economic modelling, part of its allure for some interviewees seemed to emanate from the 'mystique' of its more complex methodological approach.

The perception that economic evaluation and modelling provide clear, policy-relevant questions was not (at least in our data) mirrored by interviewees' perceptions of the other kinds of 'evidence

tool' we considered. Indeed, although researchers have promoted impact assessments and systematic reviews as tools suitable for policymaking purposes (Kemm, 2013; Lavis et al., 2005), many of our interviewees were sceptical about this. The following interviewee, for example, highlighted the 'unhelpful' consequences of the 'lens widening' approach of impact assessments:

> Civil servant (Scotland): "You might find out that your transport intervention has some kind of positive health impact, but the impact assessment won't tell you whether it's an efficient way of generating that kind of health impact…. And ultimately that's the kind of problem that decision-makers are faced with; should we spend this billion on this intervention or that intervention? […] It might help policymakers cover their backs and so forth but I don't think it's a particularly useful decision-making tool."

Systematic reviews were, likewise, criticised on the basis of a perception that they were usually unable to offer a clear 'steer' on the best way forward. On this basis, our research suggests that, of the various 'evidence tools' this paper considers, scenario modelling appears to be perceived by policy actors as the most 'useful' in policy and political terms. Indeed, one interviewee (a public health researcher working within the NHS) suggested that scenario modelling was "so powerful" that, as more policy actors 'bought' the idea, the outputs of modelling were becoming extremely difficult to challenge.

6. Discussion

In focusing on practical, technical advice about increasing/improving the use of 'evidence tools' in policy settings, the existing literature largely seems to ignore policy actors' real-life experiences, and perceptions, of such tools. This is important because our findings challenge the idea that 'evidence tools' are capable of providing the technical, supply-side solution to the under-use (or selective use) of evidence in policymaking that some public health researchers appear to have hoped. Indeed, the search for a technical solution to the 'Sisyphean task' of improving the impact of public health research on policy (Bambra et al., 2011) looks increasingly questionable if one accepts the essentially political nature of policymaking.

What becomes clear in the findings presented above is the extent to which features that are clear advantages in terms of political utility may be the very same features that lead actors to question the scientific/academic credibility of 'evidence tools'. In **Table 4**, we illustrate a number of features which can be perceived as either strengths or weaknesses of the tools, depending whether one is thinking about the tool from a scientific or policy perspective (the presentation as a set of two opposing columns is simply a heuristic device; as the arrow in the first row suggests, it may be more useful to consider these strengths and weaknesses as being positioned along a spectrum, with politically utility at one end and scientific credibility at the other). Notably, in the case of economic evaluation and modelling, no 'scientific' advantages were identified in the reviewed literature or in interviews[1]; this might be due to the fledgling state of this literature in the field of public health, or because this is a family of tools tailor-made for the world of policy.

<Please insert Table 4 here>

The 'black magic' (or at the very least the 'black box') of scenario modelling is an excellent illustration of the way in which a feature of the tool that troubles actors operating in research-focused environments can simultaneously offer political advantages in policy settings. From a policy perspective, the status of 'expert' authorship is certainly not threatened, and may even be enhanced, by a lack of transparency in method. In the case of minimum unit pricing for alcohol, one academic interviewee with policy experience remarked that "it is possible for people to really be very critical about it if they want to. The alcohol industry have been a bit rubbish at doing this, because I don't think they have anybody good enough to understand what's going on." Even when, as others have found (Katikireddi et al., 2014), an alternative model was constructed with industry support, this evidence was often viewed with suspicion due to a perception that its (commercial) authorship undermined its credibility.

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[1] This is not to say that the identified literature is unenthusiastic about the tool, simply that there are fewer examples (as well as less literature overall) where a researcher is essentially evaluating the impact of their own research, compared to the literature on Systematic Reviews and Health Impact Assessments.

Required to operate at the intersection of two distinct "modes of ordering" (Law and Mol, 2002), in which different standards of evidence apply, 'evidence tools' can rarely fully satisfy both scientific and policy demands. Indeed in some cases, as Fernler (this issue) demonstrates, these two sets of requirements can prove insurmountably different. Moreover, many of our interviewees pointed out that policy-making is (despite the best efforts of the EBP movement) a political, more than technical, business. This means that the way in which evidence and 'evidence tools' are framed in policy debates is itself often a political decision (rather than, necessarily, a reflection of the quality or credibility of the evidence/'evidence tool').

