

Surveys and questionnaires in nursing research

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ABSTRACT

Surveys and questionnaires are often used in nursing research to elicit the views of large groups of people to develop the nursing knowledge base. This article provides an overview of survey and questionnaire use in nursing research, clarifies the place of the questionnaire as a data collection tool in quantitative research design and provides information and advice about best practice in the development of quantitative surveys and questionnaires.

FULL TEXT

THE USE OF surveys and questionnaires in nursing research is familiar to many nurses. The number of nurses studying at postgraduate level has risen in the past 20 years. Completing a research dissertation is often an integral part of this study, and this research frequently requires the use of surveys and questionnaires. There are 680,000 nurses registered in the UK (Nursing and Midwifery Council (NMC) 2015), with an ever increasing emphasis on ongoing professional development (NMC 2010). At the same time, the notion of quality assurance and audit has ensured the development of new questionnaires and surveys for use by nurses and patients in their care.

Online surveys are being developed to replace paper surveys because of their ease of use in data collection and analysis and their cost effectiveness. Electronic survey methods have increased the quantity of information being gathered. However, there is little evidence as to whether this has improved data quality.

The frequency of and familiarity with surveys is growing in the professional environment, and this is mirrored in personal life, from national census surveys to establish patterns and trends in society (Office for National Statistics 2015) to email surveys requesting opinions about anything from choice of pizza to experiences with your local chemist. It would be unusual for nurses not to have been exposed to a survey in one form or another in their professional or personal life.

Greater familiarity with survey use increases confidence with survey completion, but does not necessarily equate with greater knowledge or understanding of survey design. Survey research is sometimes labelled and described as a methodology in its own right. Various descriptions of survey research permeate the literature, with surveys being developed in isolation from a chosen methodological approach (quantitative or qualitative). This has resulted in superficial approaches to data collection and generalised misunderstanding. This article aims to re-establish the questionnaire as a data collection tool within quantitative research design, and to provide information about best practice in the development of quantitative surveys and questionnaires.

Quantitative and qualitative research

There are various ways to categorise research. Approaches to research vary within disciplines as well as between disciplines. This does not present a problem for students studying within a single discipline, since they may follow the research language and trends of their discipline or faculty. However, nursing, as an applied science that operates in a multidisciplinary perspective, has adopted the research approaches and language of many disciplines. These include, but are not limited to, social research methods, generalised scientific methods, anthropology, sociology, feminist research, psychological research and ethnography. As a result, there is often

confusion about the terminology used in the discipline.

Many standard nursing textbooks take the approach that the world can be viewed in one of two ways (paradigms) - either in a positivistic way, in which everything can be measured, or a naturalistic way that emphasises the importance of subjective experiences (Polit and Tatano Beck 2014). Positivistic approaches use quantitative research methods, and naturalistic approaches favour qualitative methods (Polit and Tatano Beck 2014).

There are many occasions where qualitative and quantitative approaches are used together; this is known as mixed methods (Polit and Tatano Beck 2014 , Halcomb and Hickman 2015). The use of mixed methods can be useful to obtain some objective measurement (positivistic) and to gain some understanding of participants' subjective experiences (naturalistic), and it is considered a practical and pragmatic approach to research (Mertens 2010). These two approaches can be combined within one data collection method, for example, by including space for free writing and open responses in a questionnaire. For example, Timmins and McCabe (2005) surveyed nurses about their views on their assertive behaviour, and participants were also invited to freely provide other information about assertiveness. Another way to mix the quantitative and qualitative approaches is to carry out interviews in addition to questionnaires. Begley (1999) interviewed small groups of student midwives about their experiences of becoming a midwife and then followed up with a questionnaire to all midwifery students in Ireland to confirm and add to their findings. The qualitative findings served to help develop the questionnaire that followed, and to explain and clarify the findings (Begley 1999).

Both positivistic and naturalistic approaches follow what are now considered standardised steps in the research process (Box 1), although some variations may occur. The research process is discussed in more detail in the first article in this research series (Gelling 2015).

Box 1 Steps in the research process

Decide on a topic or define the problem.

Ask the research question and formulate the hypothesis or statement about the phenomenon of interest.

Outline the aims and objectives.

Review the literature.

