

The State of Mixed Methods Research in Nursing: Findings from a Focused Mapping Review and Synthesis

ABSTRACT

Aims

To consider the scope and quality of mixed methods research in nursing.

Design

Focused mapping review and synthesis.

Data sources

International Journal of Nursing Studies, Journal of Nursing Scholarship, Journal of Advanced Nursing, Worldviews on Evidence Based Nursing, and Journal of Mixed Methods Research.

Review methods

Within the target journals, titles and abstracts from papers published between 2015 and 2018 were searched for the words or derivative words 'mixed methods'. Additional keyword searches were undertaken using each journal's search tool. We included studies that investigated nursing and reported to use a mixed methods approach. Articles that met the inclusion criteria were read in full and information was extracted onto a predetermined proforma. Findings across journals were then synthesised to illustrate the current state of mixed methods research in nursing.

Results

We located 34 articles that reported on mixed methods research, conducted across 18 countries. Articles differed significantly both within and across journals in terms of conformity to a mixed methods approach. Nineteen studies were rated as satisfactory or good as regards our assessment of their execution, with 15 rated as poor. Primarily, a poor rating was due to the absence of an underpinning methodological approach to the study and/or limited detail of the crucial integration phase.

Conclusions

There is a paucity of published mixed methods research in the higher ranked nursing journals, and when they are published there are limitations in the detail given to the underpinning methodological approach and theoretical explanation.

Impact

This review provides best practice guidance in conducting and reporting mixed methods nursing research and will help to ensure that nurses' endeavour in mixed methods research is of the highest quality.

Key words

Focus Mapping Review and Synthesis, Mixed Methods, Nursing, Research.

INTRODUCTION

Mixed methods research (MMR) is a well-established research approach that integrates qualitative and quantitative methods to give a breadth and depth of understanding about the phenomenon of interest. MMR is said to combine the strengths of qualitative and quantitative research and to compensate for any limitations of the individual approaches (Pluye and Hong 2014) thereby offering ‘multiple ways of seeing’ (Greene 2007).

Since the development of MMR in the 1980s, it has become an important research approach in the social sciences (Creswell and Plano Clark 2018). However, in nursing its development has been slow because, according to Fleming (2007), the methodological divide of qualitative and quantitative research is more entrenched in the nursing discipline and reflects the medical hegemony in healthcare research, where randomised controlled trials dominate. That said, its use has intensified to the point where a scoping exercise, searching titles in CINAHL, showed that from January 2017-May 2018 748 MMR studies were published in journals relevant to nursing, covering subjects as diverse as assessing students in practice (Burden et al. 2018) to managing deteriorating health in nursing homes (O’Neil et al 2018). Over the years many authors have justified the use of the approach as one that has the power to uncover important evidence that may otherwise be overlooked. Given the professed value of MMR, we set out to explore the current state of MMR in nursing through a focused mapping review and synthesis (FMRS).

BACKGROUND

MMR combines the techniques of qualitative and quantitative research to address a range of complex research questions. Fielding (2012 p. 128) states that MMR “puts the findings from different methods into dialogue” to give a balanced view of a phenomenon. Numerous

definitions of MMR have been tendered and Johnson et al. (2007) suggest that in MMR, researchers need to:

‘Combine elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration’ (p.123)

This definition has been embraced by a number of authorities on MMR including Pluye and Hong (2014) and Creswell and Plano Clark (2018), all of whom stress that integration is at the heart of MMR and should feature through the design, methods, interpretation and reporting stages of the research process (Fetters et al. 2013). Fàbregues and Paré (2018) promote the ability of MMR to consider multiple world views and argue that the advantage of integration is its ability to produce knowledge that transcends what could be generated from separate qualitative and quantitative studies. Similarly, as Fielding (2012) suggests, MMR allows for greater ‘analytic density’ that is achieved through data integration.

