

## **Integrating qualitative and quantitative research methods**

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# Integrating qualitative and quantitative research methods



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**Abstract** There are a growing number of authors arguing the case for integrating qualitative and quantitative research methods within research projects. A study was carried out to identify the amount of published work integrating qualitative and quantitative research methods and to assess the quality of the outcomes of studies purporting to use both methods. Electronic searches of the health literature and critical appraisal of a random sample of papers retrieved was undertaken as well as a hand search of five journals. Over one-quarter (130, or 27%) of the papers from the electronic searches were theoretical discussions about the merits of mixing research methods, 22% (110) were papers purporting to have used mixed methodologies. Critical appraisal of the sample papers showed the qualitative and quantitative elements varied. Where the results of the different parts of the study were integrated, the outcomes from the research were more convincing than they might otherwise have been. Other papers had little discussion about the balance or integration of the different types of results. Hand searching revealed very few mixed method papers. Further work is required to refine and develop ways to mix methods to generate the evidence required to support practice.

**Key words** qualitative and quantitative research, research design, health services research

## Introduction

There are a growing number of authors who argue that there is a case for integrating qualitative and quantitative research methods (e.g. Goodwin and Goodwin, 1984; Myers and Haase, 1989; McKinley, 1993; Barbour, 1999; Burnard and Hannigan, 2000; Bourgeois, 2002). The two types of research are designed to answer different sorts of questions, collect different types of data and produce different types of answers (Barbour, 1999). Researchers have combined the two approaches for a variety of reasons: for meeting different needs at different stages of a project; compensating for shortcomings in any one method; and triangulation (Mason, 1993; Ong, 1993; Barbour, 1999). The combination of different methods is becoming increasingly important as researchers and practitioners realise that RCTs and other quantitative methods are not able to answer all questions relevant to the evaluation and assessment of increasingly complex healthcare (McPherson, 1994; Black, 1996; Murphy et al., 1998; Kelly and Long, 2000; Bourgeois, 2002).

### Widening the research base for health care delivery

The trend towards evidence-based healthcare (which has been debated for a considerable period of time) requires healthcare professionals to base their current clinical practice on scientifically derived findings (evidence) rather than on tradition, intuition, assumption and precedent as has happened in the past (e.g. Walsh and Ford, 1992; Hicks and Hennessy, 1995; Dunn et al., 1998; Bishop and Freshwater, 2003; Rafferty et al., 2003). In addition, there is an increasing emphasis placed upon the value of research, specifically the need for members of all clinical professions to be able to undertake and appreciate research and apply research to practice (Gray, 1997; Haines and Donald, 1998).

Evidence-based practice has promoted the randomised controlled trial (RCT) as the gold standard for research to provide good quality evidence upon which to base practice (Gray, 1997). RCTs have their weaknesses, for instance a number of healthcare interventions do not lend themselves to investigation by RCT and some experiments would be unethical. In some circumstances it may not be feasible to carry out an RCT because of the inclusion/exclusion criteria or the numbers of subjects/participants required (Polit and Hungler, 1993). There is room for many other types of research to be undertaken in health services (McPherson, 1994; Black, 1996).

In nursing, research has not always been related to practice (Briggs, 1972; Hicks and Hennessy, 1995; Cullum, 1998) and there are large areas of work for which there is no reliable evidence (Cullum, 1998). One reason for this may be the qualitative/quantitative divide in nursing

research. The proponents of the different approaches have been said to fall into 'camps' (Barbour, 1999), indicating a strong position on one side or the other of the debate (Rolfe, 1994). The authors have much experience of discussing research with nurses from a wide range of backgrounds and healthcare settings. Anecdotal evidence from these discussions indicates that nurses are more comfortable with qualitative research as they often do not understand the complex statistics of quantitative work. The complex terminology and fine philosophical divisions between the various qualitative methods can be just as difficult to decipher, especially for someone who is not familiar with research activities.

As more research is carried out to widen the evidence base for care delivery, there is a need for a more flexible approach. This flexibility is likely to include using a variety of different research methods, sometimes in combination with each other. Some research, combining different research methods, has been published but there are no overviews of the way the results arising from different methods have been integrated.

The aim of the work reported in this article was to ascertain the amount of published work integrating results from qualitative and quantitative research and to assess the quality of the outcomes from studies using both methods.

## **Methodology**

Electronic literature searching and hand searching of selected journals followed by critical appraisal of randomly selected published papers purporting to report the results of both qualitative and quantitative research methods.

### **Literature searching**

The following databases: MEDLINE (1984–2000); CINAHL (1982–2000); and PsycInfo (1984–2000) were searched for the time periods available at the time the searches were carried out.

In the absence of any validated search strategies, a number of keywords were used, including: triangulation, mixed methods, qualitative, quantitative, integrating methods, combining methods, research. Finally the keywords 'qualitative', 'quantitative' and 'research' were used searching within the title, abstract or subject headings of each record. The search strategy used the operator 'and' to combine the keywords, so only records containing all of the keywords were retrieved.