Choose the methodology (qualitative or quantitative, or a combination of both) and outline the proposal.

Obtain ethical approval.

Collect the data.

Analyse the data.

Write up the project.

Quantitative research, discussed in detail earlier in the research series by Watson (2015), uses systematic methods to answer questions or solve problems related to nursing practice (Polit and Tatano Beck 2014).

Through the application of rigorous methods, this approach reveals information that is generalisable and widely applicable (Polit and Tatano Beck 2014). By using quantitative methods, the researcher hopes to describe with absolute confidence certain attributes of the subjects or concepts under scrutiny or the effects of a specific intervention, such as an educational intervention to help people stop smoking. The aim is to produce an accurate, confident representation of reality (Polit and Tatano Beck 2014). Confidence in the findings is achievable, according to the rigour with which this type of research is conducted. Attention to control of variables, representative sampling methods, and construction of data collection tools is required (Polit and Tatano Beck 2014). To simplify matters and foster deep understanding of research, there is an acceptance of a research process in nursing (Box 1), within which data are collected.

The use of questionnaires is a popular method for collecting data within studies that use quantitative methods.

Use of questionnaires for data collection enables the collection of information from large numbers of people.

Questionnaires also assist quantification of answers and enable the use of theoretical frameworks and rigorously constructed measurement scales, consistent with this research paradigm. It is also possible to use questionnaires within qualitative research, and in this case a more open-ended approach is needed (Robson 2011). Survey research is a data collection tool used within a method, not a method in itself.

Questionnaire and survey design

There is confusion and overlap in the use of research terms, particularly within nursing, which draws on a range of methodologies from several disciplines. The jargon associated with research may deter some nurses and can create a barrier to the use of research in practice (Hewitt-Taylor *et al* 2012). Accordingly, the terms questionnaire and survey require demystification.

The Oxford English Dictionary (OED) (2014) defines a survey as 'a systematic collection and analysis of data relating to the attitudes, living conditions, opinions, etc, of a population... taken from a representative sample of the latter'. A questionnaire is described as 'a formulated series of questions by which information is sought from a selected group, usually for statistical analysis; a document containing these' (OED 2014).

It is obvious from these definitions that there is overlap between the two terms. The questionnaire is a sequence of questions, provided on paper or electronically, the aim of which is to derive information from large numbers of people. The questionnaire is a data collection tool for quantitative methods that aims to gather objective information. A questionnaire may be used to determine characteristics of groups, and when used for this purpose it is often termed a survey (Moule and Goodman 2014). Surveys are popular in studies of population (epidemiology) and when little is known about a group of people. A survey aims usually to consider the characteristics or views of the whole population (everyone with the same characteristics, for example, all diabetes nurse specialists) or else a representative, usually random, sample of this population (Moule and Goodman 2014). Typically, use of the term 'survey' denotes the collection of information that describes a group or population. The national population census (Office for National Statistics 2015) is a good example. Box 2 lists the purposes of a survey.

Box 2 Purposes of a survey

Asking questions.

Fact finding.

Gaining information about attitudes, opinions or health status.

Helping to understand or predict health or behaviour.

Obtaining information about a population.

(Adapted from Moule and Goodman 2014)

The term survey often refers to the use of a questionnaire in non-experimental research (Moule and Goodman 2014), where the questionnaire is distributed once only to participants to determine elements of their lives. In experimental research, a questionnaire would be completed both before and after the experiment or intervention, to determine whether there had been changes. There have been attempts to differentiate the function of a questionnaire from that of a survey, for example, by indicating that a questionnaire is more concerned with measuring attitudes, behaviours and attributes. However, surveys are increasingly used to measure these parameters as well, so this dichotomy is false (Moule and Goodman 2014). For the purpose of this article, a paper or online instrument used in nursing research and designed to capture data that quantify human responses will be referred to as a questionnaire.

Functions of a questionnaire

Questionnaires are concerned with measurement (Moule and Goodman 2014, Box 3). Moule and Goodman (2014) suggest that a questionnaire should help to answer the research question and consider the broad categories of interest in the study. It is common in questionnaires to ask specific questions about the characteristics of participants (Box 4). This is often called demographic data, and questionnaires frequently start by asking for this information. Although demographic questions are often linked to the research question, they also serve to contextualise the work, for example, whether views on a topic vary with age or experience (Moule and Goodman 2014).

