1

The Science of Words and the Science of Numbers

PRANEE LIAMPUTTONG

Chapter objectives

In this chapter you will learn:

- about evidence and evidence-based practice
- about different research designs in health
- the nature of qualitative and quantitative approaches
- the usefulness of mixed methods
- about rigour, reliability and validity in research
- about sampling issues

Key terms

Bias
Constructivism
Convenience sampling
Data saturation
Effectiveness/efficacy
Epistemology
Ethnography
Evidence
Evidence-based practice
Knowledge
Knowledge acquisition
Metasynthesis
Mixed methods
Non-probability sampling
Ontology
Phenomenology
Positivism
Pragmatism
Probability sampling method
Purposive sampling
Qualitative research
Quantitative research
Reliability
Research participant
Rigour
Systematic review
Validity
Variable

Introduction

> Knowledge is essential to human survival. Over the course of history, there have been many ways of knowing, from divine revelation to tradition and the authority of elders. By the beginning of the seventeenth century, people began to rely on a different way of knowing—the research method (Grinnell *et al.* 2011a, p. 16).

Knowledge: An accepted body of facts or ideas acquired through the use of the senses or reason, or through research methods.

Knowledge acquisition: The most efficient way of 'knowing something' is through research findings, which have been gathered through the use of research methods.

According to Grinnell and colleagues (2014a, p. 8), **knowledge** is 'an accepted body of facts or ideas which is acquired through the use of the senses or reason'. In the old days, we used to believe that the Earth was flat. Our belief came about through those who were in 'authority', who told us so, or because people in our society had always believed that the world was flat. Now we know that the Earth is spherical because scientists have travelled into space to observe it from this perspective. However, Grinnell and colleagues argue that the most efficient way of 'knowing something' **(knowledge acquisition)** is through research findings, which have been gathered through the use of research methods.

What has knowledge got to do with evidence and evidence-based practice? I contend that it is through our knowledge that evidence can be generated. This evidence can then be used for our practice. Without knowledge, there will not be evidence that we can use. But how can we find knowledge? For scientists and health practitioners, the answer is through research and research methods (Neutens 2014). According to Grinnell and colleagues (2014a, p. 17), the research method of knowing comprises two 'complementary research approaches': the qualitative approach and the quantitative approach. Qualitative research relies on 'qualitative and descriptive methods of data collection'. Data are presented in the form of words, and sometimes as diagrams or drawings, but not as numbers (Patton 2015). The quantitative approach, on the other hand, 'relies on quantification in collecting and analyzing data and uses statistical analyses' (Patton 2015). Data obtained in a quantitative study are presented in the form of numbers, not in the form of words, as is the case for the qualitative approach. These two approaches will be discussed later in this chapter.

Evidence and evidence-based practice

> It is our belief that you must know the basics of research methodology to even begin to use the concept of evidence-based practice effectively (Grinnell & Unrau 2008, p. v).

This quotation expresses the main reason why this book has been written. Thus it is intended to provide the foundations for evidence-based practice (EBP) in health. As I have suggested, evidence can be derived from knowledge and knowledge can be obtained through research.

Evidence: Evidence in the context of EBP is what results from a systematic review and appraisal of all available literature relevant to a carefully designed question and protocol.

Evidence, according to Manuel and colleagues (2014, p. 186), is 'information' that can be used to support and guide practices, programs and policies in health and social care in order to enhance the health and well-being of individuals, families and communities. For example, you might be interested in depression among young people and in the most effective way to assess their risk for suicide and to prevent it. Types of evidence that you may be interested in may include:

- perceptions and experiences of depression and suicide among young people
- factors that are related to the onset of depression in young people
- risk factors and protective factors that are relevant to depression and suicide among young people
- evidence-based methods that can be used to carry out an appropriate assessment of suicide risk
- strategies or interventions that can be used in practice
- prevention programs and policies that can have a positive impact on these health and social problems.

