Systematic Reviews: What have they got to offer evidence based policy and practice?

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Abstract

This paper contributes to the debate on extending the use of systematic reviews to a wider range of policy areas. It examines ways in which systematic review presents a distinctive approach to synthesising research, exploring the challenges faced by researchers who use systematic review outside clinical medicine and identifying reasons why it is sometimes contentious in the social policy and practice field. Areas in which the social sciences can contribute to the development of review methodology are outlined: for example, through sharing experience of user involvement and approaches to qualitative research. The wider impact of systematic reviewing on the quality of primary research is also discussed, together with the tools and training resources available to support this activity.

Key words: systematic reviews; social sciences; methods

Systematic reviews: what have they got to offer evidence based policy and practice?

1. Background

Finding out 'what works' has once more become part of the mission of government. Signals of this intent to use evidence in guiding policy making can be found in a number of policy documents including the *Modernising government* White Paper (Cabinet Office, 1999) and the Performance and Innovation Unit (PIU) report *Adding it up* (Cabinet Office, 2000). For example, *Modernising government* states that:

> Government should regard policy as a continuous, learning process, not as a series of one-off initiatives. We will improve our use of evidence and research so that we understand better the problems we are trying to address. We will make more use of pilot schemes to encourage innovations and test whether they work. (Cabinet Office, 1999)

Both documents emphasise the need to develop a more evidence based approach to policy making and suggest ways in which this climate change might be achieved.

The establishment of the Centre for Management and Policy Studies (CMPS) in the Cabinet Office, directed by a former Chief Executive of the Economic and Social Research Council (ESRC), signified a growing interest in policy research and evaluation right at the heart of government. The Centre provides a tool for putting some of the rhetoric of evidence based policy making into practice through training and development activities within the civil service.

In a speech to the ESRC David Blunkett MP, then Secretary of State for Education, called upon the research community to embrace an augmented role in the policy making process. (Blunkett, 2000)

> Social science research evidence is central to development and evaluation of policy…We need to be able to rely on social science and social scientists to tell us what works and why and what types of policy initiatives are likely to be most effective.

These developments within government present opportunities and challenges for the research community in developing its own role as a provider of evidence. As Gowman and Coote suggest: 'Too often, the evidence needed to inform decision-making at all levels of practice is hard to come by, of questionable quality and uncertain relevance.' (Gowman and Coote, 2000)

One of the tenets of evidence based policy making is that there is a lot of valuable and potentially transferable experience in the field of clinical medicine. In extending the focus on 'what works' (and what doesn't work) beyond health, there would seem to be

considerable scope for exploring the tools and approaches developed to build an evidence base for health care. In his 1996 presidential address to the Royal Statistical Society, Adrian Smith challenged the field of public policy to adopt a more 'evidence based' approach:

> Most of us have aspirations to live in a society which is more, rather than less evidence based…there has been the growth of a movement in recent years calling itself 'evidence based medicine', which perhaps has valuable lessons to offer. (Smith, 1996)

It is acknowledged that this learning needs to take place while ensuring that the distinctive elements of specific fields of research (such as social care or education) are not lost. It may also be the case that evidence based policy making in health can be strengthened by progress made in other fields. For example, researchers focusing on complex public health interventions such as 'healthy schools' programmes, face similar dilemmas to researchers working in other fields such as education. Davies and Nutley conclude that:

> Evidence on effectiveness is much more to the fore in healthcare than in any other public sector service…While other sectors may have much to learn from this progress there may well be other areas where healthcare is blind to the progress made outside its own field. Perhaps there are ready lessons to be learned from education, social services or criminal justice. (Davies and Nutley, 2000)

Evidence based medicine has been characterised by its focus on obtaining high quality evidence through experimentation, particularly through the use of randomised controlled trials (RCTs), and the systematic examination of existing research. How far the broader term evidence based policy and practice will come to mirror evidence based medicine, or whether it will develop a distinct character of its own, is a subject of current interest and debate. A brief introduction to the development of evidence based policy is provided in Working Paper 1 of this series (Solesbury, 2001).

1.1 Evidence in the form of reviews
A key part of the evidence based health care agenda is the emphasis on systematic reviews of research. This approach acknowledges the large body of existing research and seeks to synthesise the findings from all relevant studies. The reviews carried out as part of the Cochrane Collaboration offer a detailed model of research synthesis. Over the past ten years the Collaboration has built up an impressive library of reviews on a very wide range of health related topics. However, there remains some concern about the transferability of a model developed in a medical context that seems to focus on promoting specific research methodologies. There is also some confusion about what these reviews entail and how feasible it is for individual researchers to carry out systematic reviews.

This paper will begin by outlining the ways in which systematic reviewing presents a distinctive approach to synthesising research. The next section will explore the aspects of

this approach that present challenges for researchers beyond the field of clinical medicine. It will argue that social science not only has a lot to gain from systematic review methodology, but also has much to contribute to its development. The paper will conclude by suggesting ways in which review methodologies might be developed, guided not only by the useful principles already developed, but also by developments in the social science community, by the needs of policy makers and practitioners, and by the skills and capacity available to take this work forward.