Box 3 Functions of a questionnaire

To measure:

Attitudes - towards people or concepts.

Attributes - characteristics of a person or illness.

Behaviours - self-report on actions.

Beliefs.

Health status - self-report.

Knowledge.

Psychological traits.

(Adapted from Moule and Goodman 2014)

Box 4 Participant characteristics (demographics) of interest to researchers

Age.

Degrees.

Gender.

Health care region.

Income.

Job title.

Marital status.

Qualifications.

Religion.

Years of service.

Knowing the age and gender spread of the population sample can be useful. However, one must be careful to focus on the aims of the study and to ensure that the questionnaire content links with these. Demographic details are often requested in nursing research and they are used frequently to interpret the findings. It is possible to compare demographics with completed answers by data analysis and find new information that was not considered in the original research aims. However, good practice suggests that only those demographic questions essential to the research aims should be asked. Additional questions may be unwelcome for some, and this may result in non-responses to personal questions. There are differing views on placing demographic questions at the beginning of the questionnaire. Some researchers believe that if the introduction to the questionnaire is too banal it may discourage participants from responding, and so demographic questions should be placed later in the questionnaire, once interest in the subject has already been established (Babbie 2013). Demographic questions may also increase the time taken to complete the questionnaire, so to speed up responses it is best to only include those demographic questions that are deemed essential.

Questionnaire content

Most researchers agree that design is an important element of questionnaire development. Ultimately, it is the research question that guides questionnaire design. The questionnaire seeks to assist with answering the research question, so it is logical that the two are linked. Similarly, the aims and the objectives of the research and questionnaire should be aligned. Apart from the demographic data, the questionnaire should elicit answers to a range of predetermined questions. This is a point where many nurses begin to struggle. However, the steps in the questionnaire design process are straightforward.

A thorough and systematic literature review should be undertaken before designing a questionnaire (Wakefield 2015). From this, you will be able to determine whether a questionnaire that suits your needs is already in existence. Using a previously designed questionnaire has several advantages, only one of which is the convenience of a readymade tool. First, it is useful to have a large number of studies examining the same concept in the same way to advance nursing science. By replicating or partially replicating a previous study, you are adding directly to the body of knowledge. Second, it is useful in nursing to have a suite of questionnaires in use that have been subjected to scrutiny. Scientific rigour, which will be addressed in later articles in this series, is enhanced through repeated use. Issues such as validity - ensuring that the questionnaire measures what it says it measures - and reliability - ensuring that the questionnaire produces the same results again under similar circumstances - may then be addressed repeatedly or in different contexts, strengthening the questionnaire. It is recommended that

these tests of rigour are repeated, especially in different cultural settings (Papadopoulos and Lees 2002 , Kishi *et al* 2011) and if changes to the questionnaire have been made.

Previous use of a questionnaire may serve as a pilot study (Polit and Tatano Beck 2014). It is useful to pilot test a questionnaire to determine whether there are any problems with language, understanding or completion. A pilot test will help ensure cultural applicability and give you additional confidence in its use, even if the questionnaire has been developed and used previously. Some researchers suggest that a pilot test is a necessary step in questionnaire design, and to some extent it is an expectation (Coughlan *et al* 2007). However, some questionnaires reported in published journals have not been through the pilot stage. If a questionnaire is not pilot tested, the risk is that straightforward issues can cause problems during the data collection phase, and there is no opportunity to address these issues before the main study. You could find that one question simply does not work, with participants either not answering the question or answering it inappropriately. This type of issue may be addressed quickly and simply at pilot stage.

Psychology is one field where the use of predetermined questionnaires is common and serves to strengthen tool validity and consolidate knowledge in key areas. Many nurses have successfully used these tools, for example, the Hospital Anxiety and Depression Scale. This tool was originally devised by Zigmond and Snaith (1983) and has been widely used in both nursing research and clinical nursing practice (McPherson and Martin 2011 , Winkley 2013 , Drageset *et al* 2013). Finding a previously designed and validated tool that closely matches your study requirements is good research practice. Many psychological scales are available either to purchase or within specific repositories, and the American Psychologists Association (APA) (2015) provides specific advice and guidance about the retrieval of these tests. These scales may be used in their entirety as a questionnaire or embedded in a larger questionnaire, depending on their inherent structure and the aims of the specific study. Nurses looking for a questionnaire might note the use of one in a specific journal article and contact the author directly, asking for permission to use it. Direct access to the questionnaire provided by the original author has led to worldwide use and replication (McSherry and Jamieson 2011).