The results of the searches were reviewed on screen and those that appeared to be relevant were downloaded and imported into a bibliographic software database (ProCite, produced by Research Information Systems). The abstracts of the articles were read and each article classified into quantitative

research, qualitative research, literature review containing reports of both quantitative and qualitative research, theoretical articles — which discussed the merits of mixing methods without reporting results, and mixed methods reporting results. If it was not possible to classify the paper by the information contained within the abstract, the full paper was retrieved and read. Articles were deemed to be relevant for inclusion in the critical appraisal process if they were empirical studies where the authors claimed to be using a mixed methods approach to their work, i.e. using both qualitative and quantitative research methods.

### **Critical appraisal**

The mixed methods papers, which reported results, were copied into a second ProCite database. A computer-based random-number generator was used to choose papers from this database, the full texts of which were retrieved from the library, read and critically appraised by either three and four researchers (at least one researcher experienced in qualitative and one experienced in quantitative research for each paper). The reviewers then met to discuss the individual appraisals in a group. The papers were critically appraised and assessed by both qualitative and quantitative criteria. There is currently no consensus about the most appropriate approach to the critical appraisal of different research methods. The authors chose to use ten questions adapted from Mays and Pope (1995) and ten questions adapted from Oxman et al. (1994) as developed by the Critical Appraisal Skills Programme, Institute of Health Sciences, Oxford, UK (2001). These generic questions are tools that can be applied to a wide range of qualitative and quantitative studies respectively. In addition to the qualitative and quantitative content, papers were also assessed for any reference to the authors' approach to integrating methods and whether the methods were appropriate to the research questions being asked (Burns and Grove, 1997).

### **Hand searching of journals**

All of the issues of the following journals were hand searched for the calendar year 1997, selected by a computer-based random number generator: *Journal of Advanced Nursing*, *British Journal of Nursing*, *International Journal of Nursing Studies*, *Nursing Research* and the *British Journal of General Practice*. Impact factors (values associated with journals, related to the number of citations articles in the journal receive, which are used to judge the quality of research) are often used inappropriately (Garfield, 1996) and, in nursing journals, are not a good guide to research quality in nursing (Rafferty and Lewison, 2000). The first four titles were chosen as journals that carry a wide range of articles and are generally well regarded within academic nursing circles (Rafferty and Lewison, 2000). The

final title was chosen as it is the most cited journal of UK general practice (Gillies, 1999) appealing to practitioners with a wide range of interests, with an issue frequency similar to the nursing journals included.

The title and abstract of each article were read and, where this was not enough to classify the paper, the methods section was also considered. Articles were classified into literature review, theoretical discussion about some aspect of healthcare or research methodology (excluding literature reviews), qualitative research, quantitative research, clinical case study, clinical review and mixed methods research. The qualitative and quantitative methods used for the mixed methods papers were recorded. Quantitative research papers were sub-classified into descriptive methods (e.g. questionnaires, use of health statistics or records), development of tool (e.g. validation of an assessment tool) and experimental design (e.g. intervention study). Letters, editorials and personal columns were excluded.

All mixed methods papers reporting results, uncovered by hand searching, were added to the second ProCite database described above.

### **Inter-rater reliability**

Inter-rater reliability was measured by each author classifying the contents of two issues of one of the journals, chosen using a computer-based random number generator, before the full classification exercise started. The classification of each paper by each author was compared and any differences noted and resolved through discussion.

## **Results**

### **Inter-rater reliability**

There was no discrepancy between the classification of the studies by the authors. Out of 52 records used to measure inter-rater reliability there was one minor difference (about the type of quantitative study) which was resolved upon discussion.

### **Literature searching**

Table 1 shows the number of articles reviewed on screen and those downloaded into the ProCite database where their abstracts were read, for a range of different search strategies. The results of the first of these strategies, which yielded the highest number of papers reporting the results of mixed methods studies, were then used for the classification exercise. There was not enough detail in the abstracts of 45 papers for them to be classified. Twenty-seven were retrieved and read in full, the remaining 18 records could not be obtained and these were classified as 'Can't tell'. From the search results, 12 records were not relevant (they

covered non-health related subjects) and were discarded. Of the remaining 489 records, more papers were published which discussed the theoretical merits of mixing both qualitative and quantitative research methods (130, or 27%) than papers purporting to report results from studies that had used mixed methodologies (110, or 22%). The largest group of records (171, or 35%) were reports of qualitative research alone, which had mentioned the word 'quantitative' within the database record, compared with 27 (5%) for quantitative research only, mentioning the word 'qualitative' within the record.

### Critical appraisal

The randomly chosen sample of 14 mixed methods papers reporting results (12% of the total) subjected to critical appraisal were each appraised by three or four reviewers. The results of the appraisal were uniform with broad agreement between reviewers. There were no areas of major contention and minor differences in opinion were resolved through group discussion. The results of the appraisal are shown in Table 2.

There was a range of both quantitative and qualitative methods used in the published studies appraised. The research described in the papers demonstrated the use of the different methods in a range of ways, which varied between the reports. Some used the qualitative work to influence or validate the quantitative, others the opposite way round. In some cases it was difficult to justify the authors' claims that both quantitative and qualitative methods were used in the studies reported. Issues of methodological rigour, especially in the qualitative elements of the work and approaches to integrating the results obtained by different research methods, were not commented on in the majority of reports.

