Achieving Integration in Mixed Methods Designs—Principles and Practices

Michael D. Fetters, Leslie A. Curry, and John W. Creswell

Abstract. Mixed methods research offers powerful tools for investigating complex processes and systems in health and health care. This article describes integration principles and practices at three levels in mixed methods research and provides illustrative examples. Integration at the study design level occurs through three basic mixed method designs—exploratory sequential, explanatory sequential, and convergent—and through four advanced frameworks—multistage, intervention, case study, and participatory. Integration at the methods level occurs through four approaches. In connecting, one database links to the other through sampling. With building, one database informs the data collection approach of the other. When merging, the two databases are brought together for analysis. With embedding, data collection and analysis link at multiple points. Integration at the interpretation and reporting level occurs through narrative, data transformation, and joint display. The fit of integration describes the extent the qualitative and quantitative findings cohere. Understanding these principles and practices of integration can help health services researchers leverage the strengths of mixed methods.

Key Words. Qualitative research, survey, sampling, focus groups, biostatistical methods, epidemiology, program evaluation, research methodology

This article examines key integration principles and practices in mixed methods research. It begins with the role of mixed methods in health services research and the rationale for integration. Next, a series of principles describe how integration occurs at the study design level, the method level, and the interpretation and reporting level. After considering the “fit” of integrated qualitative and quantitative data, the article ends with two examples of mixed methods investigations to illustrate integration practices.

Research Questions and Mixed Methods in Health Services Research

Health services research includes investigation of complex, multilevel processes, and systems that may require both quantitative and qualitative forms
of data (Creswell, Fetters, and Ivankova 2004; Curry et al. 2013). The nature of the research question drives the choice of methods. Health services researchers use quantitative methodologies to address research questions about causality, generalizability, or magnitude of effects. Qualitative methodologies are applied to research questions to explore why or how a phenomenon occurs, to develop a theory, or to describe the nature of an individual’s experience. Mixed methods research studies draw upon the strengths of both quantitative and qualitative approaches and provides an innovative approach for addressing contemporary issues in health services. As one indication of the growing interest in mixed methods research, the Office of Behavioral and Social Sciences at the National Institutes of Health recently developed for researchers and grant reviewers the first best practices guideline on mixed methods research from the National Institutes of Health (Creswell et al. 2011).

Rationale for Integration

The integration of quantitative and qualitative data can dramatically enhance the value of mixed methods research (Bryman 2006; Creswell and Plano Clark 2011). Several advantages can accrue from integrating the two forms of data. The qualitative data can be used to assess the validity of quantitative findings. Quantitative data can also be used to help generate the qualitative sample or explain findings from the qualitative data. Qualitative inquiry can inform development or refinement of quantitative instruments or interventions, or generate hypotheses in the qualitative component for testing in the quantitative component (O’Cathain, Murphy, and Nicholl 2010). Although there are many potential gains from data integration, the extent to which mixed methods studies implement integration remains limited (Bryman 2006; Lewin, Glenton, and Oxman 2009). Nevertheless, there are specific approaches to integrate qualitative and quantitative research procedures and data (O’Cathain, Murphy, and Nicholl 2010; Creswell and Plano Clark 2011). These approaches can be implemented at the design, methods, and interpretation and reporting levels of research (see Table 1).
Integration at the Study Design Level

Integration at the design level—the conceptualization of a study—can be accomplished through three basic designs and four advanced mixed methods frameworks that incorporate one of the basic designs. Basic designs include (1) exploratory sequential; (2) explanatory sequential; and (3) convergent designs. In sequential designs, the intent is to have one phase of the mixed methods study build on the other, whereas in the convergent designs the intent is to merge the phases in order that the quantitative and qualitative results can be compared.

In an exploratory sequential design, the researcher first collects and analyzes qualitative data, and these findings inform subsequent quantitative data collection (Onwuegbuzie, Bustamante, and Nelson 2010). For example, Wallace and colleagues conducted semistructured interviews with medical students, residents, and faculty about computing devices in medical education and used the qualitative data to identify key concepts subsequently measured in an online survey (Wallace, Clark, and White 2012).

In an explanatory sequential design, the researcher first collects and analyzes quantitative data, then the findings inform qualitative data collection and analysis (Ivankova, Creswell, and Stick 2006). For example, Carr explored the impact of pain on patient outcomes following surgery by conducting initial

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Table 1: Levels of Integration in Mixed Methods Research
surveys about anxiety, depression, and pain that were followed by semistructured interviews to explore further these concepts (Carr 2000).

