

# DOING A SYSTEMATIC REVIEW

A Student's Guide

2<sup>nd</sup> Edition

Edited by  
**Angela Boland**  
**M. Gemma Cherry**  
**Rumona Dickson**



# **DOING A SYSTEMATIC REVIEW**

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# Online Resources



*Doing a Systematic Review* is supported by a wealth of online resources for both students and lecturers to aid study and support teaching, which are available at: <https://study.sagepub.com/doingasystematicreview2e>

- **WATCH ...** A FAQ video series, in which the editors address the most common systematic review challenges. Your very own team of supervisors is on hand to provide advice on everything from writing a protocol and conducting scoping searches to data extraction and meta-analysis.
- **EXPLORE ...** the Links Library, which gives you a host of online resources to help you tackle the systematic review process. Including links to organizations that specialise in conducting systematic reviews, software that can help you organize your own project and additional video. The editors have scoured the internet and carefully curated this tool kit of useful resources just for you.
- **READ ...** example reviews, journal articles and further guidance on the review process. These resources will allow you to see what a systematic review looks like in practice and provide you with a more in-depth understanding of the method generally.

# About the Editors

This book is largely the result of the collaboration of researchers who are, or have been, linked to the Liverpool Reviews and Implementation Group (LRiG). This research group was established in 2001 and the major focus of their work is related to conducting systematic reviews of clinical and cost-effectiveness evidence. Members of the group also have experience in supervising and supporting students who are conducting systematic reviews as a part of their academic endeavours.

**Dr Angela Boland** has worked at LRiG since it was established in 2001. During this time she has carried out many systematic reviews of both clinical effectiveness and cost-effectiveness of healthcare interventions. As Associate Director of LRiG, she has also managed and proofread many others. She has an undergraduate degree in Economics and Spanish, a Master's degree and PhD in Health Economics, and a Postgraduate Certificate in Learning and Teaching in Higher Education.

**Dr M. Gemma Cherry** is a lecturer in Clinical Health Psychology at the University of Liverpool and an honorary clinical psychologist at the Royal Liverpool University Hospital. Prior to qualifying as a clinical psychologist, she worked at LRiG for several years, conducting systematic reviews, particularly in the field of psychology. She was awarded her undergraduate degree in Psychology from Newcastle University in 2005, her PhD in Medical Education from the University of Liverpool in 2013 and her doctorate in Clinical Psychology from the University of Liverpool in 2016. Gemma is a strong believer in evidence-based practice and that primary research should be underpinned by systematic reviews.

**Professor Rumona Dickson** has been involved in the conduct of systematic reviews in healthcare for over 20 years and has been the Director of LRiG since 2001. During that time she has also been involved in a number of Master's programmes that have promoted the use of systematic reviews as a learning tool to help students better understand the role of research in the evolution of health policy and practice. It is these experiences that prompted her to convince her colleagues to contribute to the first edition of this book.



# About the Contributors

**Ms Sophie Beale** joined LRiG in 2011 after having spent 11 years at the University of York carrying out economic evaluations and service reviews in a range of treatment areas for pharmaceutical, National Health Service (NHS) and government clients. Her main role within LRiG is to contribute to analyses of the cost-effectiveness of new pharmaceutical products and she also enjoys contributing to other types of studies when time allows. Sophie is midway through her PhD at the University of Liverpool.

**Mrs Michaela Brown** has worked as a statistician at the University of Liverpool since 2009. During that time she has developed her skills in meta-analysis methods and has worked on a number of systematic reviews of healthcare interventions. Her main areas of expertise are the design, conduct and analysis of randomized controlled trials. She has an undergraduate degree in Psychology and Statistics from Newcastle University and a Master's degree in Statistics from Lancaster University.

**Dr Tamara Brown** has worked as a systematic reviewer since 2001. Tamara worked at LRiG from 2009 to 2012 and is now at both the University of Durham and Teeside University. She has conducted a number of systematic reviews on behalf of the UK Health Technology Assessment Programme and for the Cochrane Collaboration. She has also contributed to National Institute for Health and Care Excellence (NICE) guidance. Her main areas of research are in public health, specifically the prevention and treatment of obesity in children and adults.