**Table 1** Search strategies employed

Search terms	Total no. records obtained	No. records downloaded	No. reporting results from mixed methods research	No. of papers identified from hand searching included <sup>2</sup>
Quantitative and qualitative research	1,076	501	1101	6
Triangulation	472	345	17	2
(Mixed or integrat* or combin*) and (research and methods)	2,382	91	7	1

<sup>1</sup>included the 17 and 7 papers identified by the other search strategies listed.

<sup>2</sup>six papers were identified by hand searching.

**Table 2** Results of critical appraisal

Name	Aim of study	Population	Quantitative method and critique	Qualitative method and critique	Approach to integration	Methods appropriate to research question?	General comments
Bree-Williams and Waterman (1996). An examination of nurses' practices when performing aseptic technique for wound dressings.	To establish if nurses' actions on aseptic technique were based on up-to-date knowledge.	Convenience sample of 21 nurses working on study wards.	Quantification of observations. Inappropriate use of statistics given small numbers.	Observer as participant and semi-structured interview. No reports of individuals' perceptions or views.	No discussion about the integration of approaches and the only results reported were the quantification of observations.	Methods used may have been appropriate for the aims of the study, but not enough detail or data given in the paper to allow the reader to judge.	The 'up-to-date knowledge' on aseptic technique was not clearly stated and there was an assumption that the reader would know the best wound care techniques.
Britton (1999). A pilot study exploring families' experience of caring for children with chronic arthritis: views from the inside.	To explore six key issues with families with juvenile chronic arthritis to elicit relevance and significance and to collect baseline data on families engaged in splinting and exercise programmes.	46 families attending one consultant outpatient clinic.	Self-completion questionnaires with 100% response rate. Clear summarised data presented.	Self-completion questionnaires with textual analysis of responses to open questions, based on a ground theory approach, by the author. Categories used to explore the responses to the quantitative results. Not enough detail of the responses obtained for the reader to verify categories.	The author discusses the integration of the methods and the use of this study and its results to inform a larger study. The integration of the data provides the reader with a deeper understanding of the issues discussed.	The methods are appropriate and provide the basis for future work.	Extensive literature review and the work reported extends the body of knowledge in this area. The researcher clearly states her own interest both clinically and personally in the study.



Table 2 continued

Name	Aim of study	Population	Quantitative method and critique	Qualitative method and critique	Approach to integration	Methods appropriate to research question?	General comments
Debats et al. (1995). Experiences of meaning in life: a combined qualitative and quantitative approach.	To investigate the relation of aspects of meaning in life with indices of psychological well being.	Convenience sample of 122 Dutch psychology student volunteers.	A battery of four established questionnaires, some of which were modified for the study. Only two-thirds of the sample was included in the analysis, with no explanation of missing data. Not enough detail given of how some of the data were handled. Very extensive sub group analyses for the sample size.	Textual analysis of the responses given to open questions on the four questionnaires. Themes developed from pre-existing literature and from responses received. Very little detail provided of responses received, so it is difficult for the reader to assess the themes and categories derived from the data.	The authors used the different approaches to provide data that could add some depth to their analysis of the results. Predicted correlations within the data were shown to exist. The authors linked the length of responses to certain questions with some of the statistical results.	The methods used were appropriate to the research aims but could have been further developed to provide more insight from the data obtained.	Very dense and hard to read, the text was very repetitive. The results were obtained from a very young, select sample.
French et al. (2000). An evaluation of peer-led STD/HIV prevention work in a public sex environment.	To evaluate a complex approach to promote safe sex in a public sex environment.	Gay men using a public sex environment in one area of London, GUM and HIV outpatient attendees and members of a voluntary organisation.	Two surveys by the voluntary organisation. One distributed with a safe sex health promotion package that had a 5% response rate and one to commercial leisure venues and GUM and HIV outpatient attendees with 84% response rate.	Non-participant observation at a public sex environment, field notes taken and semi-structured in-depth interviews with gay men. Focus groups with volunteers, professionals and health service users.	At the outset the evaluation was designed to integrate different research methods and was discussed by authors.	In this complex series of interventions the methods and mixing of methods was appropriate to the evaluation.	Data from each part of the study were coherent and the mixed methods provided a fuller picture than one method alone. The results provided new information to influence the development of the service.

George et al. (1997). Research-based planning for change: assessing nurses' attitudes towards governance and professional practice autonomy after hospital acquisition.	To assess nurses' attitudes towards governance and professional practice autonomy after hospital acquisition.	All 141 registered and licensed nursing staff at the acquired hospital.	Four-part survey including two modified instruments. Poor response rate of 47% (66 individuals). No specific follow up of non-responders. Inappropriate use of statistics for size of sample.	Textual analysis of three open questions in one part of the survey. No indication of how disagreement between researchers, on interpretation of responses, dealt with. Not enough detail of responses provided for reader to assess the categories developed.	No discussion about the approach taken or integrating the results of the different parts of the study. Difficult for the reader to see any evidence of integration.	Methods may not have been appropriate, as evidenced by the low response rates. The Chief Nurse Executive of the new administration distributed the questionnaires, a more neutral researcher may have been more appropriate. Interviews may have provided more detail for the qualitative part of the study.	No information or discussion about the characteristics of the non-responders (majority). No discussion about possible bias of questionnaire distribution on response rate. Some tables very difficult to interpret.
Hastings et al. (1990). Two years of AIDS publicity: a review of progress in Scotland.	To monitor the general public's basic perceptions about AIDS. To explore audience response to specific interventions.	Stratified randomised sample of the Scottish general population and quota sample of Scottish teenagers.	Two separate surveys, each repeated three times. Very limited data from surveys presented, but have been published elsewhere.	48 small group discussions with 336 respondents. Some indications of the main findings but no reporting of actual discussions.	Eight separate studies were brought together (all previously published) to provide an overview of how the quantitative work has influenced the qualitative work and vice versa. Illustrates the pragmatic use of different techniques to support and inform health promotion activities. The qualitative work helped to develop materials and the	The paper provides an overview of the effectiveness of the whole approach taken over time. No mention of the cultural aspects of the study population and how this may have influenced the findings.	Conclusions from the different studies provide a larger view of the subject area which have guided future overall strategy.