This paper is intended for anyone thinking of either doing a systematic review or using existing systematic reviews. It is hoped that it will also contribute to the debate on extending the use of reviews to a wider range of policy areas and will provoke further discussion and development of ideas in this important area. The ESRC programme on Evidence Based Policy and Practice is one of a number of initiatives that offer an opportunity to explore the role of research synthesis in evidence based policy making. A brief description of these key initiatives is given in Table 1 below.

Table 1. A selection of relevant initiatives	
Initiative	**Brief description**
ESRC UK Centre for Evidence Based Policy and Practice	The Centre has been funded by the ESRC to promote the concept of evidence based policy and practice in the social sciences. It is working with a network of nodes focusing on specific aspects of evidence based policy making and practice.
Evidence for Policy and Practice Information and Co-ordination Centre (EPPI-Centre)	The Centre was originally commissioned by the Department for Education and Employment to provide a resource for those wishing to undertake systematic reviews in the field of education. It will also develop and maintain a database of reviews and other educational research.
Campbell Collaboration	Building on the experience of the Cochrane Collaboration, Campbell will carry out reviews of interventions in the fields of education, criminal justice and social work.
Social Care Institute for Excellence (SCIE)	SCIE has been set up to promote the quality and consistency of social care practice. It will rigorously review research and practice, and the views, experience and expertise of users and carers.

2. Systematic reviews

It is important to acknowledge that there is already a considerable amount of research review in policy and practice research. It is likely that anyone who has carried out a piece of research will, usually at an early stage, have been involved in conducting some sort of review. A wide variety of terms is used to describe reviewing activities including literature reviews, scoping studies, briefing papers and rapid reviews.

The use of review techniques is not exclusive to the research community. Recent government policy documents, particularly those produced by the Policy Action Teams (PATs) and the PIU have also made use of reviews of the evidence to support their work. For example, the PIU report, *Adding it up*, describes the review work carried out by the Pensions Provision Group.

Case study of evidence in action: We All Need Pensions

The Pension Provision Group (PPG) report *We all need pensions* was published in April 1998, around 6 months before the Government's Pensions Green Paper. It covered a wide range of basic issues in pension provision, ranging from 'incomes in old age' to 'the labour market context' to 'risk and efficiency in pension provision'.

This work helped set the context for subsequent policy development. None of the information was new to policy makers but the publication provided chapter and verse for the stylised mental map of the pensions world with which policy makers in DSS need to equip themselves. It represented a very helpful assembly of different data sources in a single place. The existence of the PPG also caused DSS to give higher priority to basic data collection than otherwise would have been the case (because it would have been crowded out by the pressure of more urgent work). (Cabinet Office, 2000)

However, although it is common practice to review previous work, a distinct feature of systematic reviews is that they are carried out to agreed standards. The next section looks at seven of these standards in order to outline what it means to review data systematically. It suggests that they could be used to strengthen future reviews in a wide variety of policy areas:

i.   **Using protocols to guide the process**
The NHS Centre for Reviews and Dissemination (CRD) at York describes a protocol as follows: 'The protocol specifies the plan which the review will follow to identify, appraise and collate evidence.' (CRD, 2001)

The main strength of developing a protocol is that it encourages the reviewer to be explicit about how the review will be carried out. Rather like action plans and other project management tools (Gregory, 1998) it helps the reviewer to think through the different stages of the process at the beginning of the review, to anticipate problems and plan for them. A protocol is also a useful tool for promoting transparency, transferability and replicability. It outlines what the reviewer intended to do and makes it possible for the review to be repeated at a later date by others.

ii.   Focusing on answering a specific question(s)
A criticism of narrative and other kinds of review is that they can be unfocused. In contrast, systematic reviews focus on a specific question or questions. Developing the question(s) is an important, but often complex and time consuming part of the review process. However, concentrating on specific questions or problems gives systematic reviews a clarity of purpose and of content that should enhance their usefulness to others.

iii.   Seeking to identify as much of the relevant research as possible
A strength of reviews *per se* is that they bring together research and help to identify commonalities and differences. Describing the impact of reviews, Sheldon and Chilvers note:

> The publication of scattered single studies with clear negative findings did little to alter professional attitudes, and where they are known about they are seen as flukes. It was reviews, that is collections of such material, that forced the conclusion upon us that just because particular approaches or patterns of service provision are routine, congenial and familiar, they nevertheless tell us little at the scientific level about effectiveness. (Sheldon and Chilvers, 2000)

Systematic reviews take a wide ranging and comprehensive approach to searching for relevant research. They use the technology now available to carry out global searches of the research databases. They aim to identify as much of the relevant research as possible, not just the most well known, well promoted and successful. Initiatives such as the Cochrane Collaboration have invested in improving search techniques and tools to facilitate this process. While it is not always possible to locate all the research in a given area, the review explains how studies were identified and obtained, and highlights any known gaps.

iv.   Appraising the quality of the research included in the review
Using exclusion and inclusion criteria set out in the protocol, the reviewers appraise the methodological quality of the studies identified to decide which studies warrant inclusion in the review. This means that decisions on inclusion are made explicit rather than implicit. The quality of the studies included in the review is also assessed.

v.   Synthesising the research findings in the studies included
The findings of included studies are synthesised in different ways. The best known techniques are meta-analysis and narrative synthesis. Where there are quantitative outcome measures, meta-analysis uses statistical techniques to bring together the findings of the studies that meet the inclusion criteria. A detailed discussion of meta-analysis can be found in *Systematic reviews in healthcare* (Egger et al, 2001). However, meta-analysis is not always possible or appropriate. For example, the studies identified might be limited in number or very diverse, or the outcome measures used in the studies might be different.