**Dr Yenal Dundar** has worked as a researcher conducting systematic reviews on a wide range of topics in healthcare since 2001. During that time he has developed particular skill in the area of systematic identification of evidence, which is an essential step in the systematic review process. Yenal is a former general practitioner, and is working in Mersey Care NHS Foundation Trust as a consultant psychiatrist. He was



awarded an MPhil from the Faculty of Medicine, University of Liverpool in 2006, Membership of the Royal College of Psychiatrists in 2010 and the Certificate of Completion of Training in General Psychiatry in 2013.

**Mr Nigel Fleeman** has been a researcher at the University of Liverpool since November 1994. Originally working in public health, he conducted a number of relatively short primary and secondary research projects for local NHS bodies before he joined LRiG in October 2006. Much of his work since has been to conduct systematic reviews, on behalf of the UK Health Technology Assessment Programme and the Cochrane Collaboration, on a wide variety of topics. Examples include reviews to investigate the effectiveness of cancer treatments, pharmacogenetic testing, interventions aimed at reducing iron overload in patients suffering with chronic anaemia and self-management strategies for people with epilepsy. Nigel has a Master's degree in Public Health from the University of Liverpool.

**Dr Janette Greenhalgh** has worked as a systematic reviewer at LRiG since October 2006. During that time she has conducted a number of systematic reviews on behalf of the UK Health Technology Assessment Programme and also for the Cochrane Collaboration on a wide variety of topics including cardiovascular disease, lung cancer, sickle cell disease and epilepsy. Janette has a PhD in Psychology from Bangor University and a PGCE in Adult Education from Llandrillo College.

**Ms Juliet Hounsome** began working at LRiG in 2005 as a clinical reviewer working on both single technology assessments for NICE and health technology assessments for the Health Technology Assessment Programme. In addition, Juliet carried out large-scale updates of systematic reviews of prevention and intervention strategies, and of risk assessment tools for populations at high risk of engaging in violent behaviour. As a consequence of these updates, Juliet has registered for a PhD and is developing and validating an additional manual for the Structured Assessment of Protective Factors for Violence (SAPROF) to be used with people with intellectual disabilities.

**Professor Elizabeth Perkins** is Director of the Health and Community Care Research Unit (HaCCRU) and William Rathbone VI Chair of Community Nursing Research at the University of Liverpool. She has spent 20 years undertaking research studies in the field of health and social care policy. Before working at the University of Liverpool, Elizabeth worked at the Policy Studies Institute, undertaking large-scale surveys and small-scale in-depth qualitative studies for a range of funders including the Department of Health. She took up the post of the Director of HaCCRU in 1997 and has since specialized in undertaking qualitative studies, often using grounded theory, in the fields of mental health, ageing and addiction.



**Mrs Gerlinde Pilkington** worked as a researcher with LRiG from 2009 to 2016 and is now at Liverpool John Moores University. She has a background in history and Classics, and an MA in Research Methodology, focusing on social policy. She has worked on systematic reviews covering a wide range of topics including mental health, cancer treatments (focusing on treatment for older people), community well-being and dentistry, and really enjoys the challenges and diversity each project brings. Gerlinde has also contributed to the organization and delivery of systematic review teaching workshops, and is building university-wide networks to support colleagues undertaking evidence synthesis.

**Ms Marty Richardson** was awarded a BSc in Mathematics in 2011 and an MSc in Statistical Epidemiology in 2012 from the University of Leeds. Since joining LRiG in 2013, she has provided statistical support on systematic reviews and meta-analyses. Marty also works with the Cochrane Infectious Diseases Group, and is undertaking a part-time PhD on the meta-analysis of pharmacogenetic studies.

**Dr Helen Smith** is a senior research associate in the Centre for Maternal and Newborn Health at Liverpool School of Tropical Medicine. She is a social scientist with a disciplinary background in demography and human geography. She has 18 years' experience in leading and contributing to research projects, and teaching on postgraduate programmes in international health. Early in her career, she authored systematic reviews with the Cochrane Infectious Diseases and Pregnancy and Childbirth groups. While recognizing the value of producing systematic reviews on priority health topics, Helen became more interested in how review evidence was being used in policy and practice; this led to her PhD, which in turn led to the implementation of evidence-based obstetric care in South Africa. She has authored several systematic reviews of qualitative research relating to health problems in low- and middle-income countries including tuberculosis, malaria, childhood illness and maternal health. Helen has also led qualitative evidence syntheses commissioned by the World Health Organization for use in guideline development. She believes that policymakers need many different types of evidence for decision-making, and that systematic reviews of views and experiences of interventions and barriers to implementation are just as important as reviews of intervention effects.