Mixed methods research in nursing

Capturing the essence of nursing is challenging, not least because as Bender (2018) asserts, nursing is not clearly demarcated but rather involves:

“Interdependent relations that constitute people, including nurses, in their health/environment circumstance, which comprises nursing’s unique, fundamental point of access in the world” (p.6)

As such, nurses need to combine diverse ways of knowing and apply this to care delivery in different contexts (Reed & Shearer, 2011). MMR may offer a means of capturing the complex nature of nursing because the combination and integration of qualitative and quantitative

approaches corresponds with the multidimensional practice that symbolises nursing (Fàbregues & Paré 2018). Crucially, Hesook (2015) contends that nurses need to *integrate* these sources of knowledge to be able to articulate what comprises nursing and to practise nursing effectively; and as we argued earlier, integration is a fundamental property of MMR.

Of course, MMR offers more scope than capturing the nature of nursing; it is also a design that can be used to evaluate nursing practice (Bressan et al. 2016) and to provide evidence about nursing interventions (Fàbregues & Paré 2018). For example, Chiang and Chan (2014) used a MMR approach to evaluate advanced simulation in nursing and Söderhamn et al. (2015) used MMR to evaluate ethical reflections in community healthcare. These authors valued the latitude of the MMR approach and claimed that the integration of qualitative and quantitative methods strengthened the results, giving a broader and more comprehensive perspective to their evaluation. Thus, overall, advocates of MMR claim that it offers the scope to explore both the experiential and intuitive facets of nursing knowledge and integrates these to provide a detailed representation of phenomena. Arguably, if these claims are justified, then we would expect to see well executed MMR in nursing and we wanted to find out whether that was the case.

THE REVIEW

Aim

We are a group of researchers, lecturers and postgraduate students who came together either to deliver or participate in teaching and learning about MMR. As part of the programme of teaching, we looked in some depth at definitions and typologies of MMR. Since a number of us have a nursing disciplinary background, we were struck by the variation in type and quality of MMR either undertaken by nurse researchers or those investigating nursing issues. This led to the aim of establishing what is happening methodologically and theoretically in MMR in nursing. As we were interested in a profile picture of the current status of a phenomenon, we

set out to explore this using a focused mapping review and synthesis (FMRS); a new approach to literature reviewing that has been described recently by Bradbury Jones et al. (2019).

Design

The FMRS is a novel approach to literature reviewing that differs from a ‘traditional’ systematic review where the aim is to synthesise evidence to discover ‘what works’ in a particular area. Instead, the FMRS seeks to explore a body of research in a pre-defined field to understand the main theoretical, methodological and epistemological assumptions that underpin the work, and provide a critical report on these assumptions and their application. In doing this, the strengths and limitations of the approach are brought to light. We followed the three-stage FMRS approach detailed by Bradbury Jones et al. (2019), which as the name of the review suggests, involves 1. Focus 2. Mapping and 3. Synthesis.

Focus

A unique feature of the FMRS is the identification of journals at the outset of the review process. Because we were interested in producing a profile of MMR within nursing, we had a clear disciplinary focus. Thus we intended to contain our search to nursing journals and elected to search the top four journals listed under ‘Nursing’ in Scimago Journal & Country Rank for the most up-to-date profiles available at the time (2018). This strategy, we considered, was likely to elicit the best quality reported MMR studies in nursing. We included journals that dealt with a broad sphere of nursing and excluded those with a specialist focus, such as education, management or clinical specialties. Since nurses do not restrict their publishing activity solely to nursing journals, we decided to supplement the nursing journals with that of the most prominent MMR journal at the time (The Journal of Mixed Methods Research). As a result, we searched the journals that feature in Table 1. Before setting out on the search process, we undertook a scoping exercise, whereby two members of the review team searched the

indexes of each of the five journals independently, to establish whether MMR featured in the journals. Following the rapid feasibility exercise, we then came together to review our search strategy and agreed on the journals and the timeframe.

As is common practice in other forms of literature review (Aveyard 2018), we also imposed time parameters on the FMRS. We wanted to ensure that we retrieved sufficient contemporary literature to address our research question and initially we restricted the search to a one-year period. Searching and retrieval of articles followed a stepped process. We established four search teams of two to three reviewers and each team was allocated one or two journals to search. Each member of the team worked through the process separately and documented the process as the review progressed.

