

The integrative review: updated methodology

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Aim. The aim of this paper is to distinguish the integrative review method from other review methods and to propose methodological strategies specific to the integrative review method to enhance the rigour of the process.

Background. Recent evidence-based practice initiatives have increased the need for and the production of all types of reviews of the literature (integrative reviews, systematic reviews, meta-analyses, and qualitative reviews). The integrative review method is the only approach that allows for the combination of diverse methodologies (for example, experimental and non-experimental research), and has the potential to play a greater role in evidence-based practice for nursing. With respect to the integrative review method, strategies to enhance data collection and extraction have been developed; however, methods of analysis, synthesis, and conclusion drawing remain poorly formulated.

Discussion. A modified framework for research reviews is presented to address issues specific to the integrative review method. Issues related to specifying the review purpose, searching the literature, evaluating data from primary sources, analysing data, and presenting the results are discussed. Data analysis methods of qualitative research are proposed as strategies that enhance the rigour of combining diverse methodologies as well as empirical and theoretical sources in an integrative review.

Conclusion. An updated integrative review method has the potential to allow for diverse primary research methods to become a greater part of evidence-based practice initiatives.

Keywords: evidence-based practice, integrative review, methodology, nursing

Introduction

An integrative review is a specific review method that summarizes past empirical or theoretical literature to provide a more comprehensive understanding of a particular phenomenon or healthcare problem (Broome 1993). Integrative reviews, thus, have the potential to build nursing science, informing research, practice, and policy initiatives. Well-done integrative reviews present the state of the science, contribute

to theory development, and have direct applicability to practice and policy.

Recent evidence-based practice initiatives have increased the need for and the production of all types of literature reviews (integrative reviews, systematic reviews, meta-analyses, and qualitative reviews). The proliferation of all types of research reviews during the past decade has contributed to more systematic and rigorous methods. Much has been learned about the methodology associated with combining

disparate studies into integrated results and conclusions, particularly with respect to systematic review and meta-analyses approaches (Cooper 1998, Greenhalgh 1997). Yet, concern has been raised that these review methods, while important for evidence-based practice, do not include the depth and breadth of nursing research as they overemphasize the randomized clinical trial and hierarchies of evidence (Kirkevold 1997, Evans & Pearson 2001). To date, evidence-based practice initiatives have viewed different types of evidence (i.e. quantitative and qualitative) as mutually exclusive (Evans & Pearson 2001).

The integrative review method is an approach that allows for the inclusion of diverse methodologies (i.e. experimental and non-experimental research) and has the potential to play a greater role in evidence-based practice for nursing. The integrative review contributes to the presentation of varied perspectives on a phenomenon of concern and has been advocated as important to nursing science and nursing practice (Kirkevold 1997, Estabrooks 1998, Evans & Pearson 2001). However, the complexity inherent in combining diverse methodologies can contribute to lack of rigour, inaccuracy, and bias (Beck 1999, O'Mathuna 2000). Methods to enhance data collection (i.e. literature search) and data extraction have been developed (Garrard 2004, Conn *et al.* 2003); however, methods of analysis, synthesis, and conclusion-drawing remain poorly formulated. This is a considerable issue, as the data extracted from primary articles of diverse methodologies generally consist of a large repertoire of varied data. Explicit and systematic methods for data analysis specific to the integrative review method are needed to protect against bias and improve the accuracy of conclusions. In addition, little attention has been paid to issues related to combining empirical and theoretical reports. The purpose of this paper, therefore, is to distinguish the integrative review method from other review methods and to propose methodological strategies specific to the integrative review method to enhance its rigour. An updated integrative review method has the potential to allow for diverse primary research methods to become a greater part of evidence-based practice initiatives.

Background

Methods of conducting reviews of the health care literature have been used since the 1970s in an effort to synthesize findings from discrete primary studies and to increase the generalizability of data about a phenomenon (Jackson 1980). Methods to improve rigour continue to evolve because of the complexity of conducting a thorough review (Greenhalgh 1997). While there are commonalities to all current review

methods (meta-analyses, systematic reviews, qualitative reviews, integrative reviews), each has a distinct purpose, sampling frame, definition, and type of analysis (Whittemore 2005a).