As you can see, there are several types of evidence that you can use to find answers to the questions about the health issue in which you are interested. Now it has to be asked: which type is the 'best' evidence that you can use, and how do you obtain this evidence? This depends on the questions you ask. It has been debated among researchers and practitioners whether there is a universal way to judge which evidence is the best (Altheide & Johnson 2011). Researchers and practitioners come from different disciplines and surely will have different perspectives on the types of evidence they see as useful or not useful for their research purposes and professional practices (Altheide & Johnson 2011; Manuel *et al.* 2014; Liamputtong 2016). What is seen as the best evidence for some researchers and practitioners may not be seen as such by others. It is at this point that I wish to bring up the issue of EBP.

Fundamentally, **evidence-based practice** in the area of health care refers to:

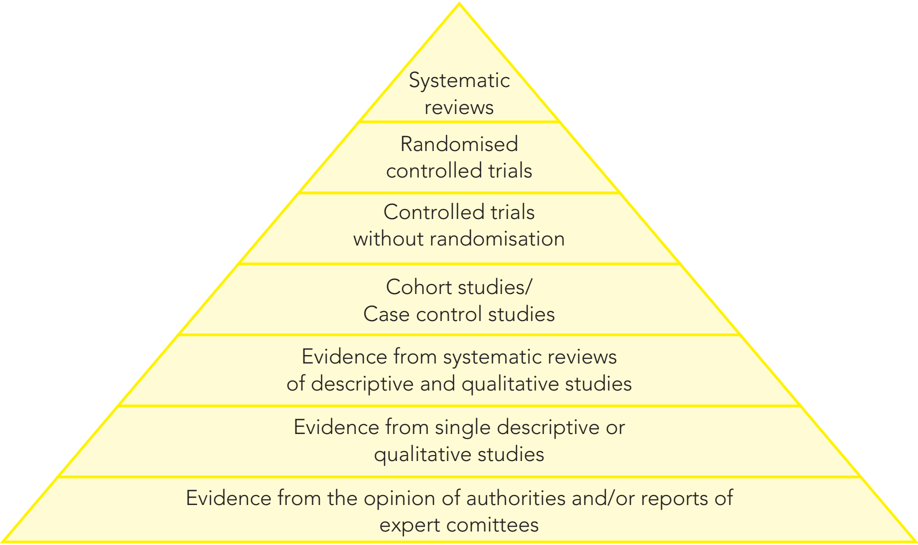
> the process that includes finding empirical evidence regarding the effectiveness and/or efficacy of various treatment options and then determining the relevance of those options to specific client(s). This information is then considered critically, when developing the final treatment plan for the client or clients (Mullen *et al.* 2014, p. 204; see also Chapters 15, 16, 17, 18).

Evidence-based practice: A process that requires the practitioner to find empirical evidence about the effectiveness or efficacy of different treatment options and to determine the relevance of that evidence to a particular client's situation.

One approach for evaluating evidence within the model of EBP is through a hierarchical ranking system (Manuel *et al.* 2014, p. 194; see Chapter 17). Within this system, evidence is evaluated according to the research design that was used to generate it. For instance, when evaluating a health care intervention, a well-designed experiment, specifically a randomised controlled trial (RCT) or, better, the systematic review of a number of RCTs, is perceived as the gold standard (Evans 2003; Aoun & Kristjanson 2005; Packer 2011; Liamputtong 2016; see Chapters 15, 16, 17).

However, the hierarchical ranking system may ignore some of the limitations of RCTs, and neglect observational studies (Aoun & Kristjanson 2005; Packer 2011; Manuel *et al.* 2014; Long 2015). For instance, confidence in the RCT is based on knowing that the research was correctly undertaken (see Chapter 15) but, more often than not, published research using RCTs presents conflicting findings (see Chapter 15). Some researchers argue that a hierarchical approach is

FIGURE 1.1 Hierarchy of evidence



(Adopted from Long 2015, p. 424)

based solely on seeing whether the intervention works as intended, or on the measurement of the **efficacy** of intervention 'with little attention to the appropriateness and feasibility of the interventions in the real practice world' (Manuel *et al.* 2014, p. 193). More importantly, as Packer (2011, p. 37, original emphasis) argued, 'the gold standard also prevents researchers from studying, let alone questioning, the forms of life in which people find themselves and in which things are found. People are *not* in fact independently existing entities. We exist together, in *shared* forms of life.'