Each reviewer began by scrutinising the index of every journal issue in reverse chronological order from May 2018 to January 2017. Titles were searched for the words or derivative words ‘mixed methods’ to identify articles that met the inclusion criteria. Articles that reported on multi methods were excluded, as were MMR review articles and articles reporting on an isolated part of a MMR study. To ensure we retrieved all relevant articles, each team member undertook an additional keyword search using the journals’ search tools. Using the same timeframe, we searched title for the key words ‘mixed method’ *and* ‘mixed-method’ *and* ‘mixed methods’ *and* ‘mixed-methods’ (*or nurse and nursing and nurs** in the Journal of Mixed Methods Research). In addition, for journals where indexes included the subtitle mixed methods (or derivatives), we searched the abstracts of articles that featured under this subtitle and included them in the review.

The FMRS incorporates a calibration process at each stage to add rigour to the process (Bradbury-Jones et al. 2019) (Figure 1). In the focused search, calibration was an iterative process. This involved frequent points of contact and deliberation amongst the entire review

team, firstly to set search parameters and then to review and revise these as necessary. Additionally, having completed our searches separately, the team allocated to each journal came together to compare and agree on their retrieved articles. Finally, the whole team regrouped to agree on the final articles for inclusion.

This process revealed the need to revise the search parameters. Our initial search was contained to article titles and this proved fruitful in three of the journals, however, no MMR studies were captured from the search of *World Views on Evidence Based Nursing* or the *Journal of Nursing Scholarship*. As a team we needed to decide whether we worked with the retrieved articles from fewer journals than intended or extended the search in some way. Since there was a danger of missing a fuller profile of nursing if we restricted journals, we agreed to extend the search. One possibility was to lengthen the timeframe of the search, but we agreed that this was likely to yield more articles from the journals that we had already successfully searched, rather than those that had returned no hits. We elected to extend the search to abstracts as it was possible that the methodology was not disclosed in article titles and this approach proved partially successful. However, we then still needed to extend the search period going back a second year and then a third year and by taking this approach we retrieved at least one further article from each of the target journals published between 2015 and 2018. This, we felt, gave the review greater meaning and as a result, we retrieved 34 articles across the five journals (Table 2).

Mapping

In their typology of reviews, Grant and Booth (2009) describe mapping as the process of producing systematic maps to characterise studies in ways other than eliciting their findings. This, they suggest could include charting the studies' theoretical perspective, their population group or the setting within which they were undertaken. Two reviewers completed this mapping process for each article independently. Articles that met the inclusion criteria were

read in full and the assigned reviewer extracted the information according to a predetermined extraction proforma. The development of this proforma was also subject to calibration. Here, using the most recent MMR article published in each of the five journals, two reviewers assessed the articles against the research questions and built the extraction form accordingly. This was then refined by the whole team. After each reviewer completed the mapping process for one article, all team members commented on the suitability of the extraction proforma and some minor changes were made at this point (Table 3). Since we were interested in the operation of the MMR design rather than the findings of the study, we did not extract data from the findings but rather, we drew out processes followed in a MMR study, as laid out by Pluye and Hong (2014). Put simply, we assessed what the authors did rather than what they said they did. On this basis, we made a judgement about the quality of the articles using the six elements that formed the extraction process. We rated papers as ‘good’ if the elements were clear and explicit in the paper, ‘poor’ if most were unclear or missing, and ‘satisfactory’ where some elements were evident and some were omitted or unclear. We acknowledge that this judgement was necessarily subjective but peer reviewed to ensure agreement.

The review team then met as a group to undertake a calibration using a sample of the completed extraction documents. Here the two reviewers of each of the selected articles presented the completed proforma and explained their judgments; and the whole team discussed any dilemmas or ambiguities to reach a consensus. Finally, two independent reviewers checked a purposively selected 20% sample, across journal and review teams, to ensure accuracy and consistency in reporting. This process gave teams the opportunity to revise their extraction work in light of any new insights and ideas, thereby introducing an additional level of rigour and ensuring consistency.

Synthesis

As advocated by Bradbury Jones et al. (2019) for our FMRS, we directed the synthesis on examining the current state of MMR in nursing. In so doing, we sought to consider the completeness of its use within the literature, so the synthesis was limited to exploring the occurrence of the design and the quality of the research. We synthesised our findings across journals (Table 4) and therefore were able to identify and compare the nuances of each journal and extract and report on the patterns within and across journals.

