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Systematic reviewing

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Liz Victor is currently undertaking PhD research at the University of Nottingham focused upon interventions for carers. This includes the conduct of a systematic review. Previously Liz worked for a research agency undertaking quantitative and qualitative research on a range of topics.

- **Systematic reviews are a method of identifying and synthesising all the available research evidence of sufficient quality concerning a specific subject.**
- **The aim is to review and synthesise evidence in a transparent and rigorous way to enhance the validity and reliability of the findings.**
- **There are three main approaches to undertaking a systematic review in the social sciences: traditional, extended and/or adapted, and integrative.**
- **Systematic reviews are undertaken through a staged process covering: definition of the review scope, questions and protocol; search for and selection of evidence; quality appraisal of evidence; data extraction and synthesis; and reporting and dissemination.**

Systematic reviewing has been developed as a specific method of identifying and synthesising research evidence. It is distinguished from a traditional literature review by a particular emphasis upon the following features. As far as possible, it should be comprehensive in its coverage of the literature; pay careful attention to the quality of included evidence; take a clear, systematic approach to the synthesis of the data; and generally follow transparent and rigorous processes. These features are designed to allow greater validity and reliability to be attributed to the synthesised findings. This is the main and critical benefit of a systematic review and the principal justification for the significant resources generally required to conduct this type of review.

Systematic reviews may be particularly useful for disseminating the key findings of large, complex bodies of research literature to policymakers and practitioners who are unlikely to have the time themselves to consider carefully the validity and reliability of individual studies. They also offer an opportunity for the social research community to consider its own efforts in terms of the quality of existing research and its reporting and to avoid duplication of effort (Oakley, Gough, Oliver, & Thomas, 2005). The synthesis of evidence in some of the particular ways used in systematic reviews may also produce

new findings in relation to a social policy or issue that might not be achieved through a more traditional literature review.

Whilst systematic review methodology is united by these common features, three broad alternative approaches to systematic reviews have been developed within the social sciences. Summaries of the nature of these and some of their main advantages and disadvantages are outlined in Table 1.

The first, 'traditional' method, originating in clinical medicine, has been applied directly in the social sciences to questions concerned with measuring the outcomes of social policy programmes. It has also been the underlying influence in approaches developed specifically for the social sciences to answer a wider range of questions and to draw upon a more diverse evidence base. These have both extended and adapted the traditional methodology. Most social science systematic reviews, which are still concentrated in the area of social policy, have taken this approach. However, as well as assessing intervention outcomes, they may also consider the processes underlying interventions and the views of the social actors involved.

A recent and very interesting set of approaches, the integrative, challenges the way in which these reviews have cumulated knowledge. The aim of this approach is to test and build theory through the review. This has also been primarily developed in the area of social policy, but the method could be applied to any area of social science enquiry. Indeed, the concerns raised in systematic review methodology about the comprehensiveness and quality of evidence and the transparency and reliability of review processes are potentially relevant issues for a review of any kind in the social sciences.

	Traditional	***Extended***	***Integrative***
Summary of approach	Originated in clinical medicine where it was designed to reach rigorous conclusions about the effects of medical interventions.	Covers a range of approaches, involving extension and/or adaptation of the traditional approach to widen its use and applicability within the social sciences.	An emerging set of approaches based upon the view that knowledge should be cumulated in an integrative rather than an additive way.
Key methodological features	A highly prescribed, staged methodology. Prioritises the inclusion of randomised controlled trials whose data is extracted via a standardised template, pooled and analysed through statistical meta-analysis.	Varying extensions and/or adaptations of the traditional staged methodology. Potentially includes a wide range of types of research and accordingly various approaches to quality appraisal. A narrative form of synthesis is often used.	Centred upon theory development. A less prescribed, more iterative process which proceeds according to the researcher's expertise and judgement. Purposive sampling and appraisal of evidence.
Research questions best addressed by this approach	Questions measuring the effect of an intervention. For example, what reduction in the level of homelessness does a new government programme cause?	Intervention effect questions where little RCT evidence is available. Also questions about intervention processes and actors' views of interventions. For example, what are homeless people's views of a new government programme?	Any question about the social world concerned with building theory. For example, what theoretical model best explains how a new government programme designed to tackle homelessness works?
Main advantages	Findings have high validity and reliability. Others can easily scrutinise the processes used and judge quality.	Flexible and sensitive to the nature of the social world and accordingly to the value and use of different kinds of social research.	Can produce sophisticated theory allowing understanding to be related to diverse social contexts.
Main disadvantages	Randomised controlled trials may be difficult to conduct practically and ethically in the social sciences. Suitable only for a very restricted type of research question.	There could be a danger of losing the clarity of purpose and focus of the other more tightly defined approaches to systematic reviewing.	Not necessarily comprehensive. The processes of quality appraisal may not be as clear. Likely to be less transparency making it harder for others to judge the validity of findings.
Sources of further information	Cooper & Hedges, 1994	EPPI Centre, 2007, Petticrew & Roberts, 2006	Dixon-Woods et al., 2006, Pawson, 2006

Table 1: Toolbox of approaches to systematic reviewing

The three approaches to systematic reviews all cover some key stages, albeit the integrative approach tends to do this in a more iterative and flexible way than the others. The staged process of a systematic review can be divided broadly into: a definition of the review scope, questions and protocol; the search for and selection of evidence; quality appraisal of evidence; data extraction and synthesis; and reporting and dissemination. Some key considerations relating to each stage of this process are now discussed in more detail.