More importantly, within this hierarchical system, qualitative evidence is often placed at the bottom of the hierarchy (Grypdonck 2006; Savage 2006; Manuel *et al.* 2014; Long 2015; Liamputtong 2016). In this model, the contribution to EBP of findings from qualitative research is undervalued, and at worst discounted (Gibson & Martin 2003; Aoun & Kristjanson 2005; Grypdonck 2006; Denzin 2009, 2011; Altheide & Johnson 2011; Liamputtong 2016). Qualitative research, despite its increasing contributions to the evidence base of health and social care, is still underrepresented in some health care areas that place a high value on evidence from the hierarchical system (Johnson & Waterfield 2004; Long 2015; Liamputtong 2016). This is in part, as Gibson and Martin (2003, p. 353) suggest, due to 'mistaken attempts to evaluate qualitative studies according to the evidence-based hierarchy, where the status of qualitative research is not acknowledged'. Many qualitative researchers argue that this is flawed, as qualitative studies also employ rigorous methods of data collection and analysis (Johnson & Waterfield 2004; Annells 2005; Hammersley 2005; Denzin 2009, 2011; Houser 2015; Liamputtong 2016). Savage (2006, p. 383), for example, argues that **ethnography**, one of the qualitative research methods, is essentially useful due to 'the attention that it gives to

Effectiveness/ efficacy: A measure used to determine whether the treatment or intervention has an intended or expected outcome. In medicine, however, it refers to the ability of a treatment or intervention to reproduce a desired outcome under ideal circumstances.

Ethnography: A research method that focuses on the scientific study of the lived culture of groups of people, used to discover and describe individual social and cultural groups.

context and its synthesis of findings from different methods'. More importantly, ethnography provides 'a holistic way of exploring the relationship between the different kinds of evidence that underpin clinical practice' (see also Altheide & Johnson 2011; see Chapter 7). Similarly, Houser (2015, p. 400) contends that phenomenological research offers means for finding evidence of nursing practices which 'support and enhance the ways patients respond to the challenges in their health care'. **Phenomenology** is valuable as it allows us to understand 'the ways in which patients react and respond to both everyday experiences and unique events' (see also Chapter 9).

Phenomenology: A methodological approach that seeks to understand, describe and interpret human behaviour and the meaning that individuals make of their experiences.

It is argued that the hierarchical model of evidence is only one way of organising different types of evidence. It is important for health researchers and practitioners to know this, so that they can evaluate the quality of evidence that can be found with respect to a specific health issue (Schmidt & Brown 2015a; Liamputtong 2016). And no doubt it can be very useful for some health practices, for example in therapeutic science (e.g. see Chapters 15, 17). However, Manuel and colleagues (2014, p. 194) believe that 'the decision on what evidence to use should be placed in context with your research study'. Researchers and practitioners need to consider the relevance and feasibility of evidence and whether the evidence accords with the values and preferences of the clients (Houser 2015). And this is what I advocate in this chapter: that we need to consider different types of evidence and that this evidence can be derived from the findings of different types of research (see also Chapter 2). This book will give readers an understanding of the different methods that researchers and practitioners can use or draw on in producing evidence: qualitative methods (see Part II), quantitative methods (see Part III), mixed methods (see Chapters 20, 21) and collaborative approaches (see Chapter 22).

It is worth noting that EBP has emerged from the long-standing commitment among health practitioners to social research and science. But there has been a significant change in how research and practice are related. In the past, according to Mullen and colleagues (2014), research and practice were seen as separate activities and/or as the roles of two different professions. Research was undertaken by researchers to add to the knowledge base, which was eventually drawn upon by practitioners to provide evidence on which to base their practice. Now these differences are blurred, and research and practice are often combined. In EBP, many of the practice questions largely resemble the essential parts of research questions: 'We search for evidence—especially research evidence—to answer our practice questions using established research criteria when the evidence comes from research studies, and we collect data on the processes and outcomes of our interventions' (p. 214).