RESULTS

Overall profile

In total, 34 articles fulfilled the inclusion criteria and were included in the review. The articles represented a good global spread, deriving from a total of 18 countries (Table 5). Some of the studies spanned multiple countries and there was a predominance of articles from Australia, the UK and USA. Of the 34 articles, eight were rated as good, with 11 being of satisfactory standard and the majority (n=15) rated as poor.

Justification and claimed MMR design

A positive finding of our review was that 29 articles stated the specific MMR design that was used in the research, with 17 of these citing an underpinning methodological source that guided their work. Some of the reasons for the lower quality assessment related to lack of reporting or regard for crucial elements of a MMR design. The most frequently used design was an explanatory sequential MMR design, whereby quantitative methods were followed by qualitative strands (e.g. Newton et al 2015). Those that justified this approach, such as Alabdulaziz et al. (2017) and Halpin et al. (2017), indicated that the intention of using this design was to enable a deeper understanding of the research topic through the use of qualitative approaches to enrich and explain the quantitative results. Other designs included exploratory-

sequential (e.g. Cabilan et al. 2016, Shahriari et al. 2015) and convergent MMR typologies (e.g. Kagawa & Deardoff 2015). However, it is worth noting that half (n=17) of the studies did not explicitly state their underpinning methodological source.

Underpinning source

Of the articles that explicitly stated an underpinning methodological source, Creswell and Plano Clark and Creswell were the most commonly cited references. Exactly half of the included articles (17 out of 34) failed to mention any underpinning methodological source in the methods section. It is noteworthy that the quality of the vast majority of the articles that explicitly stated to have used a MMR design but lacked an underpinning methodological source were rated by our research team as being poorly executed; only two articles were rated as satisfactory. For example, the articles by Chen et al. (2015) and Van Devanter et al. (2017), both rated as poor, clearly state in the methods section to have employed a MMR design. However, the authors neither provide any reason for conducting MMR nor do they explicitly articulate the design in terms of the priority of methods. It is worth mentioning that Raveis et al. (2017) cited Miles and Huberman (1994) – the authors of a best-selling textbook for qualitative data analysis (rather than MMR) – as the underpinning source for their MMR study. In a similar vein, Tuffrey-Wijne et al. (2016) cited an editorial (Miller et al. 2013) and Phelan and McCormack (2016) cite their own earlier work in which they undertook action research, in place of a recognised methodological leader to underpin their study.

Integration phase

Only eight of the 34 articles provided full details of the integration phase. Articles identified as good in this review (n=8) provided very good signposting of where integration occurred, with the best offering a diagrammatic illustration (e.g. Desborough et al. 2018). Eleven articles

were assigned to the satisfactory quality range, and in most cases, these articles had weaknesses in the reporting of data integration (e.g. Sidani et al 2016).

Reflection on strengths and limitations of MMR

Most articles provided an account of the limitations of their studies, but this mainly lacked specific reflection on either the benefits or limitations of MMR design. Of the 34 included articles, only four made an explicit statement about the limitations of the MMR approach that they had used, or some aspect of it, such as integration. Articles which commented on the limitations of quantitative and qualitative phases separately were graded 'no' for this criterion. Where limitations of MMR design were critically discussed, the lack of detailed research guidance on how to manage MMR was cited, including guidance on sampling strategies (Hall et al. 2018) and on integrating qualitative and quantitative data (Hosie et al. 2017). These are interesting claims since they seem to have overlooked the clear guidelines published by O'Cathain et al. (2010) on different approaches to integrating data in MMR studies.

DISCUSSION

What does a good quality MMR article look like?

If researchers are to produce and report on rigorous MMR that advances their field, they need to be able to recognise what 'good' looks like (Venkatesh et al. 2013) and our FMRS should help with this. In our review, high quality articles tended to include justification for undertaking a MMR approach and drew on theory to underpin the decision. For example, Burden et al. (2018) used pragmatism (Feilzer 2010) to argue that objective and subjective inquiry, using complementary methods, gives a better representation of reality. The good papers also referred and adhered to well-established models for MMR studies, for example: Nasstrom et al. (2017) and Hall et al. (2018) cited Creswell & Plano Clark (2007), Hosie et al. (2017) cited Creswell (2009), and Halpin et al. (2017) cited Wisdom & Creswell (2013).