Meta-analysis is a research review method that combines the evidence of multiple primary studies by employing statistical methods, thus enhancing the objectivity and validity of findings (Glass 1976). The research design and hypotheses of primary studies need to be very similar, if not identical (Cooper 1998). With the meta-analysis approach, each primary study is abstracted, coded, and entered into a quantitative database. Findings are subsequently transformed into a common metric to calculate an overall effect size. A significant advantage of the meta-analysis method is that adjustment for sample size and study quality can be included in the analysis (Oxman & Guyatt 1988, Broome 1993).

Systematic reviews are research reviews that combine the evidence of multiple studies regarding a specific clinical problem to inform clinical practice and are the method of choice for evidence-based practice initiatives (that is, Cochrane Collaboration). Systematic reviews require a well-specified clinical question, explicit methods, and a comprehensive search for relevant primary studies (Counsell 1997, Greenhalgh 1997). Systematic reviews often include the statistical methods of meta-analysis if primary studies meet the assumptions required for meta-analyses. If primary studies cannot be combined statistically, a narrative analysis is undertaken in conjunction with vote counting or other quasi-statistical approaches (Cooper 1998).

Numerous methods to combine qualitative research have been developed in the past decade (Jensen & Allen 1996, Sandelowski *et al.* 1997, Kearney 1998, Paterson *et al.* 2001, Sandelowski & Barroso 2003). Meta-synthesis, meta-studies, formal grounded theory, and meta-ethnography methods are aimed at synthesizing findings of individual qualitative studies into a new theory or overarching framework on the phenomenon of concern. These distinct methods exclusively synthesize qualitative primary studies, yet differ in approaches to analysis and levels of interpretation. Synthesizing the evidence from multiple qualitative primary studies is complex; however, these methods have the potential to broaden the generalizability of qualitative research.

Integrative reviews are the broadest type of research review methods allowing for the simultaneous inclusion of experimental and non-experimental research in order to more fully understand a phenomenon of concern. Integrative reviews may also combine data from the theoretical as well as empirical literature. In addition, integrative reviews incorporate a wide range of purposes: to define concepts, to review theories, to review evidence, and to analyse methodological

issues of a particular topic (Broome 1993). The varied sampling frame of integrative reviews in conjunction with the multiplicity of purposes has the potential to result in a comprehensive portrayal of complex concepts, theories, or health care problems of importance to nursing.

Yet, without explicit and systematic methods specific to undertaking an integrative review, the risk of error increases exponentially. Systematic bias and error can occur at any stage of the review (Oxman 1994, Dunkin 1996). For example, the literature search stage may be incomplete without consideration of important primary sources. Data from primary sources can be incorrectly extracted and interpreted. Most important, data analysis may be incomplete or may not be an accurate synthesis of all of the data from primary sources. Analysing and synthesizing varied primary sources is a major challenge in undertaking an integrative review. Thus, developing data analysis strategies is an important priority in updating the methodology of the integrative review. These issues will be discussed in the following section.

Strategies to enhance rigour in integrative reviews

It is well-documented that research reviews are considered research of research and therefore should meet the same standards as primary research in methodological rigour (Ganong 1987, Cooper 1998). Cooper (1998) has delineated the process of conducting a research review as encompassing a problem formulation stage, a literature search stage, a data evaluation stage, a data analysis stage, and a presentation stage. This framework, and the strategies proposed by this author, are appropriate to all review methods and anyone conducting an integrative review would benefit from reviewing this source. However, Cooper's (1998) framework is primarily aligned with the systematic review or meta-analysis method. The issues specific to the integrative review method and the challenges of combining diverse data sources are not included. Therefore, this framework will be modified to address issues specific to the integrative review method. A recent integrative review on the concept of integration will provide an example of decisions and issues associated with the process (Whittemore 2005b) (Table 1).