In EBP, practitioners need to be clear about what is known and not known about any health problem or health practice that will be 'best' for their clients (Mullen *et al.* 2014; Schmidt & Brown 2015a). But all too often, we know little about the particular health problems of some population groups, or about treatment options that are not empirically based (Liamputtong 2016). Although there is research evidence that practitioners may find in existing literature, Mullen and colleagues (2014) argue that there are still many health issues that remain unknown to us. Currently, EBP does not apply to many of the health issues of certain population groups, for example certain ethnic minorities and indigenous groups, recent immigrants and refugees, gays and lesbians, rural communities, and people with uncommon or particularly challenging health problems. In her analysis of the impact of evidence-based medicine (EBM) on vulnerable or disadvantaged groups, Rogers (2004, p. 141) points out that EBM 'turns our attention away from social and cultural factors that influence health and focuses on a narrow biomedical and individualistic model of health. Those with the greatest burden of ill health are left disenfranchised, as there is little research that is relevant to them, there is poor access to treatments, and attention is diverted away from activities that might have a much greater impact on their health.' It is clear that there is a need for more research with different groups of people as part of the EBP process. Also, much of the EBP focus, in terms of both research and application, has been centred on a subset of health issues. Research is needed in other fields, in both health issues and practices.

More importantly, depending on the research or practice question, practitioners may need evidence other than that which relates to the efficacy of interventions, to inform their practice (Aoun & Kristjanson 2005; Manuel *et al.* 2014; Houser 2015; Liamputtong 2016). Evidence that we use in EBP cannot and should not be based solely on the findings of RCTs. Rather, it should be derived from many sources (Hawker *et al.* 2002; Shaw 2011; Houser 2015; Liamputtong 2016). Some health topics or issues are not appropriate for an RCT (Aoun & Kristjanson 2005; Schmidt & Brown 2015a). Fahy (2008, p. 2), for example, contends that most maternity care practices will never be found by RCTs. However, evidence for practice in midwifery is needed so that midwives will be able to help women 'to make the best decisions for themselves by taking the best available evidence into account'. She also suggests that 'a more expansive definition of evidence and evidence-based practice' is needed. Additionally, there are many ethical concerns regarding RCTs (see Chapter 3). For instance, you may be interested in knowing about the meaning and interpretation of body weight because there have been higher rates of diabetes or anorexia nervosa in your city, or you may need to know about the understanding of homelessness among poor families and how they deal with it, because you have noticed that there are increasing numbers of homeless young people in poorer areas of your city. The 'best' evidence for these issues will not be generated by RCTs but by qualitative research. These scenarios illustrate situations where you need to look for other types of evidence.

Therefore, if there is no available evidence that you can find from systematic reviews or from other sources such as the relevant literature, evidence can be obtained by gaining knowledge through your own research. As Shaw (2011, p. 20) contends, '"valid scientific knowledge" can take many forms'. In this book, I argue that evidence can be generated by both qualitative and quantitative research (see also Beck 2009; Schmidt & Brown 2015a; Chapter 2). No doubt, most health care providers will trust the so-called 'hard' evidence obtained through quantitative approaches such as surveys with closed-ended questions, clinical measurements and RCTs (see chapters in Part III). As I have pointed out, the quantitative approach is seen as being empirical science and as being more systematic than qualitative research, so the findings of this approach are regarded as more reliable. But I argue that evidence derived from the qualitative approach can help you to understand the issue and to use the findings in your practice. Qualitative research provides evidence that you may not be able to obtain from quantitative research or from a **systematic review** of quantitative research (Patton 2015; Olsen *et al*. 2016). Seeley and colleagues (2008), for example, point out that the quantitative part of their research, which involved more than 2000 participants, failed to provide a good understanding of some of their findings regarding the impact of HIV and AIDS on families. It was only through the life histories of 24 families that they were able to explain these findings in a more meaningful way. Their study clearly points to the importance of qualitative evidence in health care and practice. Indeed, many researchers have argued that 'qualitative research findings have much to offer evidence-based practice' (Hawker *et al*. 2002, p. 1285; see also Grypdonck 2006; Jack 2006; Daly *et al*. 2007; Meadows-Oliver 2009; Houser 2015; Olsen *et al*. 2016; Chapters 9, 18). As Sandelowski (2004, p. 1382) puts it, 'Qualitative research is the best thing to be happening to evidence-based practice'.

Systematic review: A comprehensive identification and synthesis of the available literature on a specified topic. In a systematic review, literature is treated like data.