Table 2 continued

Name	Aim of study	Population	Quantitative method and critique	Qualitative method and critique	Approach to integration	Methods appropriate to research question?	General comments
Häggman-Laitila and Pietilä (1998). Life control and health in view of qualitative and quantitative research.	To address the semantic content of the life control concept, mutual connections between life control and health and life situation.	Qualitative study of Finnish men and women aged 30–50 and a survey of Finnish men in their 30s.	A random sample of 2,500 Finnish men in their 30's, with a 60% response rate. Appropriate use of statistics, results reported in more detail in other publications.	Unstructured interviews with 60 men and women aged 30–50. Transcripts analysed and categories developed using grounded theory by one researcher. Results published in more detail elsewhere.	quantitative work used to investigate how effective they were. The paper was based upon the integration of the results from two separate studies. The data were presented in such a way that the reader could not easily compare the similarities and differences between the two data sets.	Each method was appropriate for its own study and brought different results to the discussion.	The two studies were carried out quite separately. There was no discussion about any differences between the populations that could have influenced the results. There was little discussion about the results in terms of socio-economic factors that were acknowledged to be potentially important.
Hughes et al. (1997). Young people, alcohol and designer drinks: quantitative and qualitative study.	To examine the appeal of 'designer drinks' to young people.	Multi-stage cluster probability sample of 12–17-year-olds.	Two-part survey of 12–17-year-olds with a response rate of 78% (824 individuals). Face-to-face interviews for the first part of the survey and the second part, for more sensitive information, completed in	56 12–17-year-olds in eight focus groups. Subjects recruited by door-to-door interviewers. Focus group discussions were taped and transcribed. No detail about how themes or	The data from the qualitative part of the study informed the development of the questionnaires used in the quantitative part of the study.	Methods used were appropriate and the findings from each support the other.	No mention made of the 'background' drinking culture from which the sample was drawn. This may have had an influence on the attitudes of the young people interviewed.

Lindop (1993). A complementary therapy approach to the management of individual stress among student nurses.	To look at the impact of a stress reduction programme on student nurses.	Student nurse volunteers (11) from a class of 35 individuals, with data from nine.	Pre-test, post-test questionnaire of knowledge and understanding of stress. Inappropriate use of statistics for such small numbers.	confidence. categories were developed. No information given about any contradictory comments received. Six open-ended questions, but it is not possible to tell when these were completed. No detail given about how the data were collected or analysed. Only one person identified categories in the data.	No effort to bring the different types of data together or to discuss how they might relate to one another.	The methods were not appropriate as the data do not provide an understanding of the area, other than the students knew more about the subject after the intervention.	The researcher was delivering the course under study and then conducted the evaluation reported in the paper with no independent third party involved. No discussion about possible bias from this approach. Literature reported was confusing to the reader and parts were not appropriate to the study. Very forceful conclusions drawn from very weak data.
Llewellyn-Thomas et al. (1989). Measuring perceptions of the exemplary nurse.	To determine how nurses at different stages of professional development identify and weight the relative importance of the attributes of the 'exemplary' nurse in clinical practice.	200 student nurses enrolled in two university courses plus a group of graduate nurses (no number given) for part of the study.	Visual analogue scores for ten different scenarios, developed using a factorial design, from data obtained from qualitative part of the study. Responses analysed using statistical software.	Open-ended questions about qualities of the exemplary nurse. Responses categorised by two independent raters. Results used to inform the quantitative part of the study.	The study was designed so that the qualitative results would inform the quantitative part of the study. Some quantitative differences between the different groups did emerge and were discussed.	Both methods were appropriate as this study was designed as the development of scenarios followed by a quantitative study.	No discussion about the possible biases when using volunteers and small numbers. The paper is confusing and difficult to follow. Conclusions drawn are supported by the data.