Problem identification stage

The initial stage of any review method is a clear identification of the problem that the review is addressing and the review purpose. Subsequently, the variables of interest (that is, concepts, target population, health care problem) and the appropriate sampling frame are determined (that is, type of

empirical studies, inclusion of theoretical literature). Having a well-specified review purpose and variables of interest will facilitate all other stages of the review, particularly the ability to differentiate between pertinent and extraneous information in the data extraction stage. Data extraction from primary research reports can be exceedingly complex because a wide range of variables will have been studied across multiple reports. Any integrative review can encompass an infinite number of variables, issues, or populations; therefore, clarity of the review purpose is important. A well-specified research purpose in an integrative review will facilitate the ability to accurately operationalize variables and thus extract appropriate data from primary sources.

Kirkevold (1997) advocated that more integrative reviews should be carried out from an explicit philosophical or theoretical perspective, focusing a review within a broad and diverse sampling frame, in contrast to integrative reviews that are solely descriptive of existing research. For example, in an integrative review on the concept of integration, empirical and theoretical sources were included to advance the understanding of the process of integration related specifically to health and illness (Table 1). In any case, a clear problem identification and review purpose are essential to provide focus and boundaries for the integrative review process.

Literature search stage

Well-defined literature search strategies are critical for enhancing the rigour of any type of review because incomplete and biased searches result in an inadequate database and the potential for inaccurate results (Cooper 1998, Conn *et al.* 2003a). Ideally, all of the relevant literature on the problem or topic of interest is included in the review; yet obtaining this literature can be challenging and costly (Jadad *et al.* 1998). Computerized databases are efficient and effective; however, limitations associated with inconsistent search terminology and indexing problems may yield only about 50% of eligible studies. Thus, other recommended approaches to searching the literature include ancestry searching, journal hand searching, networking, and searching research registries (Conn *et al.* 2003b). Depending on the purpose and type of literature included in an integrative review, addressing the issue of publication bias may also be relevant to the literature search stage (Conn *et al.* 2003b, Soeken & Sripusanapan 2003).

In general, a comprehensive search for an integrative review identifies the maximum number of eligible primary sources, using at least two to three strategies (Jadad *et al.* 1998, Conn *et al.* 2003b). Purposive sampling can be combined with a comprehensive search if appropriate to the

Table 1 Example of integrative review on the concept of integration (Whittemore 2005b)

Stage of review	Illustration of decisions and issues
Problem identification	Theoretical and empirical work in the past decade related to the concept of integration suggested that integration was an important aspect of healing and living with a chronic illness. However, it was unclear what the similarities were across empirical and theoretical reports and whether the process of integration was similar across health-related issues. Greater understanding of the concept of integration was proposed as a possibly effective way to identify stages of healing responsive to nursing interventions. Therefore, the purpose of this integrative review was to analyse the concept of integration as related to health and illness.
Literature search	Having a specific focus on the experience of integration as related to health, illness, or nursing care facilitated the literature search stage. After using integration as a keyword in the CINAHL database, reports were initially excluded if integration was discussed in terms of health care systems (integrating a new policy in the workplace) or health care education (integrating theory and research into practice). By focusing the review, potentially relevant sources identified were reduced from 3982 to less than 200 reports.
Data evaluation	The final sample for this integrative review included empirical and theoretical reports. Empirical reports included a wide variety of methods: case study, cross-sectional, grounded theory, phenomenology, and instrument development designs. Due to this diverse representation of primary sources, reports were coded according to two criteria relevant to this review: methodological or theoretical rigour and data relevance on a 2-point scale (high or low). No report was excluded based on this data evaluation rating system; however, the score was included as a variable in the data analysis stage. In general, reports of low rigour and relevance contributed less to the analytic process.
Data analysis	Data were extracted from primary sources on sample characteristics and method (if empirical) as well as any reference to the concept of integration. Categories that were extracted included the definition of integration, aspects of the process of integration, antecedents, consequences, and facilitators of integration. Related terms were identified in addition to proposed relationships of integration to other variables. Data display matrices were developed to display all of the coded data from each report by category and were iteratively compared. As data were conceptualized at higher levels of abstraction, each primary source was reviewed to verify that the new conceptualization was congruent with primary sources.
Presentation	A synthesis in the form of a model was developed to comprehensively portray the process of integration.