# Foreword

Conducting a systematic review is a 'journey [where] you want a companion who knows what they are talking about'. In my Foreword to the first edition of this ground-breaking text, I borrowed the authors' extended journey analogy to explain what my students, and myself as their supervisor, need from such a practical guide. I am delighted to report that this expanded pool of authors for the second edition has, if anything, surpassed itself in delivering this revised, updated and extended version.

For my students, I want a text that is both readable and practical; a source of know-how to which they can turn when seeking to add some colour and detail to my monotonous on 'what to do'. This text is populated with tables, figures and frequently asked questions that will help my students to consolidate and extend my advice from supervision meetings, delivered in a vibrant, energetic and, above all, convivial style.

But why would I, as a supervisor, the driver of a juggernaut referenced in the 'Further Reading and Resources' sections of this book, want to 'swap vehicles' for the company of this University of Liverpool-based team? Quite simply – to enjoy the view! Placing myself in the capable hands of this trusted guide allows me to draw on their practical tips and concise explanations without the nagging fear that I've missed something. While a guide of this sort can't necessarily have all the answers, the authors have collectively done a marvellous job in identifying all the junctions, landmarks and potential pitfalls. In their preface, the editorial team states that they have enhanced their metaphorical truck with the addition of a trailer: namely the multiple tools that populate the different chapters of the book. From the sample filing system of Chapter 2 to the 'What an examiner is looking for in your thesis' features that conclude most chapters, I found myself continually making mental notes for future reference. If you want to be able to travel light, unencumbered by unnecessary baggage, making steady progress to successfully complete your own personal unique review journey, then climb on board!

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Reader in Evidence-Based Information Practice  
School of Health and Related Research (SchARR)  
University of Sheffield

# 10 STEP

## roadmap to your systematic review

### Step 1 Planning your review

### Step 2 Performing scoping searches, identifying the review question and writing your protocol

### Step 3 Literature searching

### Step 4 Screening titles and abstracts

### Step 5 Obtaining papers

### Step 6 Selecting full-text papers

### Step 7 Data extraction

### Step 8 Quality assessment

### Step 9 Analysis and synthesis

### Step 10 Writing up, editing and disseminating

#### Step 1 Planning your review

- ☐ Find out your submission deadline and work backwards from then to plan your time
- ☐ Check out how much contribution from others is permitted by your institution
- ☐ Identify potential collaborators for specific review tasks
- ☐ Think about the advantages and disadvantages of learning and using specialist software
- ☐ Obtain guidance from your institution about how your review should be presented

#### Step 7 Data extraction

- ☐ Identify the data that you want to extract
- ☐ Build and pilot your data extraction form or data extraction table(s)
- ☐ Extract relevant data
- ☐ Complete the data tables for inclusion in your thesis

#### Step 8 Quality assessment

- ☐ Note the design(s) of your included studies
- ☐ Identify the type(s) of quality assessment tool(s) to suit your review
- ☐ Choose appropriate quality assessment tool(s)
- ☐ Carry out quality assessment using the appropriate tool(s)
- ☐ Tabulate and summarize the results of your quality assessment
- ☐ Think about how the quality assessment results might impact on the recommendations and conclusions of your systematic review



## **Step 2** Performing scoping searches, identifying the review question and writing your protocol

- ☐ Identify a topic area of interest to you
- ☐ Carry out early scoping searches
- ☐ Focus your ideas to define the scope of the review
- ☐ Finalize your review question and develop your inclusion and exclusion criteria
- ☐ Consider contacting experts in the topic area
- ☐ Write a review protocol

## **Step 5** Obtaining papers

- ☐ Obtain the full text papers of all potentially eligible references

## **Step 6** Selecting full-text papers

- ☐ Use your screening and selection tool to help you identify full-text papers for inclusion in review