A common issue is that a previously designed and validated questionnaire is not entirely suitable for your study aims and may require adaptation - something that is often, but not always, permitted by the original copyright owners. In this case, and when no suitable questionnaires are identified in the literature search, a new questionnaire should be designed.

Questionnaire design

The most practical and straightforward way to either adapt or develop a questionnaire is to use the information gleaned from a literature review to develop key questions or statements. A theoretical framework - a scientific theory or framework that is used to describe, explain or predict particular conditions or occurrences - may have emerged from the literature review. The use of a theoretical framework within quantitative research means that the study findings will have wider relevance (Polit and Tatano Beck 2014). If a theory or framework emerges consistently from the literature review, or is used to underpin several studies that you have found, it is useful to consider whether this theory or framework could be used to structure your new questionnaire. The benefit of using a framework or theory is that it provides structure for a questionnaire and allows for some testing of the theory. It is also a useful organising framework for the study, questionnaire, findings and discussion that will follow.

Sometimes researchers allude to an underpinning framework for their study, but their data collection and findings may bear no relation to this (Timmins 2006). It is important that if a theory or framework is used, it underpins the questionnaire design, with selective and judicial use of language throughout. A recent example of theoretical framework use is by O'Sullivan *et al* (2014), who used Stamler's enablement framework for patient education (Stamler 1998) to develop a questionnaire designed to examine the practices of antenatal educators. O'Sullivan *et al* (2014) used this framework to form the structure of their questionnaire, with key elements of the framework used as subheadings within it. A framework is initially useful to identify areas that require investigation, and then to assimilate these into questionnaire form.

In addition to a framework, or in the absence of one, the emerging themes from your literature review also serve to

inform key questions or statements. For example, if death of a patient is identified in the literature as a repeated source of stress to nursing students, then it is wise to add a question about patient death to your study of nursing student stress (Timmins and Kaliszer 2002). It is useful to ask the opinions of experts during this phase, as well as using the literature and theoretical frameworks to develop key themes. You should present the study aims, objectives and research questions to a selected panel of experts to ascertain whether gaining information about the areas of interest you have selected would be useful in achieving the study aims. Other methods of informing questionnaire content include qualitative developmental methods in which the questionnaire is informed by interviews or focus group research, professional experience (Moule and Goodman 2014) and lay participation. The readability of the questionnaire should be considered since written material for patients should be easy to read. The readability of material is determined by the degree to which it matches the patients' reading skills or levels (Sabharwal *et al* 2008). Developed initially by Flesch (1948), simple testing of readability may be done in Microsoft Word using the Flesch Reading Ease and Flesch-Kincaid Grade Level assessments. The Flesch Reading Ease test uses a 100-point scale, with a higher score indicating a greater ease of understanding. A target score of between 60 and 70 is recommended. The Flesch-Kincaid Grade Level assessment provides an approximation of what language level can be read by most people. A score between 7.0 and 8.0, which is equivalent to UK school years 8 and 9, is recommended. However, a reading level of 6.0 was suggested to be appropriate for health-related materials (Sabharwal *et al* 2008). Since many people read at a level that is below their formal education (Brown 2006), ensuring basic readability means that the questionnaire is pitched at a level that is easily understood by patients and as a result, the questionnaire is more likely to be read and completed (Moulton *et al* 2004).

When key areas and theoretical frameworks have been decided, the physical structure of the questionnaire is developed. A questionnaire mostly contains closed questions with fixed responses, although a small number of open-ended questions are often used to support and enrich quantitative data (Moule and Goodman 2014). An open-ended question is often found at the end of questionnaires inviting participants to explain or comment (O'Sullivan *et al* 2014). These open-ended items often evoke short responses. These items can be coded and statistically quantified later, rather than analysing them in a qualitative manner since the depth of information is not usually sufficient. For example, in one study, students were asked the main reason for their last absence from their course and the responses were later quantified. Of these respondents, 18% spontaneously cited stress as the reason for their absence (Timmins and Kaliszer 2002).