review purpose (Broome 1993). However, any sampling decision must be justified and made explicit. Therefore, the literature search process of an integrative review should be clearly documented in the method section including the search terms, the databases used, additional search strategies, and the inclusion and exclusion criteria for determining relevant primary sources. For example, in an integrative review on the concept of integration, a clearly specified sampling methodology was identified which enhanced the ability of readers to evaluate the adequacy of the database. This included a comprehensive computer-assisted search using the keyword of integration in the Cumulative Index of Nursing and Allied Health Literature (CINAHL) from 1966 to 2004 and analysis of reference lists of retrieved reports. Purposive sampling was also used to define sub-types of integration. Reports were excluded if integration was discussed in terms of health care systems (that is, integrating a new policy or procedure into the workplace) or health care education (that is, integrating theory and research into practice). Additionally, unpublished manuscripts (that is, abstracts or dissertations) were excluded (Whittemore 2005b).

Data evaluation stage

In meta-analysis and systematic reviews, extraction of specific methodological features of primary studies is recommended in order to evaluate overall quality (Cooper 1998, others). Quality scores are subsequently incorporated into the data analysis stage. However, the notion and process of quality is complex and there is no gold standard for calculating quality scores (Jadad *et al.* 1998, Conn & Rantz 2003). Each type of research design generally has different criteria that exemplify quality (that is, randomization in two-group designs). Therefore, the process is more conducive to reviews in which the sampling frame is narrow and the research designs included are similar, if not identical.

Evaluating quality of primary sources in the integrative review method where diverse primary sources are included increases the complexity. Should broader quality criteria that may encompass different research designs and literature be used (losing specificity)? Or should multiple design or literature-specific quality evaluations be undertaken (complicating analysis)? In addition, how is quality defined for primary sources that are not empirical? As no gold standard

for evaluating and interpreting quality in research reviews exists, how quality is evaluated in an integrative review will vary depending on the sampling frame. For example, in an integrative review where primary sources are of a similar research design, calculating quality scores and incorporating these scores into the design (that is, inclusion or exclusion criteria) or the analysis may be optimal. In an integrative review with diverse empirical sources, it may only be reasonable to evaluate quality in sources that represent outliers (that is, is methodological quality a viable reason for the discrepant finding?). In an integrative review with a diverse sampling frame inclusive of empirical and theoretical sources, an approach to evaluating quality similar to historical research may be appropriate. In this case, the authenticity, methodological quality, informational value, and representativeness of available primary sources is considered and discussed in the final report (Kirkevold 1997). Theoretical reports may also be evaluated using techniques of theory analysis and critique (Walker & Avant 1995, Chinn & Kramer 2004). It can be seen that evaluating quality of primary sources in an integrative review is complex. Ideally, consideration of the quality of primary sources in an integrative review is addressed in a meaningful way. For example, in a review that encompasses theoretical and empirical sources, two quality criteria instruments could be developed for each type of source and scores could be used as criteria for inclusion/exclusion or as a variable in the data analysis stage as identified in the integrative review of the concept of integration (Table 1). Further practical application and discussion of these proposed strategies are indicated.

Data analysis stage

Data analysis in research reviews requires that the data from primary sources are ordered, coded, categorized, and summarized into a unified and integrated conclusion about the research problem (Cooper 1998). A thorough and unbiased interpretation of primary sources, along with an innovative synthesis of the evidence, are the goals of the data analysis stage.

Strategies for data analysis with integrative reviews are one of the least developed aspects of the process, yet are one of the most difficult aspects and potentially fraught with error. Therefore, a systematic analytic method should be explicitly identified before undertaking the review. Primary research methods of analysis developed for mixed-method and qualitative designs are particularly applicable to the integrative review method allowing for iterative comparisons across primary data sources (Miles & Huberman 1994, Tashakkori & Teddlie 1998, Patton 2002).