In a *convergent design* (sometimes referred to as a concurrent design), the qualitative and quantitative data are collected and analyzed during a similar timeframe. During this timeframe, an *interactive* approach may be used where iteratively data collection and analysis drives changes in the data collection procedures. For example, initial quantitative findings may influence the focus and kinds of qualitative data that are being collected or vice versa. For example, in one study Crabtree and colleagues used qualitative findings and quantitative findings iteratively in multiple phases such that the data were interacting to inform the final results (Crabtree et al. 2005). In the more common and technically simpler variation, qualitative and quantitative data collection occurs in *parallel* and analysis for integration begins well after the data collection process has proceeded or has been completed. Frequently, the two forms of data are analyzed separately and then merged. For example, Saint Arnault and colleagues conducted multiple surveys using standardized and culturally adapted instruments as well as ethnographic qualitative interviews to investigate how the illness experience, cultural interpretations, and social structural factors interact to influence help-seeking among Japanese women (Saint Arnault and Fetters 2011).

Advanced frameworks encompass adding to one of the three basic designs a larger framework that incorporates the basic design. The larger framework may involve (1) a multistage; (2) an intervention; (3) a case study; or (4) a participatory research framework.

In a *multistage mixed methods framework*, researchers use multiple stages of data collection that may include various combinations of exploratory sequential, explanatory sequential, and convergent approaches (Nastasi et al. 2007). By definition, such investigations will have multiple stages, defined here as three or more stages when there is a sequential component, or two or more stages when there is a convergent component; these differences distinguishes the multistage framework from the basic mixed methods designs. This type of framework may be used in longitudinal studies focused on evaluating the design, implementation, and assessment of a program or intervention. Krumholz and colleagues have used this design in large-scale outcomes research studies (Krumholz, Curry, and Bradley 2011). For example, a study by their team examining quality of hospital care for patients after heart attacks consisted of three phases: first, a quantitative analysis of risk-standardized mortality rates for patients with heart attacks to identify high and low performing hospitals; second, a qualitative phase to understand the pro-
cesses, structures, and organizational environments of a purposeful sample of low and high performers and to generate hypotheses about factors associated with performance; and third, primary data collection through surveys of a nationally representative sample of hospitals to test these hypotheses quantitatively (Curry et al. 2011; Bradley et al. 2012). Rufin and colleagues conducted a multistage mixed methods study to develop and test in a randomized controlled trial (RCT) a website to help users choose a screening approach to colorectal cancer. In the first stage, the authors employed a convergent design using focus groups and a survey (Rufin et al. 2009). In the second stage, they developed the website based on multiple qualitative approaches (Fetters et al. 2004). In the third stage, the authors tested the website in an RCT to assess its effectiveness (Rufin, Fetters, and Jimbo 2007). The multistage framework is the most general framework among advanced designs. The additional three frameworks frequently involve multiple stages or phases but differ from multistage by having a particular focus.

In an intervention mixed methods framework, the focus is on conducting a mixed methods intervention. Qualitative data are collected primarily to support the development of the intervention, to understand contextual factors during the intervention that could affect the outcome, and/or explain results after the intervention is completed (Creswell et al. 2009; Lewin, Glenton, and Oxman 2009). For example, Plano Clark and colleagues utilized data from a pretrial qualitative study to inform the design of a trial developed to compare a low dose and high dose behavioral intervention to improve cancer pain management—the trial also included prospective qualitative data collection during the trial (Plano Clark et al. 2013). The methodological approach for integrating qualitative data into an intervention pretrial, during the trial, or posttrial is called embedding (see below), and some authors refer to such trials as embedded designs (Creswell et al. 2009; Lewin, Glenton, and Oxman 2009).

In a case study framework, both qualitative and quantitative data are collected to build a comprehensive understanding of a case, the focus of the study (Yin 1984; Stake 1995). Case study involves intensive and detailed qualitative and quantitative data collection about the case (Luck, Jackson, and Usher 2006). The types of qualitative and quantitative data collected are chosen based on the nature of the case, feasibility issues, and the research question(s). In one mixed methods case study, Luck and colleagues utilized qualitative data from participant observation, semistructured interviews, informal field interviews and journaling, and quantitative data about violent events collected through structured observations to understand why nurses under-report violence in the workplace and describe how they handle it (Luck, Jackson, and
Usher 2008). Comparative case studies are an extension of this framework and can be formulated in various ways. For example, Crabtree and colleagues used a comparative case approach to examine the delivery of clinical preventive services in family medicine offices (Crabtree et al. 2005).