Despite the concentration in the literature on meta-analysis and the challenges it presents, narrative synthesis is likely to form an important part of the vast majority of reviews. A

narrative synthesis brings together the results of the studies and looks at similarities and differences between the studies and their outcomes. Although it does not seek to provide an average effect size, it can look at effectiveness and does take into account the methodological quality of the studies. Narrative synthesis can also make use of tables to provide a systematic and consistent record of information from the studies in the review. CRD's guidance on systematic review (its Report 4) discusses the different approaches to synthesis available to the systematic reviewer in more depth (CRD, 2001).

vi.   Aiming to be as objective as possible about research to remove bias
Attitudes to bias differ considerably between different research approaches. In RCTs a key pre-occupation is with the elimination of bias with respect to the comparison of interest. Researchers using other methodologies such as action research also recognise the existence of bias. Where it is not possible to remove bias, it is important that researchers explicitly acknowledge the ways in which it is likely to have impacted upon the results of a study.

vii.   Updating in order to remain relevant
Reviews do not always need updating. For example, reviews carried out by organisations such as the National Institute for Clinical Excellence (NICE) are often designed to be used at particular point in time in order to meet a specific policy need. However, a key feature of the systematic review is that, where appropriate, it can be updated.

A review of the effectiveness and appropriateness of peer delivered health promotion interventions for young people.

'The intuitive appeal of the idea is not matched by much hard evidence'

The review explored an increasingly fashionable strategy of using peers to deliver health promotion interventions. The review critically appraised studies describing processes as well as those looking at outcomes. The majority of the studies were outcome-only or process-only. Just 5% of the studies were integrated outcome and process evaluations.

The researchers found that few of the outcome evaluations identified were judged to be methodologically sound for drawing reliable conclusions about intervention effectiveness. With the seven quality criteria used to appraise the process evaluations, less than half gave a clear description of the sample and methods used. Only two out of 15 met all seven criteria.

Although there was some evidence to support the effectiveness of peer delivered health promotion for young people, the reviewers concluded that methodologically sound studies are *'disappointingly scarce.'* (Harden et al, 1999)

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3. Why is systematic reviewing contentious in the social science community?

Many of the features identified above appear to be potentially useful beyond the field of clinical medicine. For example, a clear protocol describing the approach taken by the reviewer is often lacking in literature reviews, leaving the reader wondering how the studies included were identified, appraised and synthesised.

However, there are a number of important reasons why the systematic review is often met with scepticism in different policy areas.

3.1 The broader debate about the relative value of different research methods
There is a concern that Cochrane systematic reviews prioritise certain research methodologies above others. The idea of a 'gold standard' (the RCT) is not so prevalent in other fields of research. The table below, extracted from *What works* (Davies et al, 2000), demonstrates the relative weight given to research methodologies in various policy areas. It clearly illustrates the diverse approaches to research and the very varied evidence bases available to policy makers in key policy areas.

Table 2. Evidence in different policy areas		
Policy areas	**Methodological preferences and debates**	**Nature of the evidence base**
Healthcare (especially NHS clinical services)	Gold standard of RCT with additional methodological safeguards. Growing interest in qualitative methods to give complementary view.	Expensive and accessible via national initiatives such as the Cochrane Collaboration and local clinical effectiveness strategies.
School education	Much research is considered less than robust. Paradigm wars. Eclectic methods competing rather than complementing. Large datasets are analysed but there is relatively little true experimentation.	Fragmented research community. No accessible database of research evidence (but fresh initiatives underway). Few systematic reviews.
Criminal justice	General acceptance of experimental methods in determining what works. Preference for theory driven rather than method driven approach to evaluation.	Large, but still limited research base. No on-line, up-to-date database of research in the UK, but Home Office research reports are available online.
Social care	Preference for qualitative methodologies. Quantification and experimentation often viewed with suspicion and even hostility.	The Caredata database of research findings is available via the Social Care Institute for Excellence website. Concept of evidence is still hotly contested.
Welfare policy (focus on social security benefits)	Eclectic use of methods to provide complementary insights. Some longitudinal study but almost no experimentation (because of legal impediments due to the statutory duty for to provide equitable benefits).	Evidence created in response to perceived policy problem. Little apparent collation into a stable evidence resource.