A constant comparison method is one overarching approach used in a broad array of qualitative designs that converts extracted data into systematic categories, facilitating the distinction of patterns, themes, variations, and relationships (Glaser 1978, Miles & Huberman 1994, Patton 2002). Initially, extracted data are compared item by item so that similar data are categorized and grouped together. Subsequently, these coded categories are compared which further the analysis and synthesis process. In the integrative review method, this approach to data analysis is compatible with the use of varied data from diverse methodologies. The method consists of data reduction, data display, data comparison, conclusion drawing, and verification (Miles & Huberman 1994). These processes will be explained in more detail.

Data reduction

The first phase of data reduction involves the determination of an overall classification system for managing the data from diverse methodologies. The primary sources included in the integrative review need to be divided into subgroups according to some logical system to facilitate analysis. In an integrative review, this initial subgroup classification can be based on type of evidence and analysed sequentially (that is, examining all qualitative or descriptive studies on topic, then correlational or comparative designs, and lastly any intervention or experimental designs). This initial subgroup classification can also be based on chronology, settings (that is, rural or urban), sample characteristics (that is, gender, SES) or by a predetermined conceptual classification (that is, experience of participants, attitudes, and behaviours) (Brown 1999, Patton 2002), and analysed by topic. For example, in considering an integrative review on lifestyle change in type 2 diabetes, the initial categorization may include the perspective of individuals attempting lifestyle change, the barriers and facilitators to lifestyle change, and the behaviours or interventions that promote lifestyle change.

Next, data reduction involves techniques of extracting and coding data from primary sources to simplify, abstract, focus, and organize data into a manageable framework. Reliable and valid coding procedures are essential to ensure methodological rigour (Broome 1993, Brown *et al.* 2003). Predetermined and relevant data of each subgroup classification are extracted from all primary data sources and compiled into a matrix or spreadsheet (Miles & Huberman 1994, Garrard 2004). Thus, each primary source is reduced to a single page with similar data extracted from individual sources (of each subgroup classification). This approach provides succinct organization of the literature which facilitates the ability to systematically compare primary sources on specific issues, variables, or sample characteristics.

Data display

The next step in data analysis is data display which involves converting the extracted data from individual sources into a display that assembles the data from multiple primary sources around particular variables or subgroups. Data displays can be in the form of matrices, graphs, charts, or networks and set the stage for comparison across all primary sources. These displays enhance the visualization of patterns and relationships within and across primary data sources and serve as a starting point for interpretation (Knafl & Webster 1988, Sandelowski 1995). Again, different data displays are likely to be required for each subgroup classification of the integrative review.

Data comparison

The next step in data analysis is data comparison which involves an iterative process of examining data displays of primary source data in order to identify patterns, themes, or relationships. Once patterns begin to be discerned a conceptual map can be drawn that includes a majority of the variables or identified themes (Brown 1999). Similar variables are grouped near one another and a temporal order can be displayed (if appropriate). Relationships can also be depicted between variables or themes. This process of data visualization and comparison can provide some clarity to the empirical and/or theoretical support emerging from early interpretive efforts. Several resources are available that provide excellent examples of the variations of data display that can enhance data comparison and interpretation of data (Miles & Huberman 1994, Brown 1999). Other strategies that can be employed during this phase of data analysis and comparison which begin to identify meaningful and higher-order clusters are included in Table 2. Creativity and critical analysis of data and data displays are key elements in data comparison and the identification of important and accurate patterns and themes.

Table 2 Elements of data analysis

 Elements

- Noting patterns and themes
 - Seeing plausibility
 - Clustering
 - Counting
 - Making contrasts and comparisons
 - Discerning common and unusual patterns
 - Subsuming particulars into general
 - Noting relations between variability
 - Finding intervening factors
 - Building a logical chain of evidence
-

Based on Miles and Huberman (1994), Sandelowski (1995) and Patton (2002).

Conclusion drawing and verification

Conclusion drawing and verification is the final phase of data analysis that moves the interpretive effort from the description of patterns and relationships to higher levels of abstraction, subsuming the particulars into the general. Patterns and processes are isolated, commonalities and differences are identified with a gradual elaboration of a small set of generalizations that encompass each subgroup database of the integrative review in its entirety. Conclusions or conceptual models that are developed are continually revised in order to be inclusive of as much data as possible (Miles & Huberman 1994).