We have already established the necessity of integration in MMR (Fetters et al. 2013) since MMR is more than simply collecting multiple forms of qualitative and quantitative evidence (Klassen et al. 2012). It follows that articles identified as good in this review articulated how integration was accomplished and provided clear signposting of where it occurred. Good studies, such as Bailie & Thomas (2017), also provided some reflective account on the beneficial use of MMR in their studies. All studies need to show appropriate theoretical depth and breadth of alignment to a recognised MMR design (Creswell & Plano-Clark, 2007; Creswell, 2009) and again, this was evident in good studies, which articulated their approaches to sequential phasing, data triangulation, integration and synthesis. Of course this could result merely in an operational approach to replication without advancing the method. In some papers this was taken further, and advanced integration or theoretical application was evident as illustrated in Figure 2.

The Mixed Methods Appraisal Tool (MMAT) (Hong et al. 2018) gives a clear view of what is expected of high quality MMR. It comprises five criteria to assess methodological quality in terms of: (1) providing adequate rationale for using a MMR design, (2) effectively integrating the different components to answer the research question, (3) the overall interpretation (meta-inferences) derived from integrating qualitative and quantitative findings, (4) divergences and inconsistencies found when integrating the findings, and (5) adhering to the quality criteria of each tradition. Since they adhered closely to these criteria, the papers by Desborough et al. (2018) and Nasstrom et al. (2017), both published in the *Journal of Advanced Nursing (JAN)*, epitomised what a good quality MMR study looks like. Desborough et al. (2018) conducted a concurrent MMR study on developing a positive patient experience with nurses in general practice and Nasstrom et al (2017) used a convergent parallel mixed methods design to explore partners' perspectives on participating in home care for patients with heart failure. Although neither team of authors provided an explicit rationale for using a MMR design, they compared

and integrated the results of the multilevel analyses in an exemplary manner. In terms of the overall interpretation, both papers used tabular data displays as a visual means of drawing out new insights that moved beyond the results of the separate qualitative and quantitative components (Figure 2). In addition, these data displays provided a structure to understand conceptual similarities between quantitative variables and qualitative categories and the way they interacted, converged or expanded. This approach culminated in an integrated model of patient satisfaction and enablement (Desborough et al. 2018) or an account of different levels of partner participation in care (Nasstrom et al. 2017).

Poor quality

It is also important to consider what impedes the quality of MMR so that future researchers avoid similar traps. Our review shows that one of the weaknesses of poor quality studies was the failure to describe the design in terms of the sequence of methods. Gerrish et al. (2016) appear to have made this omission because whilst they give detail of their different data collection methods, they do not explain how these methods inform each other. This is contrary to the guidelines for Good Reporting of a Mixed Methods Study (O’Cathain et al. 2008) that stress the need to articulate the order of a design to show how decisions and inferences are made.

Within this cluster of poorly rated articles, most claimed adherence to a MMR approach, frequently in the title of the article (e.g. Dale et al 2015, Gerrish et al 2016, Wong et al 2018) or in the method section (e.g. Long et al 2016, Martin et al 2017). However, despite asserting a MMR design, these authors clouded their position by failing to refer to key texts that could have steered the research approach. This was also the case in some of the papers that were rated as satisfactory (e.g. Zugai et al. 2018), the difference being that the satisfactory papers were redeemed through their observation of other important MMR elements. Stating the source of

the mixed methods design is important because many different MMR designs exist, and researchers often use different terms to refer to these designs. This oversight leads to confusion and prevents methodological replication, which, according to Castro et al. (2010) is one of the canons of scientific research.