A range of demographics is often presented within a questionnaire together with a series of closed response options. The simplest choice for closed questions - for example, 'Are you currently employed as a registered nurse or midwife in the UK?' - is a simple yes/no response tick box. An alternative and less labour-intensive approach is to supply fixed responses, being careful not to overlap content choice. For example, if asking about the respondent's age, the age categories should not overlap, such as 20-29 and 30-39 years. Another useful approach is to ask participants to rank items, that is to place the number one beside their top priority and assign an appropriate number in rank order to all other listed items (Polit and Tatano Beck 2014).

Unless a questionnaire is eliciting very specific information, such as true or false options to ascertain nurses' knowledge on a topic (Lehwaldt and Timmins 2005), it will often offer respondents a range of possible responses, so that a full variation of views on a topic can be established. The most common approach to this is to use a Likert scale (Moule and Goodman 2014); a list of statements is provided and respondents indicate their strength of agreement or disagreement, ranging from strongly agree to strongly disagree. A 5-point Likert scale is most commonly used (strongly disagree, disagree, uncertain, agree, strongly agree), although a 4-point scale can be used in which the uncertain option is not included. This forces the respondents to provide an unequivocal answer. It is useful to present statements in logical sections, perhaps according to key themes, or in line with the theoretical framework used, rather than listing all the statements in the questionnaire. An example of this is presented in Figure 1 , in which statements related to a single theme (spirituality) are presented together. Statistical analysis, once you have collected some data from the questionnaire, can also help you to subdivide statements into logical themes more accurately. Factor analysis examines commonalities in responses and

enables you to recategorise items into key clusters and is a useful tool in questionnaire design (Timmins *et al* 2014).

Content validity

Content validity is a commonly used assessment that uses certain criteria to ascertain the views of experts on the questionnaire (Polit and Tatano Beck 2012). The context is examined to determine whether the questionnaire measures what it claims to measure. The questionnaire, when finalised, can be presented to a panel of experts in the field of study, as done by O'Sullivan *et al* (2014). These experts are then asked to comment on the relevance and clarity of each item in the questionnaire. Although this can be done in an informal manner, it is useful to provide reviewers with a measurement scale so that joint responses can be collated objectively. The experts can be asked to rate the relevance of each question using a scale of 1-4 (not relevant, somewhat relevant, quite relevant, highly relevant) (Polit and Tatano Beck 2012). Calculations of mean scores can then be determined to reveal an overall content validity average index. A score of 0.90 or above is an acceptable validity level (Polit and Tatano Beck 2012). The item content validity index for each individual item should be above 0.80 (Polit and Tatano Beck 2012 , Timmins *et al* 2015).

The final task is to consider the sequence of the items in the questionnaire. Polit and Tatano Beck (2014) suggest that the questions should be sequenced in a way that is psychologically meaningful for the participants so that the questionnaire 'encourages co-operation and candour'. Careful development and refinement of the questionnaire will help to achieve this. The researcher is the final arbitrator, and pilot testing will inform cosmetic judgements. The font should be size 12 Arial, or similar typeface, and lower case type is easier to read (Moule and Goodman 2014).

Estimated completion time is an important factor to consider. A questionnaire that is too long is not likely to attract respondents or they may simply give up halfway through. Consideration should be given to the type of participant and their particular requirements and needs. Participants with fatigue, for example, should not be given a questionnaire that takes 30 minutes to complete, whereas students might have no problem with a questionnaire of this length. It is usual to prepare candidates for the time taken to complete a questionnaire. This instruction may appear with other instructions on the front of the introductory sheet or information leaflet. It is useful in some circumstances to collect questionnaire data using structured interviews to improve response rates (Polit and Tatano Beck 2014). Structured interviews may help those with limited mobility who require assistance, or may help to explain terms used in the questionnaire to participants with limited understanding.