Table 2 continued

Name	Aim of study	Population	Quantitative method and critique	Qualitative method and critique	Approach to integration	Methods appropriate to research question?	General comments
Martinson et al. (1997). The experience of the family of children with chronic illness at home in China.	To examine and document the care-giving experience of children with chronic illness at home in China.	Convenience sample of 75 families in three Chinese cities.	Semi-structured interviews using two instruments modified and translated into Chinese. Responses from closed questions analysed using computer software.	Semi-structured interviews using two instruments modified and translated into Chinese, responses to open questions translated into English to be coded and analysed. No details about how the coding was undertaken. Results were used to develop three case studies, but not clear how many different responses were used in the case studies.	No obvious approach to integration. The qualitative and quantitative results were reported separately.	Methods were appropriate but could have been integrated. As the paper reads, either method used singly may have produced the same results.	No account was taken of the severity of the disease or the prognosis when reporting the data. There was no mention of different cultural perspectives and if anything, was lost in the two stages of translation.
McCann (1997). Willingness to provide care and treatment for patients with HIV/AIDS.	To discuss factors which influence nurses' and doctors' willingness to provide care and treatment for patients with HIV/AIDS.	All nurses and doctors working in three large public teaching hospitals in New South Wales, Australia.	Questionnaire with questions derived from the literature. Obtained a 48% response rate (265 individuals). No follow-up of non-responders. Very small proportion of respondents had contact with target patients. No indication of numbers in the	Semi-structured interview developed from the results of the questionnaire. Thirty interviews undertaken which were recorded and transcribed. Only one person appeared to analyse and code the transcripts. No indication of any contradictory comments received.	The data are integrated, up to a point, to support the themes but there is no indication of any contradictory comments or other results.	Both methods were appropriate, although the strength of using different methods is not discussed.	The authors' position was not stated and there is no indication of who did the interviews. No mention of possible bias from sampling and cultural issues. The conclusions are over-generalised from the results.

				<p>categories reported. Author uses the terms 'representative' and 'atypical' in connection with interviewees but does not explain what this means or why it is significant for the results.</p>			
<p>Meredith and Wood (1996). Aspects of patient satisfaction with communication in surgical care: confirming qualitative feedback through quantitative methods.</p>	<p>To examine aspects of patient satisfaction with communications in surgical care.</p>	<p>150 consultations in 10 outpatient clinics, 30 patients randomly selected from two hospital sites and 789 patients from five hospital sites.</p>	<p>Questionnaire developed from qualitative part of the study. Two follow-up letters sent to non-responders. Final 89% response rate.</p>	<p>Non-participant observation of 150 consultations and semi-structured interviews with surgeons and other staff. 30 semi structured patient interviews that were recorded and transcribed as case studies. No indication of how analysis of data was performed.</p>	<p>The study used the qualitative data to inform the development of the quantitative phase. The results are presented in an integrated way and the discussion highlights and where conflicts between data sets exist.</p>	<p>The two approaches complemented each other and enhanced the results from the other in a sophisticated way.</p>	<p>The data support the conclusions that have a greater depth than using one method alone.</p>
<p>Murray et al. (2000). The interplay between social and cultural context and perceptions of cardiovascular disease.</p>	<p>To investigate the impact of social and cultural influences upon perceptions and cardiovascular risk and lifestyle changes amongst post-MI patients.</p>	<p>Purposeful sample of in-patients in one post-coronary care unit in an inner-city UK hospital.</p>	<p>Three researcher-designed questionnaires for patients, carers and nursing staff respectively. Questionnaires completed by the researcher during an interview. Inappropriate graphical display of results obtained.</p>	<p>Structured interview with ten patient, carer and nursing staff triplets. Thematic analysis to identify common themes.</p>	<p>The questionnaires were part of the structured interview and there was no discussion about this or other aspects of integrating methods by the authors.</p>	<p>There is plenty of potential in using a mixed methods approach with this population but this was not fulfilled by the data presented in this paper. It was hard to tell from what was presented in the paper, but the themes appeared to come directly from prompts in the interview.</p>	<p>Data were collected very soon post-MI and there was no discussion about the impact in the longer term, although this was identified for future research. The author acknowledged limitations of the very small sample.</p>

### Hand searching of journals

The results of hand searching journals are shown in Table 3. There was a difference in type of research reported; the nursing journals printed more qualitative and theoretical articles in contrast to the general practice journal. A smaller proportion of quantitative studies published in the nursing journals were experimental in design compared to those published in the British Journal of General Practice (4% versus 16%).

All of the published studies reporting the use of mixed methods (six) were published in the *Journal of Advanced Nursing*. Five of the studies used questionnaires and interviews and, in the sixth, a Delphi study and focus groups. No mixed methods papers were published in the general practice journal.

All six of the mixed methods papers found by hand searching were also found in the electronic search and were therefore included in the second ProCite database used to choose papers for critical appraisal.

### Discussion

This study aimed to identify the amount of published work integrating the results of quantitative and qualitative research in one manuscript. The results of hand searching all the papers published in four selected nursing journals for 1997 show that more quantitative than qualitative work was published. The majority of these quantitative studies were descriptive, with only 4% of the total reporting experimental studies assessing an intervention. The experimental studies used a range of methods, not solely RCTs. Very few papers (six) contained reports of mixed methods, using both qualitative and quantitative approaches to the problems examined: all six were published in one journal (the *Journal of Advanced Nursing*).