Table 2. Evidence in different policy areas (cont.)		
Policy areas	**Methodological preferences and debates**	**Nature of the evidence base**
Housing	Predominant use of qualitative and quantitative survey methods. Use of econometrics for forecasting housing needs. The emergence of more multi-method and multi-disciplinary approaches.	Extensive databases on the state of housing stock used for monitoring purposes. Weaker evidence base in other areas of housing policy. Housing research increasingly related to wider policy considerations (such as social exclusion).
Transport (focus on roads policy)	Multi-disciplinary area. Policy-related research is often rooted in economic modelling and statistical forecasting methods.	Tends to focus on technical and operational issues relating to the design of the transport infrastructure. Up until the late 1990s largely reliant on government sources only, chiefly the Transport Research Laboratory.
Urban policy	Major problems of attribution of effect to interventions and identifying externalities. Diverse methods employed, mostly pluralistic case studies. Little or no true experimentation.	Strong emphasis on evidence collected in appraisal and evaluation of government-funded schemes.

3.2 Studies often involve complex interventions with multiple outcomes

Social scientists are particularly interested in capturing the impact of context on the success or failure of an intervention. They are also often involved in research with complex interventions and multiple outcomes. For example, a recent pilot programme for older people was designed to 'improve public services for older people by better meeting their needs, listening to their views and encouraging and recognising their contribution' (Hayden and Boaz, 2000). This broad aim resulted in wide ranging activities in 28 pilots with diverse objectives and planned outcomes. There is a concern that systematic reviews are not designed to value and synthesise this important data.

3.3 Concern that there is no room for theory to play a role

Theory often plays an important role in social research and many social interventions are guided by a theory of change. The adoption of 'Realistic Evaluation' approaches (Pawson and Tilley, 1997) and the promotion of 'Theories of Change' (Connell and Kubisch, 1998) have added weight in recent years to the idea that there are important change processes that mediate the impact of an intervention. For example, the evaluation of the Health Action Zones is using a Theories of Change approach to assess the complex, local partnership initiatives set up to tackle inequalities in health (Judge and Bauld, 2001). Further consideration needs to be given to developing a role for theory in research reviews. In Working Papers 4 and 5 in this series (Pawson, 2001a&b), the potential contribution of theory to systematic reviews is explored in greater detail.

4. Strengthening systematic review methodology

Are there ways in which developments and debates in other fields of research can contribute to the development of systematic review methodologies? Initiatives such as the Cochrane Collaboration are constantly evolving, and acknowledge the scope for developing and refining their approach to systematic reviews. One of the key principles on which the Collaboration is based is as follows: 'Ensuring quality, by being open and responsive to criticism, applying advances in methodology, and developing systems for quality improvement.' (see http://www.cochrane.dk)

This principle has also been adopted by the Campbell Collaboration and there are likely to be a range of opportunities to shape Campbell in the early years of its development.

4.1 Involving users in defining the problems and questions

Oakley notes that there has been a tendency within Cochrane to prioritise the views and perspectives of professionals. She suggests, for example, that very different issues and research questions would be identified in the field of maternal care drawing on the perspectives of mothers rather than doctors (Oakley, 1999). The recent development of the Cochrane Consumers Network may begin to address some of these issues. However, this is an area where there is considerable scope for dialogue between researchers from a wide variety of disciplines. Some areas of research, including the field of social care, have made significant progress in involving both the users of research and those affected by the public services being researched. User involvement in research review is likely to be a priority issue for the new Social Care Institute for Excellence (SCIE).

4.2 Developing methods for involving a broader range of types of research in reviews (including studies with mixed methods)

Oxman (2000) discusses the challenges for Cochrane as follows:

> While the Cochrane Collaboration should continue to focus on systematic reviews of RCTs and non-randomised controlled trials, coherent and transparent decision rules are needed for deciding when only to include RCTs, when to include non-randomised controlled trials and when to include other types of evidence. So far as possible, there should be an empirical basis for these decision rules, as well as logical arguments. Developing that empirical basis is a major challenge.

The Cochrane Collaboration has a number of working groups dealing with specific issues of methodology. These include the Qualitative Methods Network which is focusing on developing standards for identifying, critically appraising and synthesising qualitative research to complement the existing evidence included in Cochrane reviews (see http://www.salford/ac.uk/iphrp/cochrane/homepage.htm). There are already plans to link this work to the methodological discussions taking place within the Campbell Collaboration.

The value of qualitative methods can be found not only in their additionality (in exploring specific questions) but also in their complementarity.

Researchers have begun to develop new tools to appraise qualitative research identified for inclusion in reviews (Popay et al, 1998). For example, Harden et al (1999) have developed separate tools for the qualitative and quantitative studies identified for inclusion in their systematic reviews. While acknowledging the absence of consensus about quality standards in qualitative research, they adopted the following criteria for a recent review:

- an account of the theoretical framework and/or inclusion of a literature review
- clearly stated aims and objectives
- a clear description of context
- a clear description of sample
- a clear description of methodology, including systematic data collection methods
- analysis of data by more than one researcher
- the inclusion of sufficient original data to mediate between data and interpretation

This is an area currently attracting considerable attention and the CMPS plans to commission a systematic review of existing quality standards to provide guidance for research users within government.