In some ways, the manner in which interviewees described 'evidence tools' being employed in policy debates reflects previous research which identifies a high degree of 'symbolic' use of evidence in policymaking (see Weiss, 1979), a role which is often viewed in derisive terms (although see Boswell, 2009). In other words, most of the individuals who had engaged in public health policy debates (in both the literature we identified and our interview data), suggested that 'evidence tools' tended to be employed by policy actors in ways which indicate that they might be better understood as 'research-informed advocacy tools'. In performing such a role, 'evidence tools' were reported as useful in persuading other policy actors, journalists or members of the public of the benefits of pursuing a particular policy proposal; in other words, as Boswell (2009) points out, the symbolic use of evidence constitutes an important function in policy contexts. In this sense, whilst not reflecting the 'instrumental' influence that many public health researchers seem to have hoped for, these tools are nonetheless active, evidence-informed agents in policy debates, helping one set of actors to promote their preferred approach with reference to syntheses of evidence.

Our data suggest that the three kinds of 'evidence tools' we considered vary in their persuasive capabilities in policy debates and, therefore, in their perceived political utility. Some of the factors we identified as informing the political credibility of 'evidence tools', such as authorship, apply equally across the different tools. Indeed, the extent to which tools associated with *academic* authorship appeared to be preferred by policy actors over tools from more commercial sources, underlines the fact that academic credibility and political credibility are, at least partially, related. Beyond this, however, the data suggest that some 'evidence tools' are deemed more politically 'useful' than others; scenario modelling, for example, emerged as a tool with particularly persuasive capabilities. We argue that this is not coincidence but rather a function of the fact that

scenario modelling is geared towards providing a sense of clear, quantifiable potential outcomes; the numbers, as one of our interviewees stated, that 'policymakers all want'. In this, it accomplishes what Callon and Law (2005, p. 731) describe as "qualculation": "a process in which entities are detached from other contexts, reworked, displayed, related, manipulated, transformed, and summed in a single space" (see also Jørgensen, this issue). Yet, at the same time, we were unable to identify a single interviewee who suggested that cost-benefit analysis, a more simplistic form of economic decision-making, was similarly persuasive. Rather, the attractiveness of economic scenario modelling for policy actors seemed to result from the fact that it was perceived to be relatively sophisticated (whilst simultaneously being capable of providing clear policy predictions). In other words, the relative influence of scenario modelling within public health policy debates, compared to other kinds of 'evidence tool', appears to reflect the 'black magic' of the process, combined with the 'gold dust' of quantifiable projected outcomes. This, in turn, we suggest, reflects the particular epistemic and political roles played by 'evidence tools' at the boundary of science and policy.

Conclusion:

In this article, we have argued that the fact that impact assessments, systematic reviews and economic decision-making tools have all been promoted as means of synthesising evidence for public health policy audiences suggests it is useful to consider them collectively as 'evidence tools'. Yet, to date, the literature and debates surrounding each tool appear to have developed in parallel communities, preventing much analysis of the similarities and differences between these contrasting approaches to synthesising evidence. In exploring the similarities and the differences in the roles these tools play in public health policy, we aim to make visible (and interesting) the epistemic work they do.

We worked to unpack the assumption, evident within a great deal of public health literature, that 'evidence tools', as professional guidelines, constitute 'objective' and impersonal tools to improve the use of health-related research in policy contexts. We demonstrate that the political purchase of 'evidence tools' within policy debates is highly variable and suggest four related features of these tools which inform the extent to which they are deemed politically useful: (i) the extent to which

they save policymakers time (which influences the extent to which they are likely to be employed at all); (ii) their ability to appear externally coherent (as a brand or label) whilst simultaneously being able to 'flex' to accommodate specific contexts or demands; (iii) the extent to which they are perceived as credible in policy terms (a feature which may have more to do with authorship than with any aspect of the tool itself); and (iv) the clarity (often numerical) with which they can answer specific policy questions. It is notable that, whilst the academic authorship of 'evidence tools' appeared to reinforce their credibility in policy debates, several of the features of 'evidence tools' which seem most desirable for policy actors were the very same features that academic interviewees suggested undermined their credibility in scientific terms. We argue that the popularity of scenario modelling within our data reflects the preferences outlined above; modelling appears methodologically sophisticated and yields the 'gold dust' of a quantified, numerical answer to the perennial policy question of 'what will happen if we do x?' Hence (at least if deemed credible in authorship terms), scenario modelling currently appears to be one of the more successful 'research-informed advocacy tools'.