The results of the electronic health database searches showed that there was an enthusiasm amongst researchers for mixing research methods. Over

**Table 3** Classification of reports contained within hand searched journals

Type of article	Four nursing journals (1997)		<i>British Journal of General Practice</i> (1997)	
	Number	(%)	Number	(%)
Review	50	(9)	17	(13)
Theoretical	167	(30)	15	(11)
Qualitative	111	(20)	5	(4)
Quantitative	172	(31)	98	(72)
Clinical case study	5	(1)	1	(1)
Clinical review	46	(8)	0	(0)
Mixed methods	6	(1)	0	(0)
Totals	557		136	

one-quarter of all reports retrieved from the literature databases were theoretical discussions about the merits of mixing methods. A recent review of the literature has concluded that it is profitable to recognise the complementarity of qualitative and quantitative methods, acknowledging their particular strengths (Murphy et al., 1998). The mixing of methods may undermine some taken-for-granted assumptions, such as the position taken about the generalisability of results by both qualitative and quantitative researchers. These positions might otherwise limit the usefulness and distort the findings of research in the field of health technology assessment, if this were to be solely quantitative (Murphy et al., 1998) or qualitative.

The randomly selected sample of papers that were subjected to critical appraisal was of variable quality. There is no one accepted way of assessing the quality of quantitative or qualitative research. The two methods used gave an indication of the quality for each type of research. This was combined with the articles' authors' views on the approach to the integration of methods, based upon the way the results were reported, and any constructive discussion about the balance between or integration of the different types of results within the paper.

In some cases quantitative methods were the major approach used in the research (Lindop, 1993; Debats et al., 1995; George et al., 1997), and in another qualitative (Bree-Williams and Waterman, 1996; Murray et al., 2000). Some studies had been developed from the outset to ensure that the data from the different methods was integrated and used to influence future service developments (French et al., 2000) or to inform larger, mixed method, studies (Britton, 1999).

Mixing methods was not always appropriate and some papers reported weaker studies than might have been the case if only one method had been used (Lindop, 1993; Bree-Williams and Waterman, 1996; Martinson et al., 1997; Murray et al., 2000).

The exercise highlighted the importance of looking at the rigour demanded by each method separately, before they can be brought together. This means that conflicting demands of different methods have to be resolved before embarking upon such studies. Issues of rigour, such as sampling strategies and the need to remove other potential sources of bias, are critical, but were not discussed in any detail in a number of the papers appraised (Hastings et al., 1990; Bree-Williams and Waterman, 1996; Meredith and Wood, 1996; Hughes et al., 1997; Martinson et al., 1997; Häggman-Laitila and Pietiä, 1998). In addition, ontological and epistemological assumptions from different qualitative methods also have an impact on the way that the results may be integrated.

Using the two sets of questions to appraise the papers, not all of the criteria were applicable to each study and could potentially cause some level of conflict. Issues that may be appropriate for one method may not be so for the



other. In addition, the results of qualitative and quantitative parts of a study may contradict each other (Meredith and Wood, 1996). This should provide the researchers with a challenge that can lead to a greater exploration of issues and add to knowledge. It is important for authors to develop a coherent discussion of their results; otherwise this could lead to publication bias, as studies with apparently contradictory results are not published.

The different methods were used imaginatively. Qualitative work influenced quantitative studies (Llewlyn-Thomas et al., 1989; Bree-Williams and Waterman, 1996; Meredith and Wood, 1996; Hughes et al., 1997), and vice versa (McCann, 1997). In all papers appraised, the potential that integrating methods could provide for the subject areas covered was evident to the appraisers, although not always discussed by the authors. Where the results of the different parts of the study were integrated by the authors, the outcomes from the research were more convincing than they might otherwise have been (Hastings et al., 1990; Meredith and Wood, 1996; Britton, 1999; French et al., 2000).

The findings presented here, together with criticisms of the use of checklists to ensure rigour in qualitative research (Barber, 2001), highlight the need for research teams working on research questions that require both quantitative and qualitative techniques to include members with experience and understanding of research design and data analysis of both types of method. This will promote the taking of appropriate steps to ensure methodological rigour for the different parts of the research and the valid ontological and epistemological interpretation of the results.

In the future, when researching direct care interactions, there will be an increasing need to look at patient–professional interactions, communication skills, staff knowledge and attitudes. This will prove more important as patients become more knowledgeable, e.g. obtaining information from the Internet. The tradition of researchers having a narrow focus, using one set of methods only, will have to be challenged. Individuals with an understanding of the strengths and weaknesses of different approaches will be required to ensure that appropriate techniques can be applied to answer the research questions. Single method approaches will remain important, but mixed methods will have increasing prominence. For instance, the RCT, the gold standard approach to providing evidence for practice, requires other more qualitative methods to be used in tandem to obtain the views of patients and staff, ensuring that evidence is put into practice.

Computer packages have been developed that allow new associations to be discovered in mixed qualitative and quantitative data, that can add another dimension to research findings using mixed methods (Bazeley, 1999). These new tools should enhance the use of mixed methods, providing mechanisms to answer more complex questions than individual approaches can address and provide ‘added value’ to research data (Bazeley, 1999).