The majority of the poorly rated articles neglected to chronicle the specific details of a MMR study. For example, Yoon et al. (2016) claimed a convergent, parallel mixed method design but did not align this to the framework of an acknowledged methodological source and gave no indication of how integration was achieved. Due to these limitations in reporting, it is difficult to gain an appreciation of the level of alignment to an accepted MMR design within the poorly rated articles. This does not necessarily mean that they all lack scientific benefit or are of poor quality, but indicates a lack of regard for rigorous reporting and an inclination by journals to publish papers that do not satisfy best practice in defining the methodological criteria.

Overwhelmingly, the major weakness of the poor articles was the lack of data integration, especially during analysis and discussion. In most cases, authors reported findings separately for the quantitative and qualitative parts of their studies and failed to integrate the findings at any point. Studies by Afram et al. (2014), Arbour et al. (2017), Bleijenberg et al. (2016), Halcomb et al. (2017), He et al. (2015), Rahn et al. (2018) and Richardson et al. (2015) illustrate this shortcoming because although they gave a lot of detail of the separate parts of the study, they neglect to explore the interaction between phases. Therefore, they miss the opportunity for analytical density which could have given the new insights that integration offers.

Changes over time

Overall, when comparing the quality of MMR studies included in our FMRS with the results of O'Cathain et al. (2008) – who assessed 118 MMR studies published between 1994 and 2004

– it is evident that quality has improved over the past decade. While lack of transparency of the MMR approach still compromises the quality of MMR studies, more than one third (14 out of 34) of articles in our FMRS showed evidence of at least partial integration of findings derived through qualitative and quantitative research methodology. For example, Kinley et al. (2018) maintain that they integrated data, but the detail of the process is confined to telling us that they ‘followed a thread’ of new concepts from the qualitative data back to the quantitative data. Similarly, Ngangana et al. (2016) state that the qualitative and quantitative components of their study were mixed in the interpretation stage, but they do not outline the process.

In their review of 294 MMR studies in nursing, published between 1998 and 2015, Beck and Harrison (2016) found that integration of the qualitative and quantitative components was minimal. Their assertions compare to those of O’Cathain (2008) and colleagues who stated that:

‘Judgements about integration could rarely be made due to the absence of an attempt at integration of data and findings from different components within a study’ (p.92)

The level of recognition of the integration phase in both of these reviews differs to the (at least) partial integration that was revealed in our findings. Since O’Cathain et al. (2008) reviewed papers that extended beyond nursing, one explanation is that the nursing papers were the rare exceptions to their observations; and of higher quality than the other disciplines. However, as this is not borne out by Beck and Harrison (2016), it is more likely that the publication and widespread dissemination of reporting guidelines for MMR studies is the main reason for a positive development over time. This explanation is corroborated in our review where there is a chronological shift in quality (Table 4), with no good papers published in 2015, five by 2017 and three in the first five months of 2018 alone.

Journal Conventions

It is worth raising the point that journal conventions can muddy the waters when considering the quality of MMR papers because of the approach that some journals take when classifying their articles. For example, we observed that JAN organises its research papers under subheadings, including “ORIGINAL RESEARCH: EMPIRICAL RESEARCH – MIXED METHODS”. Three papers that were initially retrieved during our scrutiny of the journal index featured under this heading. However, when we explored these in more detail, it was evident that they did not follow MMR conventions and indeed, the authors made no claim of a MMR study. At this point we excluded the articles; however, they could easily have slipped through the net. Had this happened, they would have unjustifiably been rated as ‘poor’ MMR studies when in fact they were reporting on one phase of their MMR study (Lima et al. 2016), a multi-method study (Stefana et al. 2018) and a Delphi study (Perry et al. 2017). There are recommendations for journals here that we refer to below.

Limitations

There are inherent limitations to our review methodology because it provides a snap-shot profile that is constrained by the focused element of the FMRS (Bradbury-Jones et al. 2019). If the review is to be repeated at a different point in time, or with a different set of included articles, the conclusions may well be different. However, our study holds some useful insights and even within the limitations of its focus, we have been able to discern some interesting shifts across time.