Overall, given the uncertainty and complexity of the underlying evidence, coupled with the inevitably ethical and political business of policymaking, we argue that the utility of research-informed advocacy tools lies primarily in their symbolic value as a marker of 'good' ('evidence-informed' and 'transparent') decision-making, rather than as a means of employing evidence in instrumental terms, to inform the policy options on the table. Their roles within policy debates are therefore to some extent performative. This does not mean, however, that they are not also playing a more substantive role. We are not, we want to be clear, arguing that rejecting the neutral, 'objective' status of the epistemic work done by 'evidence tools' equates to a 'victory' for politics over science (in Pawson's, 2006, terms). Rather, we suggest that a more realistic understanding of the role of such tools in policy debates creates space for us to acknowledge the interconnected nature of politics and evidence. This space might allow public health researchers to engage more confidently in policy-orientated advocacy, including by promoting relevant findings and putting our expertise in critical appraisal to work on the outputs presented by other policy actors. In this sense, re-conceptualising these boundary objects as evidence-informed advocacy tools, rather than simple evidence tools, can be understood as an opportunity, rather than a concession.

References

Ahmad, B., Chappel, D., Pless-Mulloli, T., White, M., 2008. Enabling factors and barriers for the use of health impact assessment in decision-making processes. *Public Health* 122, 452–457. doi:10.1016/j.puhe.2007.08.014

Bambra, C., Smith, K.E., Garthwaite, K., Joyce, K.E., Hunter, D.J., 2011. A labour of Sisyphus? Public policy and health inequalities research from the Black and Acheson Reports to the Marmot Review. *Journal of Epidemiology & Community Health*, 65, 399–406.

Bax, C., Elvik, R., Veisten, K., 2009. Knowledge Utilisation in Road Safety Policy: Barriers to the Use of Knowledge from Economic Analysis. *Knowledge Technology & Policy,* 22, 275–285. doi:http://dx.doi.org/10.1007/s12130-009-9088-6

Bekker, M., 2007. *The politics of healthy policies: redesigning health impact assessment to integrate health in public policy*. Eburon: Delft.

Blunkett, D., 2000. Influence or irrelevance: can social science improve government? *Research Intelligence*, *BERA,* 71.

Boaz, A., Ashby, D., Denyer, D., Egan, M., Harden, A., Jones, D.R., Pawson, R., Tranfield, D., 2006. A multitude of syntheses: a comparison of five approaches from diverse policy fields. *Evidence & Policy*, 2, 479–502.

Boswell, C., 2009. *The political uses of expert knowledge: immigration policy and social research*. Cambridge: Cambridge University Press.

Busch, P.-O., Jörgens, H., Tews, K., 2005. The Global Diffusion of Regulatory Instruments: The Making of a New International Environmental Regime. Annals of the American Academy of Political and Social Science, 598, 146–167.

Cabinet Office, 1999. *Modernising government* (White Paper - CM 4310). The Stationery Office: London.

Callon, M., Law, J., 2005. On qualculation, agency, and otherness. *Environment & Planning D*, 23, 717.

Ciliska, D., Hayward, S., Dobbins, M., Brunton, G., Underwood, J., 1999. Transferring public health nursing research to health system planning: assessing the relevance and accessibility of systematic reviews. *Canadian Journal of Nursing Research*, 31, 23–36.

Curtis, S., 2008. How can we address health inequality through healthy public policy in Europe? *European Urban Regional Studies*, 15, 293–305.

Dixon-Woods, M., Bonas, S., Booth, A., Jones, D.R., Miller, T., Sutton, A.J., Shaw, R.L., Smith, J.A., Young, B., 2006. How can systematic reviews incorporate qualitative research? A critical perspective. *Qualitative Research*, 6, 27–44.

Dobbins, M., Cockerill, R., Barnsley, J., 2001a. Factors affecting the utilization of systematic reviews: a study of public health decision makers. *International Journal of Technology Assessment in Health Care,* 17, 203–214.

Dobbins, M., Cockerill, R., Barnsley, J., Ciliska, D., 2001b. Factors of the innovation, organization, environment, and individual that predict the influence five systematic reviews had on public health decisions. *International Journal of Technology Assessment in Health Care*, 17, 467–478.

Dobbins, M., Thomas, H., O'Brien, M.A., Duggan, M., 2004. Use of systematic reviews in the development of new provincial public health policies in Ontario. *International Journal of Technology Assessment in Health Care*, 20, 399–404.

Douglas, M., Murie, J., 2004. *HIA in Scotland, in: Health Impact Assessment. Concept, Theory and Applications*. Oxford: Oxford University Press.

Driesen, D.M., 2006. Is cost-benefit analysis neutral. *University of Colorado Law Review*, 77, 335-405.

Drummond, M., Brandt, A., Luce, B., Rovira, J., 1993. Standardizing Methodologies for Economic Evaluation in Health Care: Practice, Problems, and Potential. *International Journal of Technology Assessment in Health Care,* 9, 26–36.