## **Step 9** Analysis and synthesis

- ☐ Report your extracted data in your thesis
- ☐ Choose an appropriate method of analysis/synthesis
- ☐ Combine data narratively or statistically in line with your chosen method of analysis/synthesis
- ☐ Present the results of your chosen method of analysis/synthesis

## **Step 3** Literature searching

- ☐ Think about how comprehensive your search needs to be
- ☐ Consider the different types of evidence available to you
- ☐ Identify the specific bibliographic databases that you will search for evidence
- ☐ Identify and refine your key search terms
- ☐ Search bibliographic databases using your final search strategies and collate citations
- ☐ Consider complementary searching activities

## **Step 4** Screening titles and abstracts

- ☐ De-duplicate references
- ☐ Develop and pilot your screening and selection tool
- ☐ Screen all of your titles and abstracts identified via searches against your inclusion and exclusion criteria

## **Step 10** Writing up, editing and disseminating

- ☐ Ensure that you adhere to institutional guidelines regarding presentation and content
- ☐ Be consistent in use of language and abbreviations, and in reporting and referencing styles
- ☐ Ensure sufficient time for write-up and dissemination



# Preface

Welcome to the second edition of *Doing A Systematic Review: A Student's Guide*! It strikes us as odd that the preface to the second edition of a book usually assumes that the reader is familiar with the first edition. We don't want to start our preface by launching into what is different in this edition compared with the first edition. Instead, we want to be different! So, with that in mind, we want to first welcome you to this book, and give you a bit of history about *Doing a Systematic Review: A Student's Guide*.

## Why did we write this book?

There are a variety of excellent books written by systematic review experts that provide the 'How to...' of carrying out a systematic review. Why, then, in 2013, did we think it was necessary to write a new one for students? Well, we wrote the first edition of this book for two reasons.

First, we have long held a strong conviction that carrying out a systematic review as a postgraduate research project can yield excellent learning opportunities for students. Increasingly, academic and scientific communities are also acknowledging the value of this research activity. Conducting such a review requires insight into the fundamentals of research. Students learn to develop research questions, critique research findings and, most importantly, synthesize findings and make recommendations regarding how to use results in professional practice. These are valuable skills for students to learn, no matter what their academic or professional discipline.

Second, we wanted to reflect on the systematic review process from the viewpoint of a student working independently (most likely at Master's level, but perhaps at undergraduate or doctoral level) to undertake a systematic review as part of their academic programme. Even though the 'How to...' books are useful to students, they



frequently don't focus on the 'But what do I do when...?' type questions that so often arise during the review process. These are the questions that students need to know the answers to more or less immediately so that they can move forward with their theses. While we wanted the first edition of our book to provide a comprehensive guide to carrying out a systematic review, we decided to focus more on the *practicalities* of systematic reviewing rather than on the theory underpinning it. We pitched the first edition of this book at students carrying out a systematic review, not simply learning about them.

Understandably, we were a bit nervous about how the first edition of this book would be received. Luckily, there was no need for nerves. Response proved what we believed: that there was a need for an easy-to-read handbook to guide students through their systematic review journey. Fortunately, our publishers agreed, and, in 2016, we began work on the second edition of our book.

## What does the second edition of this book contain?

The second edition of this book contains 12 chapters. The first chapter explains why we think systematic reviews are important, how they came about and why they provide an excellent learning opportunity for students. The remaining chapters focus on the actual systematic review process and offer methodological and practical advice on conducting and reporting this type of research within the format of a postgraduate thesis. As in the first edition, each chapter ends with a 'Frequently Asked Questions' section. These questions have been taken from actual student supervision meetings and highlight the most common challenges encountered during the review process. They include not only the 'What do I do?' types of questions but also the 'Why do I do this?' and the 'What are my options?' types of questions. Our answers set out practical approaches to help students deal with these issues. We know that a lot of students turn to the Internet for further resources, so our publishers have designed a purpose-built website (<https://study.sagepub.com/doingasystematicreview2e>) which contains resources to complement the material in this book; any student can browse our online systematic review materials and search for information that is relevant to their own review. In addition, we have included references to supporting web links and web pages at relevant points throughout this book. Common sense will tell you that these links have a tendency to go out of date quickly – we have tried to reference only well-established organizations, pages and resources, so that if the links no longer work, they can still be accessed via a quick Internet search.