CONCLUSION

The quality of reporting of mixed methods research in the articles included in our review was mixed. Primarily, a poor rating was due to the absence of an underpinning methodological approach to the study and/or limited detail of the theoretical application used to drive the crucial integration phase. This review provides useful guidance on best practice in conducting and

reporting mixed methods nursing research and will help to ensure that nurses' endeavour in MMR is of highest quality. The principle quality criteria are twofold: to make sure that the MMR design is well explained and that it includes an integration phase. This does not necessarily mean strictly adhering to current reporting convention. We know that MMR represents the complexity of inquiry very well (Fleming 2007) and diversifying attempts to represent it could help to further advance the design and expand our ways of knowing.

Highly rated MMR articles in our review included a flow chart that showed how the different aspects of the mixed methods design were integrated. This is a simple strategy for MMR to continue to improve quality in reporting.

Recommendations

Aside from the recommendations for authors to be clear and detailed in their reporting of MMR, we also call upon journal editors to review their practices. Journals should provide clear guidance for authors on the reporting of MMR; for example, the framework developed by O'Cathain et al. (2008) is currently recommended by the EQUATOR Network (2013), which aims to enhance the quality and transparency of health research. Moreover, we urge editors to avoid classifying articles as MMR unless claimed by authors.

Conflict of Interest statement

No conflict of interest has been declared by the author(s).

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Figure 1: Search Calibration

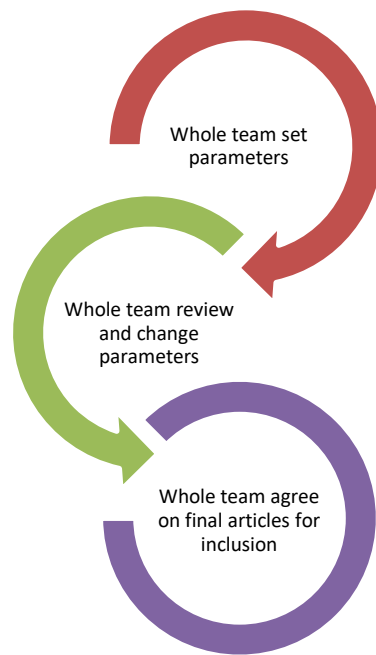


Figure 2.