Drummond, M.F., Jefferson, T.O., 1996. Guidelines for authors and peer reviewers of economic submissions to the. *BMJ,* 313, 275–283.

Fernler, K. (under review) To be confirmed. *Evidence & Policy* (this special issue).

Finer, D., Tillgren, P., Berensson, K., Guldbrandsson, K., Haglund, B.J.A., 2005. Implementation of a Health Impact Assessment (HIA) tool in a regional health organization in Sweden—a feasibility study. *Health Promotion International*, 20, 277–284.

Gough, D., Oliver, S., Thomas, J., 2013. *Learning from research: systematic reviews for informing policy decisions*. London: Alliance for Useful Evidence.

Hacking, I., 1999. *The social construction of what?* Cambridge, MA: Harvard University Press.

Harris-Roxas, B., Harris, E., 2011. Differing forms, differing purposes: A typology of health impact assessment. Environmental Impact Assessment *Review*, 31, 396–403.

Harris-Roxas, B.F., Harris, P.J., Harris, E., Kemp, L.A., 2011. A rapid equity focused health impact assessment of a policy implementation plan: An Australian case study and impact evaluation. *International Journal for Equity in Health*, 10, 6.

Haynes, L., Service, O., Goldacre, B., Torgerson, D., 2012. *Test, Learn, Adapt: Developing Public Policy with Randomised Controlled Trials*. Cabinet Office Behavioural Insights Team, London.

Henderson, M., 2013. *Geek manifesto: why science matters*. London: Transworld Publishers.

Hoffmann, C., 2000. The influence of economic evaluation studies on decision making.: A European survey. *Health Policy,* 52, 179–192.

Jørgensen, M.W. (under review) To be confirmed. *Evidence & Policy* (this special issue).

Katikireddi, S.V., Bond, L., Hilton, S., 2013. Perspectives on econometric modelling to inform policy: a UK qualitative case study of minimum unit pricing of alcohol. *European Journal of Public Health*. Online advance access: doi: 10.1093/eurpub/ckt206.

Katikireddi, S.V., Hilton, S., Bonell, C., Bond, L., 2014. Understanding the development of Minimum Unit Pricing of alcohol in Scotland: a qualitative study of the policy process. *PLoS ONE* 9, 3: e91185. doi:10.1371/journal.pone.0091185.

Kelman, S., 1981. Cost-benefit analysis: an ethical critique. *Regulation,* 5, 33–40.

Kemm, J., 2013. *Health impact assessment: past achievement, current understanding, and future progress*. Oxford: Oxford University Press.

Kemm, J., Parry, J., Palmer, S., Palmer, S.R., 2004. *Health Impact Assessment*. Oxford: Oxford University Press.

Knorr Cetina, K., 2009. *Epistemic Cultures: How the Sciences Make Knowledge*. Cambridge, MA: Harvard University Press.

Kobelt, G., 2013. *Health Economics: An Introduction to Economic Evaluation*. Office of Health Economics.

Krieger, N., Northridge, M., Gruskin, S., Quinn, M., Kriebel, D., Smith, G.D., Bassett, M., Rehkopf, D.H., Miller, C., 2003. Assessing health impact assessment: multidisciplinary and international perspectives. *Journal of Epidemiology & Community Health,* 57, 659–662.

Lampland, M., Star, S.L., 2009. *Standards and Their Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life*. Cornell University Press.

Lascoumes, P., Le Gales, P., 2007. Introduction: Understanding Public Policy through Its Instruments—From the Nature of Instruments to the Sociology of Public Policy Instrumentation. *Governance,* 20, 1–21.

Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network Theory*, Oxford: Oxford University Press.

Lavis, J., Davies, H., Oxman, A., Denis, J.-L., Golden-Biddle, K., Ferlie, E., 2005. Towards systematic reviews that inform health care management and policy-making. *Journal of Health Services Research & Policy*, 10 Suppl 1, 35–48.

Law, J., Mol, A., 2002. Complexities: an introduction, in J. Law & A. Mol (eds) *Complexities: Social Studies of Knowledge Practices*. Durham and London: Duke University Press.

Majone, G., 2003. *Risk regulation in the European Union: between enlargement and internationalization*. Florence: European University Institute, Robert Schuman Centre for Advanced Studies, European Forum.

Mathias, K.R., Harris-Roxas, B., 2009. Process and impact evaluation of the Greater Christchurch Urban Development Strategy Health Impact Assessment. *BMC Public Health,* 9, 97. doi:10.1186/1471-2458-9-97.

Mays, N., Pope, C., Popay, J., 2005. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *Journal of Health Services Research & Policy*, 10 Supplement 1, 6–20.