4.3 Developing methods for reviewing complex issues, interventions and outcomes
Complex policy issues and interventions present a number of methodological challenges for reviewers. As we have discussed above, qualitative methods provide insights into why and how complex initiatives work. Systematic reviews also need to find ways of combining evidence from qualitative and quantitative studies in order to capture the full complexity of an intervention, its impact and its transferability to other contexts. Long et al (1999), in a recent paper exploring the feasibility of systematic reviews in social care, conclude that:

> In order to gain insight into the complexity of interventions in the social care field and the perspective of service users and their informal carers, systematic reviews must include evidence from both quantitative and qualitative research studies.

However, there are additional methodological challenges in synthesising complex policy issues and interventions. For example, more time may need to be spent on developing and clarifying the question the review is to explore. One challenge might be to develop methods for negotiating review questions with stakeholders such as policy makers.

4.4 Systematic reviews as a tool for policy, practice and individual decision making
Highly technical reports the size of telephone directories suggest that systematic reviews are designed with a specific 'expert' audience in mind. Often evidence based policy and practice seems to be reduced to a consideration of the needs of policy makers. However, systematic reviews should provide evidence that is of use to policy makers, practitioners and members of the public who also have an interest in accessing the best evidence to inform their decisions.

Considerable progress has been made in some areas of social policy to make resources more accessible. Examples include the Joseph Rowntree Foundation's *Findings* (http://www.jrf.org.uk/knowledge/findings/default.htm) and research networks in the social care field such as RIP (research in practice at http://www.rip.co) and Making Research Count (http://www.uea.ac.uk/swk/research/mrc/welcome.htm). However, ensuring that reviews are of use to all three constituencies remains a major challenge for the ESRC UK Centre for Evidence Based Policy and Practice, SCIE and the Campbell Collaboration.

5. The wider impact of taking a systematic approach

One argument for adopting some of the principles of systematic reviewing is that they may well have a wider impact on the quality of primary research. In particular, identifying clear questions and preparing protocols for reviews should help to:

- Increase the transparency of the research approach and the methods used
- Encourage an increased focus on the impact and outcomes of interventions ('what works') while continuing to explore processes involved and the perspectives of stakeholders ('why it works')
- Develop standards for assessing the quality of qualitative research
- Encourage the development of improved information systems, including databases of research and associated search tools
- Generate future research questions

A further challenge will be to build upon existing good practice. Petticrew (2001) recognises that there has already been progress in systematic review in non-clinical areas. He gives a range of examples in the table reproduced below.

Table 3. Examples of systematic reviews in the 'real world' (Petticrew, 2001)		
Review question	**Methods**	**Authors' conclusions**
Does spending more money on schools improve educational outcomes?	Meta-analysis of effect sizes from 38 publications[r1].	Systematic positive relation between resources and student outcomes.
Do women or men make better leaders?	Review of organisational and laboratory experimental studies of relative effectiveness of women and men in leadership and managerial roles[r2].	Aggregated over organisational and laboratory experimental studies in sample, male and female leaders were equally effective.
Does sexual orientation of the parent matter?	Review investigating impact having homosexual as opposed to heterosexual parents has on emotional wellbeing and sexual orientation of child[w3].	Results show no differences between heterosexual and homosexual parents in terms of parenting styles, emotional adjustment, and sexual orientation of child(ren).
Are fathers more likely than mothers to treat their sons and daughters differently?	Review of 39 published studies[r4].	Fathers' treatment of boys and girls differed most in areas of discipline and physical involvement and least in affection or everyday speech. Few differences for mothers.
Is job absenteeism an indicator of job dissatisfaction?	Review of 23 research studies[r5].	Yes; stronger association was observed between job satisfaction and frequency of absence than between satisfaction and duration of absence.
Are jurors influenced by defendants' race?	Meta-analytic review of experimental studies[r6].	Results are consistent in finding that race influences sentencing decisions.
Is there a relation between poverty, income inequality, and violence?	Review of 34 studies reporting on violent crime, poverty, and income inequality[r7].	Results suggest that homicide and assault may be more closely associated with poverty or income inequality than rape or robbery.

A recent systematic review of research on low intensity support services offers an interesting example of the use of systematic review methods in a non-medical context. It also illustrates the potential of reviews as tools for identifying research quality issues in a specific field of study (Quilgars, 2000).

Low intensity support services: a systematic literature review

This study looked at the evidence of effectiveness of low intensity support services. Low intensity support services include housing/tenancy support, direct practical help (such as help with housework and domestic services) and emotional and social support. A search strategy was developed and used to search 15 electronic databases. 'Key players' were also contacted and the researchers searched relevant websites and carried out hand searches of library resources. These searches identified 5000 references and each study was checked against a set of pre-agreed criteria. 41 studies met the criteria and were included in the review.

The researchers were concerned that the literature in this field was poorly developed. The review concludes that the research base needs to be strengthened to include, for example, more work that measures effectiveness, larger scale studies, more use of controls for other factors, and longer term evaluations. The researchers also recommend developing the use of qualitative methods, and more explicit discussions of the values shaping individual pieces of research. (Quilgars, 2000)

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6. Capacity building

It is estimated by the EPPI-Centre that a systematic review costs at least £55K (Gough, 2001). While there is considerable investment in health research from a variety of sources including government, charities and the pharmaceutical industry, there is considerably less funding available for research in other fields. Shortage of funding is, at least in the short term, a very important factor to be borne in mind when developing realistic suggestions for methods of research synthesis.