Best practice in integration of results

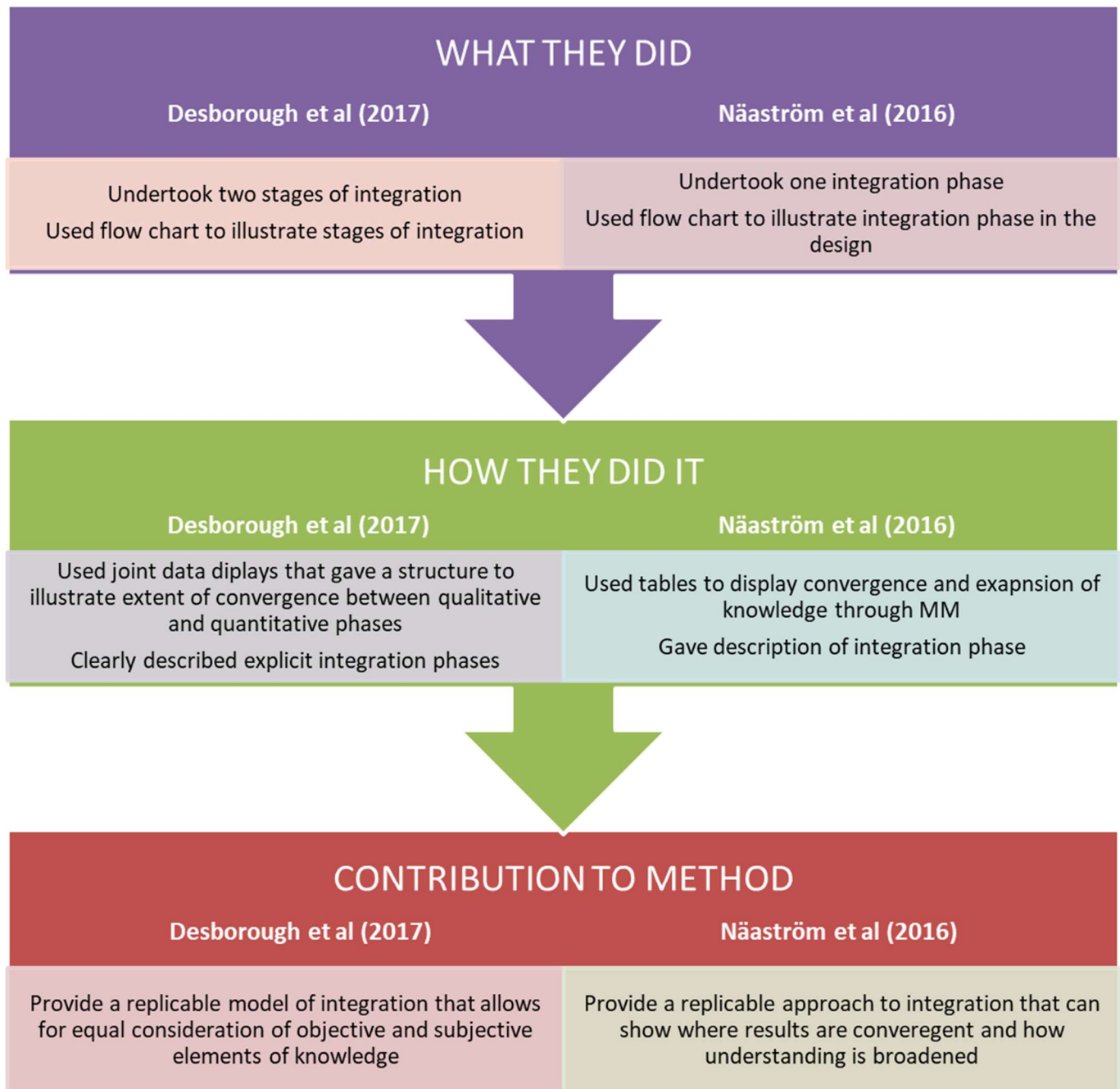


Table 1: Journals included in the Search

Journal	Ranking*	Journal home country
International Journal of Nursing Studies (IJNS)	27	UK
Journal of Nursing Scholarship (JNS)	65	UK
Journal of Advanced Nursing (JAN)	74	UK
Worldviews on Evidence Based Nursing (WEBN)	82	UK
Journal of Mixed Methods Research (JMMR)	Not applicable	USA

**Ranking in Scimago Journal & Country Rank for Nursing as of 10 May 2018*

Table 2: Included articles by Journal

Journal	Number of articles meeting inclusion criteria
IJNS	5
JAN	20
JMMR	1
JNS	3
WEBN	5
Total	34

Table 3: Data Extraction Pro forma

Journal reference	Justification for MMR study (Y/N)	Claimed MMR design (Y/N)	Underpinning source (Y/N)	Integration phase (Y/P/N)	Reflection on benefits of MMR approach (Y/N)	Limitations identified by authors (Y/N)	Well executed? (Pr/S/G)

Y=Yes

N=No

Pr=Poor

S=Satisfactory

G=Good

Table 4: Profile across journals

Journal reference	Justification for mixed methods study		Claimed mixed method design		Underpinning source		Integration phase			Reflection on benefits of MM approach		Limitations identified by authors		Well executed?		
	Y	N	Y	N	Y	N	Y	P	N	Y	N	Y	N	G	S	Pr
IJNS	4	1	5	0	5	0	3	1	1	2	3	2	3	3	1	1
JAN	7	13	17	3	9	11	5	4	11	5	15	1	19	5	7	8
JMMR	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0
JNS	1	2	2	1	0	3	0	0	3	1	2	0	3	0	0	3
WEBN	0	5	4	1	2	3	0	1	4	2	3	1	4	0	2	3
Totals	13	21	29	5	17	17	8	6	20	10	24	4	30	8	11	15

Partial (P); Good (G); Satisfactory (S); Poor (Pr); Yes (Y); No (N)

Table 5: Country profile

Country	Number of articles including this country
UK	8
Australia	7
USA	5
Canada	3
Germany	3
Netherlands	2
Sweden	2
Saudi Arabia/Middle East	2
China	1
Estonia	1
Finland	1
France	1
Iran	1
Ireland	1
Mexico	1
New Zealand	1
Singapore	1
Spain	1
Not specified	1
Total	42