Mindell, J., Boaz, A., Joffe, M., Curtis, S., Birley, M., 2004. Enhancing the evidence base for health impact assessment. *Journal of Epidemiology & Community Health*, 58, 546–551.

Moat, K.A., Lavis, J.N., Wilson, M.G., Røttingen, J.-A., Bärnighausen, T., 2013. Twelve myths about systematic reviews for health system policymaking rebutted. *Journal of Health Services Research & Policy,* 18, 44–50.

NHS Health Development Agency, 2003. Economic appraisal of public health interventions (Briefing paper). London: NHS Health Development Agency.

O'Mullane, M., 2013. *Integrating Health Impact Assessment with the Policy Process: Lessons and experiences from around the world*. Oxford: Oxford University Press.

Parry, J.M., Kemm, J.R., 2005. Criteria for use in the evaluation of health impact assessments. Public Health 119, 1122–1129.

Pawson, R., 2006. *Evidence-based policy: A realist perspective*. London: Sage.

Petticrew, M., 2003. Why certain systematic reviews reach uncertain conclusions. *BMJ* 326, 756.

Petticrew, M., 2007. "More research needed": plugging gaps in the evidence base on health inequalities. *European Journal of Public Health* 17, 411–413.

Radaelli, C.M., 2009. Measuring policy learning: regulatory impact assessment in Europe. *Journal of European Public Policy*, 16, 1145–1164.

Siegerson, D.N., 2013. *The challenges and opportunities for evidence use in impact assessment in the health service – Equality & Diversity lead perspectives* (Masters). University of Glasgow, Glasgow.

Signal, L., Langford, B., Quigley, R., Ward, M., 2006. Strengthening health, Wellbeing and Equity: Embedding Policy-Level HIA in New Zealand. *Social Policy Journal New Zealand / Te Puna Whakaaro*, 17–31.

Smith, K.E., 2013. *Beyond Evidence Based Policy in Public Health: The Interplay of Ideas*. Basingstoke: Palgrave Macmillan.

Star, S.L., 2010. This is Not a Boundary Object: Reflections on the Origin of a Concept. *Science, Technology & Human Values*, 35, 601–617.

Star, S.L., Griesemer, J.R., 1989. Institutional ecology, "translations" and boundary objects: amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, 19, 387–420.

Stevens, A., 2011. Telling policy stories: an ethnographic study of the use of evidence in policy-making in the UK. *Journal of Social Policy,* 40, 237–255.

Taylor-Robinson, D., Milton, B., Lloyd-Williams, F., O'Flaherty, M., Capewell, S., 2008. Policy-makers' attitudes to decision support models for coronary heart disease: a qualitative study. *Journal of Health Services Research & Policy*, 13, 209–214.

Tenney, A., Kværner, J., Gjerstad, K.I., 2006. Uncertainty in environmental impact assessment predictions: the need for better communication and more transparency. *Impact Assessment & Project Appraisal*, 24, 45–56.

The Cochrane Collaboration, 2013. *Evidence-based health care and systematic reviews*. Cochrane Collaboration: http://www.cochrane.org/about-us/evidence-based-health-care (accessed 3.18.14).

Wallenburg, I. Under review. To be confirmed. *Evid. Policy* (this special issue).

Ward, M., 2006. HIA *in New Zealand. Experience at a Policy Level.* URL: http://www.apho.org.uk/resource/item.aspx?RID=116489 (accessed 3.19.14).

Weiss, C.H., 1979. The many meanings of research utilization. *Public Administration Review*, 426–431.

Welch, V., Petticrew, M., Tugwell, P., Moher, D., O'Neill, J., Waters, E., White, H., the PRISMA-Equity Bellagio group, 2012. PRISMA-Equity 2012 Extension: Reporting Guidelines for Systematic Reviews with a Focus on Health Equity. *PLoS Medicine,* 9, e1001333. doi:10.1371/journal.pmed.1001333

World Health Organisation, 1999. *Health Impact Assessment: Main concepts and suggested approach. Gothenburg:* Gothenburg Consensus Paper.

Wright, J., Parry, J., Scully, E., 2005. Institutionalizing policy-level health impact assessment in Europe: is coupling health impact assessment with strategic environmental assessment the next step forward? *Bulletin of the World Health Organization*, 83, 472–477.

York Health Economics Consortium, 2006. *Cost benefit analysis of health impact assessment: Final report.* HIA Gateway: West Midlands Public Health Observatory.

Young, K., Ashby, D., Boaz, A., Grayson, L., 2002. Social science and the evidence-based policy movement. *Social Policy & Society*, 1, 215–224.