6.1 Tools
A number of tools support researchers in the preparation of reviews. The first of these is a **protocol**. Examples of protocols can be found on a number of the websites included in Table 4. The CRD website provides detailed guidance on how to put together a protocol (see http://www.york.ac.uk/inst/crd/report4.htm phase 2).

Bibliographic and research databases, now generally electronic, are the primary source of material for systematic reviews, although the internet is gaining in importance. The social science literature is more fragmented than in the sciences where the peer reviewed journal is the norm; grey literature, practitioner journals, books and government reports are all important publication media. The social sciences also lack the large scale, sophisticated databases characteristic of medicine, chemistry, engineering and other scientific disciplines. Some medium-to-large databases do exist (ERIC, Social Science Citation Index, ASSIA etc) but a comprehensive search in many fields of social policy and practice requires access to several databases. These are often small scale and/or highly specialised, either by subject (e.g. Caredata, AgeInfo) or by type of material (e.g. the SIGLE and HMIC databases of grey literature, or the UKOP database of official publications). Some are only available via commercial hosts (e.g. ASSIA) or individual subscription (e.g. Planex). Useful though these sources may be, extensive manual searching of the literature is still likely to be necessary to ensure that a systematic review is as comprehensive as possible.

Search strategies are essential for exploiting databases to collect information for systematic reviews. All reviews identify a search strategy in terms of key words and phrases, with details given in the protocol and the text of the review. Examples can be found in most published reviews including those on the EPPI-Centre website (http://eppi.ioe.ac.uk). Constructing search strategies is more difficult than in scientific disciplines like medicine because of the imprecision and fluidity of social science terminology, and because of the variability of database indexing policies. Some use natural language indexing, requiring the searcher to be creative in thinking of synonyms and related concepts. Others use controlled indexing languages, but these can vary from database to database.

Database searches are constructed using **search operators** and these can also vary in sophistication. In some very small scale databases, one may be able to search only through drop-down lists of subject terms; in others complex searches can be carried out using a wide variety of operators over and above the familiar AND, NOT and OR. This

variability means that searchers may need to accustom themselves to a wide variety of conventions to ensure that they maximise useful retrieval from their chosen databases. The internet can be searched using a variety of search engines including Lycos (http://www.lycos.com), Yahoo (http://www.yahoo.com) and Google (http://www.google.com).

Data extraction tools are convenient mechanisms for systematising and recording the process of data extraction. Some research teams carrying out reviews include their data extraction tools as appendices, for example Long et al (1999). A basic data extraction tool developed for a recent review on the attitudes and aspirations of older people (Boaz et al, 1999) is attached in Appendix 3 . The CRD's Report 4 outlines the key requirements of a data extraction tool and provides examples (http://www.york.ac.uk/inst/crd/report4.htm, phase 6). Finally, a number of **meta analysis software packages** are available, including RevMan and Epi Meta. Details of these packages and others are also given in Report 4.

6.2 Training

The Cochrane Collaboration and others have stressed that training is necessary in order to enable researchers to use these tools to their fullest potential. Cochrane has spent ten years developing the capacity for systematic review in the field of clinical medicine and a similar, if not greater, challenge faces the Campbell Collaboration and other organisations seeking to promote systematic review methodologies in other fields. Training will be needed in both the short term, through professional development, and the long term through undergraduate and postgraduate courses.

The training that is currently available has been developed largely in the medical field and is consequently very health focused. Courses are offered by a number of organisations including the Centre for Evidence-Based Medicine, Oxford University and the Systematic Reviews Training Unit at the Institute of Child Health. Recent developments in the use of review techniques in the social sciences have led to the introduction of training courses at the EPPI-Centre. Courses in developing critical appraisal skills are also offered by the Centre for Evidence Based Social Services at Exeter University (http://www.ex.ac.uk/cebss). It is likely that increased demand will lead to a wider variety of course options for researchers interested in carrying out reviews exploring a diverse range of research questions.

Table 4. Where to go to find out more [websites last checked 7/11/01]