Within the emergence of EBP in health care, Grypdonck (2006, p. 1379) contends that qualitative research contributes greatly to the appropriateness of care. She argues that health practitioners need to have a good understanding of:

> what it means to be ill, to live with an illness, to be subject to physical limitations, to see one's intellectual capacities gradually diminish, or to be healed again, to rise from [near] death after a bone marrow transplant, leaving one's sick life behind, to meet people who take care of you in a way that makes you feel really understood and really cared for.

Practitioners may not obtain knowledge from existing literature in order to address these crucial issues of health and illness. Such knowledge can only be gained through the integration of research into their daily work (see Chapter 9, for example). Surely, by gaining a better understanding of the lived experience of patients and clients, health practitioners will be able to provide more sensitive and appropriate care.

I argue here that qualitative enquiry is an essential means of eliciting evidence from diverse individuals, population groups and contexts. In clinical encounters, Knight and Mattick (2006, p. 1084) say this clearly: 'The inclusion of qualitative research within EBM brings closer the link between individual patients' perspectives and "scientific" perspectives'. Long (2015, p. 423) contends that we should not underestimate the contributions of qualitative research because data from qualitative enquiry can offer the perspective of the consumers/patients, which is a crucial part of EBP in health care. The findings from qualitative research can be used to 'enhance evidence-based practice' by integrating the values and preferences of consumers/patients into the guides for health care practice (Houser 2015, p. 34). Houser (2015, p. 388) also suggests that qualitative research is especially valuable in EBP as it allows us to identify the needs, motives and preferences of the patients. Qualitative research is 'helpful in describing the acceptability of an intervention. Interventions that require lifestyle adjustment, attitude changes, or behavioural alterations are particularly well suited to qualitative studies'. Although practitioners must use 'scientific evidence' in their evidence-based health care, they must also 'see a social or human problem through the eyes of the patient' (see also Streubert & Carpenter 2011). Indeed, qualitative enquiry not only offers an in-depth understanding about patients but also 'adds another dimension to quantitative evidence: one based on the human experience' (Houser 2015, p. 389).

In relation to interventions in health care, qualitative research can contribute to many things (Audrey 2011; Young *et al.* 2012; Houser 2015):

- it allows health care providers to pinpoint the needs of people that they serve
- it helps health care providers to develop interventions which are more acceptable to their patients
- it helps health care providers to enhance the understanding of the effect of an intervention from the patients' perspectives within their own social/cultural contexts
- it gives health care providers a more accurate understanding of the reasons for attrition, cessation of treatment, or lack of adherence to a treatment protocol.

However, there is still a sense of distrust of qualitative research. This is mainly due to a perception that qualitative enquiry is unable to produce useful and valid findings (Hammersley 2008; Torrance 2008, 2011; Houser 2015), a perception that stems largely from insufficient understanding of the philosophical framework for qualitative work, which has its focus on meaning and experience, the social construction of reality, and the relationship between the researched and the researcher (Patton 2015).

Metasynthesis: A generic term that represents the collection of approaches of qualitative research on previous qualitative studies in a field of interest.

Recently, however, we have witnessed an attempt to synthesise qualitative findings in a form of metasynthesis because the synthesis provides 'stronger credibility' than individual studies can offer within EBP (Thorne 2009, p. 571; Houser 2015). **Metasynthesis,** according to Zuzelo (2012, p. 500), 'offers a mechanism to help establish qualitative research as a viable source of evidence for EBP'. With the acceptance of metasynthesis of qualitative research in EBP, 'the pursuit of "what works" in evidence-based practice can be enhanced by examining "what is at work" when individuals and communities experience interventions and report these experiences in their own words' (Padgett 2012, p. 193; see also Chapter 18).

STOP AND THINK

- Considering what has been discussed above, what is your opinion regarding evidence and evidence-based health care?
- Should all EBP be based on an RCT or quantitative research approach only? Why?
- What type of evidence would you need in your own profession? With colleagues who have a different professional background from you, discuss what evidence would be more appropriate for your work and your prospective clients.

Research designs: which one?

> Designs are built about the questions we ask. Then, understanding, insight, and knowledge emerge from inquiry into the questions we ask. That means determining what data to collect and what cases to study (Patton 2015, p. 254).