We have drawn on our own extensive experiences of carrying out systematic reviews when writing this book. This means that the book relies heavily on the systematic



review of healthcare interventions using quantitative methods. However, the principles covered in this book are also relevant to students in other disciplines, such as social work or education, where there is encouragement to systematically review current research or practice. We know that there is more than quantitative data to review so we have included introductions to reviewing qualitative data and health economics data, both of which are currently exciting, controversial and evolving areas of research. We acknowledge that these two sections only offer students a starting point for their review journey, but hope they will inspire students to read more widely around these methodological areas.

## What does this book have to offer you?

We had to make some general assumptions regarding the typical reader of this book. We thought long and hard about the research skills and resources postgraduate students might have at this point in their academic journey. Based on this, we have assumed that you, the typical reader of this book, will:

- be carrying out a systematic review as part of your postgraduate study;
- have access to a computer;
- be able to search the Internet;
- have word-processing skills and not be afraid to use them;
- have your own learning objectives relating to either professional practice or to the research process;
- have a specific research area in mind;
- be working (mainly) independently;
- need to meet a set-in-stone deadline.

As with the first edition, we've tried to make the contents of this book useful and easy to read. We've assumed that you want a no-frills approach and each chapter is written with this in mind. The basics of systematic review methods are delivered in bite-sized chunks so that you are not overwhelmed by the enormity of your project. Students tell us that they are happiest (and most productive) when they are in control of their own research and are not reliant on others for data or direction. This book is therefore written to guide you as you take control of your review. We are confident that it will help you move forward at your own pace, particularly when used in conjunction with the digital materials and resources on our website (<https://study.sagepub.com/doingasystematicreview2e>). We know that you will want to excel in your studies so, at the end of most chapters, we have also set out a section on what an examiner might be looking for in the final thesis.



## What's new in this second edition?

One of the most obvious changes to our second edition is the front cover! In keeping with our journey analogy, we have added a trailer to our much-loved truck. This symbolizes the addition of the many extra tools and resources contained both within this book and within our new website (which we are delighted to say is now hosted by our publishers, Sage Publishing).

Within the book itself, there are several significant changes – thank you to our reviewers and readers for their constructive feedback and suggestions. We have rearranged the structure of the book, and have rewritten certain sections to make them easier to understand. Specifically, we have:

- moved the positioning of the 'Planning and Managing My Review' chapter to much earlier in the book, because feedback on our first edition indicated that students valued the advice and information contained within this chapter and felt that it was far too important to be the final chapter;
- split the 'Developing My Search Strategy and Applying Inclusion Criteria' chapter into two chapters, and have included more 'step-by-step' instructions for each activity so as to make the two activities easier to understand and conduct;
- swapped around the 'Quality Assessment: Where Do I Begin' and the 'Data Extraction: Where Do I Begin' chapters, because we felt that this order better reflects the order in which many students conduct these activities;
- changed the title of the 'Understanding and Synthesizing My Numerical Data' chapter to 'Understanding and Synthesizing Numerical Data from Intervention Studies', and added additional content to help students to better understand the complex principles discussed in this chapter;
- significantly supplemented the 'Reviewing Qualitative Evidence' chapter in order to provide students conducting systematic reviews of qualitative evidence with a more comprehensive starting point;
- added more examples from non-health fields and disciplines in order to illustrate the application of systematic review methodology to a variety of topic areas;
- added a 'Further Reading and Resources' section to each chapter to provide students with a guide to exploring the wider literature base.

There are also several notable additions to this edition, the most significant of which is a new chapter that focuses on dissemination (i.e. the sharing of research findings or ideas through avenues such as publication, conference proceedings or academic social media). In the first edition of this book, aside from some brief recommendations about dissemination in the Epilogue, we only really focused on the processes involved in completing a systematic review as part of a Master's thesis. We realize now



that this was an important oversight on our part, so we hope that you enjoy this new addition and that it helps you to recognize the value in disseminating your work.