Stages of the systematic review process

Review scope, questions and protocol

The first step of a systematic review is to define its scope and aims. It may be important to involve stakeholder groups, for example, policy makers, practitioners, researchers and service users in this process and throughout the review (Coren & Fisher, 2006). This can help to ensure that the review is relevant to those who may use or be affected by it. It can also be helpful to conduct some initial scoping searches to develop an idea of the extent and nature of the literature to inform the review scope and questions.

Once the review questions have been agreed, a protocol is normally written. This is a detailed, technical description of the methods to be used in the review. This is to ensure that the methods are systematic and rigorous and that there is transparency so that others can assess any bias in the process. Some specific structures for review protocols have been set out by relevant bodies (see, for example, Campbell Collaboration, 2001).

Searching for and selection of evidence

Specific criteria for the evidence to be included are designed to ensure that the evidence is likely to answer the review question appropriately. A search strategy is then developed to locate all the relevant evidence. This should be as comprehensive as possible in order to avoid bias arising through the inclusion of only particular types of evidence. The types of evidence which could be covered include: published and unpublished research; 'grey' literature, for example, government reports; theses; conference reports; and research in progress. Methods for identifying evidence include: searches of databases and research registers; citation tracking; and contact with academics and other specialists in the field. Search terms are devised for use in databases. These are often quite complex and require careful testing. The balance between sensitivity (the power to identify all articles on a particular topic) and specificity (the ability to exclude irrelevant articles from the result) must be carefully considered. The evidence identified by the search strategy is then screened against the inclusion criteria of the review, before it is quality appraised.

Quality appraisal

An important part of the systematic review process is assessing the quality of the evidence included. This allows judgements to be made about the strength of the conclusions of the review.

Various tools have been developed to appraise the quality of research. Selection of the appropriate tool will depend upon the type of evidence being included in the systematic review. For reviews focused upon evaluating intervention outcomes, generally evidence is prioritised according to the research design with randomised controlled trials as the 'gold standard' because of their high internal validity. Quality appraisal measures have also been developed to evaluate non-randomised intervention studies. These have been comprehensively identified and assessed by Deeks et al (2003). There has also been much work to consider how best to appraise the quality of qualitative research for reviews. One useful example is a tool developed for the UK government (Spencer, Ritchie, Lewis, & Dillon, 2003).

It is also important to review the quality of the processes of the systematic review itself. For example, commonly, quality appraisal is undertaken by two reviewers and their individual assessments cross-checked.

Data extraction and synthesis

Relevant data from included studies is generally extracted according to a standard template and stored in a database. The data extracted includes methodological details such as the sample characteristics and methods of analysis as well as the detailed findings.

The data is then synthesised. The method of synthesis will again depend upon the type of evidence which has been included and the review questions. A review that has prioritised the inclusion of controlled trials in order to establish intervention effect measurements will ideally use statistical meta-analysis to synthesise the data (Cooper & Hedges, 1994). A narrative form of synthesis has commonly been used instead in systematic reviews of social interventions where trial data is non-existent or limited (Popay et al., 2006). This involves describing synthesised findings through narrative in a structured way often linked to the tabular presentation of key data. Different approaches may be used in reviews which synthesise qualitative research. For example, meta-ethnography may be undertaken in which qualitative themes across pieces of research are analysed to identify concepts and themes which transcend individual datasets (Noblit & Hare, 1988). Integrative reviews also draw upon thematic synthesis with an explicit focus upon linking themes in theoretical models or frameworks.

Some interesting mixed methods approaches are also being developed for use in reviews which include different types of data or address questions with sub-parts of a different nature, for example, 'what' and 'why' (see, for example, Oliver et al., 2005).

Reporting and dissemination

Systematic reviews are often undertaken to inform policymakers and practitioners. Report production and dissemination are therefore critical parts of the process. Reports generally include an introduction, the methodological protocol, commentary on the nature of the evidence identified, detailed findings and conclusions and recommendations. It is important that the outputs are presented in an accessible way to reach a range of audiences, for example, through the use of summaries. However, detailed, technical appendices of methods also need to be included to allow the reader to judge the validity of the review's methods.

The future of systematic reviewing in the social sciences

The literature and debates on systematic review methodology in the social sciences are growing and methods will continue to develop. This is to be welcomed as systematic reviews offer an important means of considering the cumulative insight of large and complex bodies of research in a transparent and rigorous way. This has primarily occurred in the area of social policy to date. However, many of the underlying concerns about the comprehensiveness and quality of evidence and the transparency and reliability of review processes are potentially of relevance to anyone conducting a review in an area of social enquiry.

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Other good sources of information about systematic reviews in the social sciences include:

- the journal, *Evidence and Policy*
- the website of the Evidence Network, http://www.evidencenetwork.org
- the website of the Campbell Collaboration, http://www.campbellcollaboration.org

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