Campbell Collaboration http://campbell.gse.upenn.edu	Building on the experience of the Cochrane Collaboration, Campbell will carry out reviews of interventions in the fields of education, criminal justice and social work. The website currently includes guidance on protocol construction, specimen protocols and other information.
Cochrane Collaboration http://www.cochrane.org	The Cochrane Collaboration prepares, maintains and disseminates the results of systematic reviews of research on the effects of health care. The Cochrane Library is a quarterly updated electronic database of reviews. The Cochrane manual and the reviewers handbook are available on-line.
Evidence for Policy and Practice Information and Co-ordinating Centre http://eppi.ioe.ac.uk	The Centre was originally commissioned by the DfEE to provide a resource for those wishing to undertake systematic reviews in the field of education. It will also develop and maintain a database of reviews and other educational research. Useful publications on systematic review methodologies are accessible via this site.
ESRC UK Centre for Evidence Based Policy and Practice http://www.evidencenetwork.org	The Centre's EvidenceNetwork website is designed to act as a starting point for accessing key literature and information resources on evidence based policy and practice.
Health Development Agency Evidence Base http://www.hda-online.org.uk/evidence/eb2000	Evidence Base pulls together health promotion and health improvement evidence from a wide variety of sources. The evidence is searchable via the site which also includes quality criteria for appraising evidence.
Health Education Board for Scotland http://www.hebs.org.uk	The HEBS Health Promotion Library Scotland is a free national information resource for health promotion and behavioural sciences. The site offers on line access to a range of databases. There is also a specialist subsite (http://www.hebs.com/research/) that aims to disseminate HEBS research to practitioners, policy makers and researchers.
Health Technology Board for Scotland http://www.htbs.org.uk	The HTBS works to improve Scotland's health by providing evidence based advice to NHS Scotland on the clinical and cost-effectiveness of new and existing health technologies. Reports are available on-line.
Health Technology Assessment http://www.hta.nhsweb.nhs.uk	This is a national programme of Department of Health funded research designed to produce user-friendly, high quality research information on the costs, effectiveness and broader impact of health technologies. Research reports are accessible on-line.
Interactive primer on systematic reviews http://www.comp.leeds.ac.uk/comir/people/eberry/sysrev/	This interactive site explains what a systematic review is and explores how and why they are carried out. The site includes a quiz to test your knowledge of systematic reviews.
National Institute for Clinical Excellence http://www.nice.org.uk	NICE commissions reviews and provides guidance on current 'best practice' for patients, health professionals and the public. Publications are accessible through the website.
NHS Centre for Reviews and Dissemination http://www.york.ac.uk/inst/crd	CRD carries out systematic reviews on selected topics in the health care field and maintains a database of reviews (DARE). A number of useful documents, including *Undertaking systematic reviews of research on effectiveness: CRD report no 4,* are accessible on-line.
Netting the Evidence http://www.shef.ac.uk/~scharr/ir/netting/	Netting the Evidence is intended to facilitate evidence based healthcare by providing support and access to helpful organisations. It also provides access to useful learning resources, such as an evidence based virtual library, software and journals.
Social Care Institute for Excellence http://www.scie.org.uk	SCIE is a newly established organisation. It will commission reviews of research and practice, and of the views, experience and expertise of users and carers. These reviews will be available on the website.

7. Conclusions

The emphasis on research synthesis is an important strand in the evidence based policy debate. To quote again from Adrian Smith's address to the Royal Statistical Society:

> But what is so special about medicine? We are, through the media, as ordinary citizens, confronted daily with controversy and debate across a whole spectrum of public policy issues. But, typically, we have no access to any form of systematic 'evidence base' – and, therefore, no means of participating in the debate in a mature and informed manner. Obviously topical examples include education – what does work in the classroom? – and penal policy – what is effective in preventing offending? (Smith, 2000)

There are a wide variety of approaches to reviewing evidence, from traditional literature reviews, to rapid reviews and systematic reviews. Traditional reviews offer a summary of a number of different studies and sometimes draw conclusions about a particular intervention or policy. Rapid reviews are carried out to meet pressing policy demands or to lay the ground for a more comprehensive, systematic review. Policy makers also use review methods, such as specially commissioned scoping studies and briefing papers, to inform policy developments. These reviews tend to summarise a number of different studies as part of a wider discussion of a particular policy issue. A recent article by Petticrew (2001) summarised the main differences between systematic reviews and more traditional reviews in the table reproduced below.

Table 5. Systematic reviews and traditional reviews compared (Petticrew, 2001)		
	Good quality systematic reviews	**Traditional reviews**
Deciding on review question	Start with clear question to be answered or hypothesis to be tested.	May also start with clear question to be answered, but they more often involve general discussion of subject with no stated hypothesis.
Searching for relevant studies	Strive to locate all relevant published and unpublished studies to limit impact of publication and other biases.	Do not usually attempt to locate all relevant literature.
Deciding which studies to include and exclude	Involve explicit description of what types of studies are to be included to limit selection bias on behalf of reviewer.	Usually do not describe why certain studies are included and others excluded.
Assessing study quality	Examine in systematic manner methods used in primary studies, and investigate potential biases in those studies and sources of heterogeneity between study results.	Often do not consider differences in study methods or study quality.
Synthesising study results	Base their conclusions on those studies which are most methodologically sound.	Often do not differentiate between methodologically sound and unsound studies.

There is increasing interest in the systematic review as an approach to research synthesis. This paper has outlined the ways in which systematic reviewing presents a distinctive approach to synthesising research. It has explored the aspects of this approach that present challenges for researchers beyond the field of clinical medicine, and highlighted the ways in which synthesis can be strengthened by adding in some of the ingredients used to make a systematic review. For example, we have identified some of the advantages of using protocols, developing and carrying out comprehensive searches and clearly articulating the research question the review is designed to explore. However, we also identify ways in which the traditions and experiences of social scientists can contribute to the development of systematic review methodology. Particular strengths include experience of involving users in the development of research questions, and in combining methods to explore complex issues.