All discernment of patterns, themes, relationships, or conclusions requires verification with primary source data for accuracy and confirmability (Miles & Huberman 1994). Explicit care needs to be undertaken during this process to avoid premature analytic closure (being locked into a particular pattern) or exclusion of pertinent evidence (Sandelowski 1995). Addressing conflicting evidence is a considerable challenge, particularly when results are equally compelling and from high quality reports. Cooper (1998) proposes vote counting as one strategy to categorize and analyse conflicting results, comparing the frequency of significant positive findings against the frequency of significant negative ones. Exploration of confounding influences contributing to variability in findings (that is, sample characteristics) can also be considered. However, conflicting evidence in general demonstrates the need for further research with the subsequent research question and design aimed at resolving the conflict.

On completion of each subgroup analysis, a final step of the data analysis in an integrative review is the synthesis of important elements or conclusions of each subgroup into an integrated summation of the topic or phenomenon. A new conceptualization of the primary sources integrates all subgroups into a comprehensive portrayal of the topic of concern, thus completing the review process.

As with all qualitative analysis, a record should be kept during the entire process of data analysis that documents data analysis decisions, analytical hunches, thoughts, puzzles, alternate hypotheses, or any idea that may directly relate to the interpretation of data (Rodgers & Cowles 1993, Miles & Huberman 1994). Analytical honesty is a priority; the data analysis process is made transparent with rival explanations and spurious relationships thoughtfully explored. For example, Schilling *et al.* (2002) clearly display the attributes of self-management and the primary sources that supported the categorization in a concept analysis of self-management of type 1 diabetes in children.

What is already known about this topic

- The integrative review method can summarize past empirical and theoretical literature on a topic of interest.
- The integrative review method can incorporate diverse methodologies in order to capture the context, processes and subjective elements of the topic.
- The integrative review method has been critiqued for its potential for bias and lack of rigour.

What this paper adds

- Strategies to enhance the rigour of the integrative review method in nursing, particularly with respect to data analysis and synthesis.
- Through enhancing its rigour, the integrative review method has the potential to allow for findings from diverse methodologies to be applied to clinical practice and evidence-based practice initiatives.
- Rigorously developed integrative reviews allow for various perspectives on a phenomenon to be synthesized into a systematic knowledge base, thus forming the foundation for nursing practice.

Presentation

Conclusions of integrative reviews can be reported in table or diagrammatic form. Explicit details from primary sources and evidence to support conclusions need to be provided to demonstrate a logical chain of evidence, allowing the reader of the review to ascertain that the conclusions of the review did not exceed the evidence (Oxman 1994). Ideally, the results capture the depth and breadth of the topic and contribute to a new understanding of the phenomenon of concern; and implications for practice are emphasized in addition to implications for research and policy initiatives. Lastly, all methodological limitations of the review are explicitly stated. Quality criteria for review methods have been proposed (Whittemore 2005a).

Completion of all stages of this proposed methodology, with attention to the issues specific to undertaking an integrative review, have the potential to strengthen the process and the outcomes of integrative reviews. This updated methodology for integrative reviews incorporates what has been learned in the past decade about research reviews and methods of qualitative analysis. Further development of this method is encouraged.

Conclusion

Systematic and rigorous integrative reviews have the potential to present a comprehensive understanding of problems relevant to health care and policy. Integrative reviews include diverse data sources which enhance a holistic understanding of the topic of interest. However, combining diverse data sources is complex and challenging. An updated methodology of integrative reviews includes a more systematic and rigorous approach to the process, particularly to data analysis. Employing techniques of mixed method or qualitative research to this process has the potential to decrease bias and error. Integrative reviews can subsequently play a greater role in evidence-based practice initiatives, portraying the complexity inherent in all health care problems of concern to nursing.

Author contributions

RW was responsible for the study conception and design, drafting of the manuscript and provided administrative support. RW and KK made critical revisions.

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