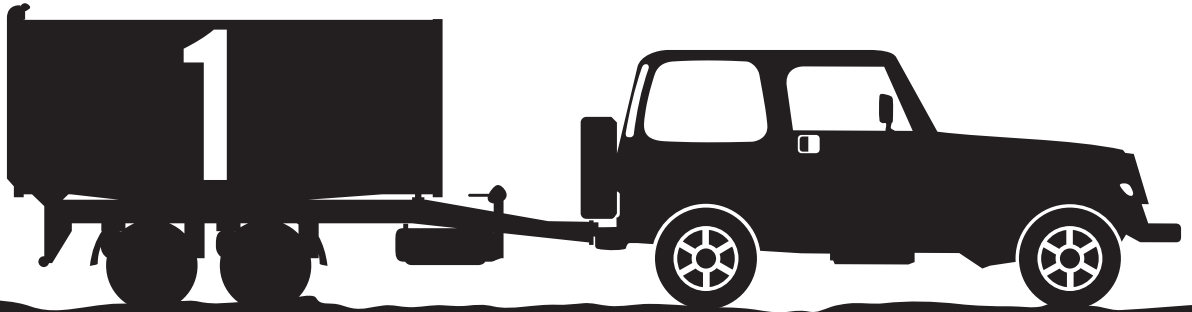
We pitched the tone of the first edition of this book as an informal, friendly ‘advisor’. However, there was inevitably some assumed knowledge, which may have made some sections difficult for the novice reader to understand. We have tried to be mindful of this in our second edition. We haven’t changed our tone, as we believe that this is one of the strengths of our approach, but have included a Glossary of terms to give the reader a more in-depth explanation of terms as they arise. Glossary terms appear in bold type at first mention in the text. If you are unfamiliar with the vocabulary of systematic reviewing, then we encourage you to consult this Glossary frequently until you feel able to fully engage with the content of each chapter.

## Future partnerships

In the preface to the first edition of this book, we stated that we did not see publication of the book as the end of our work with students; rather, we saw it as the beginning of a partnership. We must reiterate this here as we have received so much valuable feedback from students since the publication of our first edition. We will continue to build on the educational resources we have brought together in this book and add to those we’ve provided on our website. We intend to use our materials to support students who are interested in the rewards of systematic review methodology. We therefore encourage both you and your supervisors to submit questions to us via our website (<https://study.sagepub.com/doingasystematicreview2e>), and we look forward to hearing from you about your experiences as systematic reviewers.







# Carrying Out a Systematic Review as a Master's Thesis

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Angela Boland

## **This chapter will help you to...**

- Understand the term 'systematic review'
- Gain an awareness of the historical context and development of systematic reviewing
- Appreciate the learning experience provided through conducting a systematic review
- Become familiar with the methods involved in carrying out a systematic review

## Introduction

In this chapter we introduce you to the concept of systematically reviewing literature. First, we discuss what **systematic reviews** are and why we think carrying out a systematic review is a great learning experience. Second, we give you an overview of the evolution of systematic review methodology. Third, we introduce the key steps in the systematic review process and signpost where in the book these are discussed. Finally, we highlight how systematic reviews differ from other types of **literature review**. By the end of the chapter we hope that you will be confident that you have made the right decision to carry out a systematic review and that you are looking forward to starting your research.

## What is a systematic review?

A systematic review is a literature review that is designed to locate, appraise and synthesize the best available evidence relating to a specific **research question** in order to provide informative and **evidence-based** answers. This information can then be used in a number of ways. For example, in addition to advancing the field and informing future practice or research, the information can be combined with professional judgement to make decisions about how to deliver interventions or to make changes to policy. Systematic reviews are considered the best (**'gold standard'**) way to synthesize the findings of several studies investigating the same questions, whether the evidence comes from healthcare, education or another discipline. Systematic reviews follow well-defined and transparent steps and always require the following: definition of the question or problem, identification and **critical appraisal** of the available evidence, synthesis of the findings and the drawing of relevant conclusions.

## A systematic review: a research option for postgraduate students

As a postgraduate student you may be offered the choice of conducting a **primary research** study (e.g. an **observational study**) or a **secondary research** project (e.g. a systematic review) as part of your academic accreditation. There are very good reasons why you are asked to carry out a research project as part of your studies, the most important being that conducting a research project enables you to both understand the research process and gain research skills.

Systematically reviewing the literature has been accepted as a legitimate research methodology since the early 1990s. Many Master's programmes offer instruction in systematic review methods and encourage students to conduct systematic reviews as part