The methods used in this study have their limitations. Papers using mixed qualitative and quantitative methods may not explicitly use the chosen key words ('qualitative', 'quantitative', 'research') in the title, abstract or subject headings of the article or in the full text of the article (where that was read). Indexing services are not necessarily consistent between different databases and do not always include every paper published in each issue of a journal. In addition, it is not always possible to identify the type of study from the information provided in the abstract alone (Pitkin et al., 1999). These factors could have led to relevant articles being missed. Hand searching journals overcame this problem to a small degree. This process was time consuming and depends upon journal collections being complete and up-to-date. In this study, only a relatively small number of journals were hand searched. Online searching of the contents of articles was possible for some journals; however, the online journal contents did not always include the abstracts and methods, which were required to complete the classification process. In some cases, especially for grey literature, such as reports or theses, it was very difficult to obtain paper copies of the items listed in the database. Publication bias, where only some studies are published for a variety of reasons, meant that it was not possible to look at the extent of the use of mixed methods in work undertaken, but only in that published. Work undertaken by authors who had used both qualitative and quantitative methods, but published the results separately, would not have been retrieved by the searches used, unless the authors had made substantive reference to their previous work.

## **Conclusion**

The debate about integrating qualitative and quantitative methods is continuing (Risjord et al., 2002; Brinton and Fujiki, 2003; Racher and Robinson, 2003). A substantial number of papers purporting to report the results of mixed methods have been published and the numbers appear to be increasing over time. Further work is required to refine and develop ways of mixing methods to allow the full potential of integration to be met. This will include use of computer programs that can provide added value to using large data sets; bringing together mixed groups of qualitative and quantitative researchers who can contribute their expertise in research teams, and changes within education to ensure that undergraduate and postgraduate curricula include debate about the subject. In addition, research programmes offered to new researchers should include such debate, enabling full use of appropriate, available methods.

### Key points

- There is enthusiasm for mixing qualitative and quantitative research methods.
- Critical appraisal of papers purporting to use mixed qualitative and quantitative methods identified that authors used a wide range of ways to integrate the data obtained from the different methods.
- Exploration of the issues raised by results obtained from the different methods can lead to a greater depth and understanding of the issues which would not have been possible using either method alone.
- Research using mixed methods requires research team members with experience of using each method.
- Future work should refine and develop ways of mixing methods to generate the full benefits of integration.

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### References

- Barber, R.S. (2001) Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *British Medical Journal* **322**: 1115–1117.
- Barbour, R.S. (1999) The case for combining qualitative and quantitative approaches in health services research. *Journal of Health Services Research & Policy* **4**: 39–43.
- Bazeley, P. (1999) The Bricoleur with a computer: piecing together qualitative and quantitative data. *Qualitative Health Research* **9**: 279–287.
- Bishop, V., Freshwater, D. (2003) Capacity-building and careers in nursing research: rationale and context. *Nursing Times Research* **8**: 398–406.
- Black, N. (1996) Why we need observational studies to evaluate the effectiveness of health care. *British Medical Journal* **312**: 1215–1218.
- Bourgeois, P. (2002) Anthropology and epidemiology on drugs: the challenges of cross-methodological and theoretical dialogue. *International Journal of Drug Policy* **23**: 259–269.
- Bree-Williams, F.J., Waterman, H. (1996) An examination of nurses' practices when performing aseptic technique for wound dressings. *Journal of Advanced Nursing*, **23**: 48–54.

- Briggs, A. (1972) *Report of the Committee in Nursing*. London: HMSO.
- Brinton, B., Fujiki, M. (2003) Blending quantitative and qualitative methods in language research and intervention. *American Journal of Speech Language Pathology* **12**: 2, 165–171.
- Britton, C. (1999) A pilot study exploring families' experience of caring for children with chronic arthritis: views from the inside. *British Journal of Occupational Therapy* **62**: 534–542.
- Burnard, P., Hannigan, B. (2000) Qualitative and quantitative approaches in mental health nursing: moving the debate forward. *Journal of Psychiatric and Mental Health Nursing* **7**: 1–6.
- Burns, N., Grove, S.K. (1997) *The Practice of Nursing Research: Conduct, Critique and Utilisation*, 3rd Edition. Philadelphia: W.B. Saunders.
- Critical Appraisal Skills Programme (2001) Institute of Health, Oxford, UK: Critical Appraisal Skills Programme. Available from: <http://www.phru.org/casp/> (accessed 12 November 2001).
- Cullum, N. (1998) Evidence-based practice. *Nursing Management* **5**: 32–35.
- Debats, D.L., Drost, J., Hansen, P. (1995) Experiences of meaning in life: a combined qualitative and quantitative approach. *British Journal of Psychology*, **86**: 359–375.
- Dunn, V., Crichton, N., Roe, B., Seers, K., Williams, K. (1998) Using research for practice: a UK experience of the BARRIERS scale. *Journal of Advanced Nursing* **26**: 1203–1210.
- French, R., Power, R., Mitchell, S. (2000) An evaluation of peer-led STD/HIV prevention in a public sex environment. *AIDS Care* **12**: 225–234.
- Garfield, E. (1996) How can impact factors be improved? *British Medical Journal* **313**: 411–412.
- George, V.M., Burke, L.J., Rodgers, B.L. (1997) Research-based planning for change: assessing nurses' attitudes towards governance and professional practice autonomy after hospital acquisition. *Journal of Nursing Administration* **27**: 53–61.
- Gillies, J.C.M. (1999) The future of the BJGP. *British Journal of General Practice* **49**: 664.
- Goodwin, L.D., Goodwin, W.L. (1984) Qualitative versus quantitative research or qualitative and quantitative research. *Nursing Research* **33**: 378–380.
- Gray, J.A.M. (1997) *Evidence-Based Healthcare: How to Make Health Policy and Management Decisions*. Edinburgh: Churchill Livingstone.
- Häggman-Laitila, A., Pietiä, A.M. (1998) Life control and health in view of qualitative and quantitative research. *International Journal of Nursing Practice* **4**: 103–112.
- Haines, A., Donald, A. (1998) *Getting Research Findings into Practice*. London: BMJ Books.
- Hastings, G.B., Eadie, D.R., Scott, A.C. (1990) Two years of AIDS publicity: a review of progress in Scotland. *Health and Education Research* **5**: 17–25.
- Hicks, C., Hennessy, D. (1995) Mixed messages in nursing research: their contribution to the persisting hiatus between evidence and practice. *Journal of Advanced Nursing* **5**: 595–601.
- Hughes, K., MacKintosh, A.M., Hastings, G., Wheler, C., Watson, J., Inglis, J. (1997) Young people, alcohol and designer drinks: quantitative and qualitative study. *British Medical Journal* **314**: 414–418.
- Kelly, B., Long, A. (2000) Quantity or quality? *Nurse Researcher* **7**: 4, 53–67.
- Lindop, E. (1993) A complementary therapy approach to the management of individual stress among student nurses. *Journal of Advanced Nursing* **18**: 1578–1585.
- Llewellyn-Thomas, H.A., Sims-Jones, N., Sutherland, H.J. (1989) Measuring perceptions of the exemplary nurse. *Journal of Nursing Education* **28**: 366–371.