It will only be by trying to adapt these methods to fit our purposes that policy researchers will be able to develop approaches to research synthesis that serve the evidence based policy and practice agenda. A number of reviews are now appearing that seek to use systematic review methodologies to explore non-clinical policy questions (Atkinson, 2001; Quilgars, 2000). The next step will be to continue exploring 'through doing' the potential of new approaches to synthesis in order to develop some alternative models of good practice. Pawson (2001a&b) has already introduced the concept of realistic synthesis. There might also be scope for developing 'pragmatic' or 'policy focused' approaches to reviewing. Pragmatism is not a new idea to policy researchers, who are used to working in a climate where resources and funding opportunities shape the everyday business of research.

There should be scope for using the principles developed for systematic reviews, in ways that meet the needs of policy makers and policy researchers. Later Working Papers in this series will seek to develop review methodologies and will explore the issue of assessing the quality of research for inclusion in reviews. We will also focus on the issue of research utilisation. After all, as policy researchers we are keen to carry out reviews of research that can be used to inform both policy and practice.

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Appendix 1

Abbreviations

CMPS: Centre for Management and Policy Studies

CRD: NHS Centre for Reviews and Dissemination

DfEE: Department for Education and Employment

DfES: Department for Education and Skills

EPPI-Centre: Evidence for Policy and Practice Information and Co-ordination

ESRC: Economic and Social Research Council

HDA: Health Development Agency

HTA: Health Technology Assessment

NICE: National Institute for Clinical Excellence

PAT: Policy Action Team

PIU: Performance and Innovation Unit (Cabinet Office)

RCT: Randomised Controlled Trial

SCIE: Social Care Institute for Excellence

Appendix 2

Glossary

Campbell Collaboration

The Campbell Collaboration was established in 2000 and will carry out systematic reviews of interventions in the fields of education, criminal justice and social work. It is intended that the Campbell Collaboration will work closely with the Cochrane Collaboration, as demonstrated by the establishment of the joint Cochrane-Campbell Methods group.

Cochrane Collaboration

Building on the work of epidemiologist Archie Cochrane, the Cochrane Collaboration was formally established in 1993. It is committed to preparing and maintaining systematic reviews of health care interventions which are accessible via the Cochrane Library (http://www.update.software.com/cochrane.htm).

Cochrane Review

A Cochrane Review is a systematic, up-to-date summary of reliable evidence of the benefits and risks of healthcare. Cochrane Reviews are intended to help people make practical decisions. For a review to be called a 'Cochrane Review' it must be in the Parent Database maintained by the Cochrane Collaboration. The Parent Database is composed of modules of reviews submitted by Collaborative Review Groups (CRGs) registered with the Cochrane Collaboration. The reviews contributed to one of the modules making up the Parent Database are refereed by the editorial team of the CRG, as described in the CRG module. Reviewers adhere to guidelines published in the Cochrane Reviewers' Handbook. The specific methods used in a Cochrane Review are described in the text of the Review. Cochrane Reviews are prepared using Review Manager software, also known as RevMan, provided by the Collaboration, and adhere to a structured format that is described in the Handbook. (Cochrane definition)

Gold Standard

The Gold Standard is a method, procedure or measurement which is widely conceived to be the best available, against which new interventions should be compared. It is especially important in the context of diagnostic testing. (CRD definition)

Grey Literature

Grey literature are publications which are usually not produced in large quantities, are not widely distributed, and are often not listed in commonly used abstracts and indexes. (CRD definition)

Hierarchy of Evidence

Study designs are often grouped together into a hierarchy according to their validity, or degree to which they are not susceptible to bias. The hierarchy indicates which studies should be given most weight in a synthesis. In a medical context, well-designed randomised controlled trials are usually seen as being at the top of the hierarchy, whereas observational studies or expert opinion are seen as low down. (adapted CRD definition)

Meta-analysis

The use of statistical techniques in a systematic review to integrate the results of included studies. Sometimes used as a synonym for systematic reviews, where the review includes meta-analysis. (Cochrane definition)

Protocol

A protocol is a plan giving details of all the steps that will be followed in a scientific investigation. (CRD definition)

Systematic review (synonym: systematic overview)

A review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies. See also Cochrane Review. (Cochrane definition)

Appendix 3

This data extraction tool was developed for a literature review on the attitudes and aspirations of older people (Boaz, Hayden and Bernard, 1999).

Basic data extraction tool	
Details of publication Author Title Source (journal, conference etc.) Year/volume/pages/country of origin Institutional affiliation	
Research question Aim	
Study design When was the fieldwork conducted?	
Participation in the study Target population Exclusion criteria Recruitment procedures Characteristics of participants (age, sex, social class, ethnicity, geographical location, health status, income status, other information)	
Research tools What were the research tools used? Where were they piloted? Was a specific attitude scale used? Which?	
Theory Was any theory referred to in the research? Give details	
Ethics Was ethics committee approval obtained?	
Analysis Statistical techniques used Qualitative analysis techniques used Computer analysis tools used	
Reviewers decision Is the study methodologically sound (see decision tools)? Is it relevant to the review topic? Is it to be included?	