Reliability

Reliability testing is important to establish the rigour of a questionnaire (Polit and Tatano Beck 2014). For a questionnaire to be valid it should also be reliable; however, its reliability is not dependent on its validity (Tavakol and Dennick 2011). Reliability is the consistency with which respondents answer the questionnaire items, and whether the questionnaire would produce the same results in different circumstances. A test-retest may be performed before the main study, in which the questionnaire is distributed to the same participants, under the same conditions, but at different times, usually two to three weeks apart. The questions should not be open to multiple interpretations and a comparison of the findings should show similar responses on both occasions, if the questionnaire is reliable. The test-retest can be used as a pilot test. However, changes cannot be made to the questionnaire until after the retesting has taken place.

When some completed questionnaires are available, an internal consistency of responses test can be used to determine the reliability of respondents' answers to statements presented in similar categories. This is called Cronbach's coefficient alpha (Cronbach 1951) and is usually used for examining responses to similar constructs (Tavakol and Dennick 2011). Cronbach's coefficient alpha is a statistical test to demonstrate that responses are as similar as possible, and as such, as consistent as possible. Although it is a complex statistical method to use manually, it can be simply performed by statistical software packages such as the Statistical Package for the Social Sciences (SPSS), version 22.0. Cronbach's coefficient alpha should be as close as possible to the number one; a figure of 0.80 or above is considered very reliable (Mathers and Huang 2004). Timmins *et al* (2014) used

Cronbach's coefficient alpha during an analysis of nurses' views on spirituality. The coefficient alphas for the individual subsections within the questionnaire were as follows: spirituality (0.19), spiritual care (0.97), religiosity (0.43), and personal care (0.96). The overall coefficient alpha for the questionnaire was 0.6. Although two individual subsections of the questionnaire had high reliability, the other two subsections did not, resulting in an overall low reliability figure.

Distribution

Questionnaires were typically distributed on paper and completed in pen and ink in the past. Online questionnaires are increasingly common, and SurveyMonkey (www.surveymonkey.com) is a commonly used data collection tool in nursing research. Online questionnaires are useful because pre-prepared templates are available, including example questions, and links can be sent to respondents by email or social media (O'Connor *et al* 2014), saving time and costs. There is also no need for separate data entry and analysis, which also saves time.

Questionnaires often have a low response rate, sometimes as low as 25% (Timmins *et al* 2012). This can undermine the validity of the findings because little information is known about those who did not respond. A response rate of 75% or more is useful, even though this means that not all views have been captured (Moule and Goodman 2014). However, such a high response rate is unrealistic in practical terms. Practical ways of increasing response rates include: the attractiveness of the presentation of the questionnaire, ensuring that the study aim is clearly outlined, providing a contact name or telephone number in case of queries, using headed notepaper, and assuring confidentiality (Moule and Goodman 2014). Incentives are also useful, such as small payments or prizes.

Questionnaires aim for subjectivity when used in quantitative methods, but are limited by the truthfulness of the participants' responses (Polit and Tatano Beck 2014). There is a risk that respondents will reply in a way that they think is socially desirable. For example, people may not wish to reveal bad habits, poor practice or poor health practices. This limitation of self-reporting questionnaires is usually acknowledged when results of the research are published. Improving the accuracy of data collection usually involves using a combination of methods. For example, direct observation could accompany a survey on reported handwashing (Abd Elaziz and Bakr 2009). Physiological measurements may accompany questionnaires about smoking; for example, urine or breath analysis for cotinine and breath analysis for carbon monoxide could accompany analysis of self-reporting questionnaires among smokers (Caman *et al* 2013).

Conclusion

Nursing as an applied science has adopted the research approaches and language of many disciplines.

Questionnaires are popular methods for collecting data within quantitative studies in nursing, because they enable the collection of information from large numbers of people. Although the terms questionnaire and survey tend to be used interchangeably, questionnaire is the most appropriate term in nursing research.

A questionnaire should assist with answering a specific research question and consider the broad categories of interest within the study. It is also common to ask specific questions about the participants' demographics to enable comparison in the data. Questionnaires can be derived from those already in use or may be designed to address a specific research question. Questionnaire structure requires a systematic approach that considers the literature on a topic and theoretical frameworks that may apply. Questionnaire development considers both structure and content of the questionnaire and the advice of experts in the field, as well as the results of a pilot test or test-retest. Questionnaires are useful tools for the practising nurse. When they are considered and developed rigorously, questionnaires yield rich information to inform research and practice.

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