- McCann, T.V. (1997) Willingness to provide care and treatment for patients with HIV/AIDS. *Journal of Advanced Nursing* **25**: 1033-1039.
- McKinley, T.B. (1993) The promotion of health through socio-political change: challenges for research and policy. *Social Sciences in Medicine* **36**: 109-113.
- McPherson, K. (1994) The Cochrane lecture: the best and the enemy of the good: randomised controlled trials, uncertainty and assessing the role of patient choice in medical decision making. *Journal of Epidemiology and Community Health* **48**: 6-15.
- Martinson, I.M., Armstrong, V., Qiao, J., Davis, A., Yi-Hua, L., Gan, M. (1997) The experience of the family of children with chronic illness at home in China. *Pediatric Nursing* **23**: 371-375.
- Mason, S.A. (1993). Employing qualitative and quantitative methods in one study. *British Journal of Nursing* **2**: 869-872.
- Mays, N., Pope, C. (1995) Rigour and qualitative research. *British Medical Journal* **311**: 109-112.
- Meredith, P., Wood, C. (1996) Aspects of patient satisfaction with communication in surgical care: confirming qualitative feedback through quantitative methods. *International Journal for Quality in Health Care* **8**: 253-264.
- Murphy, E., Dingwall, R., Greatbatch, D., Parker, S., Watson, P. (1998) Qualitative research methods in health technology assessment: a review of the literature. *Health Technology Assessment* **2**: 16.
- Murray, S.A., Manktelow, K., Clifford, C. (2000) The interplay between social and cultural context and perceptions of cardiovascular disease. *Journal of Advanced Nursing* **32**: 1224-1233.
- Myers, S.T., Haase, J.E. (1989) Guidelines for integrating quantitative and qualitative approaches. *Nursing Research* **38**: 798-799.
- Ong, B.N. (1993) *The Practice of Health Services Research*. London: Chapman and Hall.
- Oxman, A.D., Cook, D.J., Guyatt, G.H. (1994) Users' guides to the medical literature VI How to use an overview. *Journal of American Medical Association* **272**: 1367-1371.
- Pitkin, R.M., Brannagan, M.A., Burmeister, L.F. (1999) Accuracy of data in abstracts of published research articles. *Journal of the American Medical Association* **281**: 1110-1111.
- Polit, D.F., Hungler, B.P. (1993) *Essentials of Nursing Research: Methods, Appraisal and Utilisation*, 3rd Edition. Philadelphia: JP Lippincott Company.
- Racher, F.E., Robinson, S. (2002) Are phenomenology and postpositivism strange bedfellows? *Western Journal of Nursing Research* **25**: 464-481.
- Rafferty, A.M., Lewison, G. (2000) *Measuring the Outputs of Nursing R&D*. London: Centre for Policy in Nursing Research, London School of Hygiene & Tropical Medicine.
- Rafferty, A.M., Traynor, M., Thompson, D., Ilott, I., White, E. (2003) Research in nursing, midwifery and the allied health professions; Quantum leap required for quality research. Editorial. *British Medical Journal* **326**: 833-834.
- Risjord, M.W., Dunbar, S.B., Moloney, M.F. (2002) A new foundation for methodological triangulation. *Journal of Nursing Scholarship* **34**: 3, 269-275.
- Rolfe, G. (1994) Towards a new model of nursing research. *Journal of Advanced Nursing*, **19**: 969-975.
- Walsh, M., Ford, P. (1992) *Nursing Rituals: Research and Rational Actions*. Oxford: Butterworth Heinemann Ltd.