In a participatory framework, the focus is on involving the voices of the targeted population in the research to inform the direction of the research. Often researchers specifically seek to address inequity, health disparities, or a social injustice through empowering marginalized or underrepresented populations. The distinguishing feature of a participatory framework is the strong emphasis on using mixed methods data collection through combinations of basic mixed methods designs or even another advanced design, for example, an intervention framework such as an RCT. Community-based participatory research (CBPR) is a participatory framework that focuses on social, structural, and physical environmental inequities and engages community members, organizational representatives, and researchers in all aspects of the research process (Macaulay et al. 1999; Israel et al. 2001, 2013; Minkler and Wallerstein 2008). In one CBPR project, Johnson and colleagues used a mixed methods CBPR approach to collaborate with the Somali community to explore how attitudes, perceptions, and cultural practices such as female genital cutting influence their use of reproductive health services—this informed the development of interventional programs to improve culturally competent care (Johnson, Ali, and Shipp 2009). A similar variation involving an emerging participatory approach that Mertens refers to as transformative specifically focuses on promoting social justice (Mertens 2009, 2012) and has been used with Laotian refugees (Silka 2009).

Integration at the Methods Level

Creswell and Plano Clark conceptualize integration to occur through linking the methods of data collection and analysis (Creswell et al. 2011). Linking occurs in several ways: (1) connecting; (2) building; (3) merging; and (4) embedding (Table 2). In a single line of inquiry, integration may occur through one or more of these approaches.

Integration through connecting occurs when one type of data links with the other through the sampling frame. For example, consider a study with a survey and qualitative interviews. The interview participants are selected from the population of participants who responded to the survey. Connecting can occur through sampling regardless of whether the design is explanatory sequential or convergent. That is, if the baseline survey data are analyzed, and
then the participants sampled based on findings from the analysis, then the design is explanatory sequential. In contrast, the design is convergent if the data collection and analyses occur at the same time for the baseline survey and interviews of all or a subsample of the participants of the survey. A key defining factor in sequential or convergent is how the analysis occurs, either through building or merging, respectively.

Integration through building occurs when results from one data collection procedure informs the data collection approach of the other procedure, the latter building on the former. Items for inclusion in a survey are built upon previously collected qualitative data that generate hypotheses or identify constructs or language used by research participants. For example, in a project involving the cultural adaptation of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey for use in the Arabian Gulf (Hammoud et al. 2012), baseline qualitative interviews identified new domains of importance such as gender relations, diet, and interpreter use not found in the existing CAHPS instrument. In addition, phrases participants used during the interviews informed the wording of individual items.

Integration through merging of data occurs when researchers bring the two databases together for analysis and for comparison. Ideally, at the design phase, researchers develop a plan for collecting both forms of data in a way that will be conducive to merging the databases. For example, if quantitative data are collected with an instrument with a series of scales, qualitative data can be collected using parallel or similar questions (Castro et al. 2010). Merging typically occurs after the statistical analysis of the numerical data and qualitative analysis of the textual data. For example, in a multistage mixed methods study, Tomoaia-Cortisel and colleagues used multiple sources of existing quantitative and qualitative data as well as newly collected quantitative and qualitative data (Tomoaia-Cortisel et al. 2013). The researchers examined the relationship between quality of care according to key patient-centered medical home (PCMH) measures, and quantity of care using a productivity measure. By merging both scores of quality and

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Table 2: Integration through Methods
quantity, with qualitative data from interviews, the authors illuminated the
difficulty of achieving highly on both PCMH quality measures and produc-
tivity. The authors extended this understanding further by merging staff
satisfaction scores and staff interview data to illustrate the greater work com-
plexity but lower satisfaction for staff achieving measures for high-quality
care (Tomoaia-Cortisel et al. 2013).

Integration through *embedding* occurs when *data collection and analysis
are being linked at multiple points* and is especially important in interventional
advanced designs, but it can also occur in other designs. Embedding may
involve any combination of connecting, building, or merging, but the hall-
mark is recurrently linking qualitative data collection to quantitative data
collection at multiple points. Embedding may occur in the pretrial period,
when qualitative (or even a combination of qualitative and quantitative) data
can be used in various ways such as clarifying outcome measures, under-
standing contextual factors that could lead to bias and should be controlled
for, or for developing measurement tools to be utilized during the trial. Dur-
ing the trial, qualitative data collection can be used to understand contextual
factors that could influence the trial results or provide detailed information
about the nature of the experience of subjects. Post-trial qualitative data col-
lection can be used to explain outliers, debrief subjects or researchers about
events or experiences that occurred during the trial, or develop hypotheses
about changes that might be necessary for widespread implementation out-
side of a controlled research environment. Such studies require caution to
avoid threatening the validity of the trial design. In a site-level controlled
trial of a quality improvement approach for implementing evidence-based
employment services for patients at specialty mental health clinics, Hamil-
ton and colleagues collected semistructured interview data before, during,
and after implementation (Hamilton et al. 2013). In another interesting
example, Jaen and colleagues used an embedded approach for evaluating
practice change in a trial comparing facilitated and self-directed implementa-
tion strategies for PCMH. The authors use *both* embedded quantitative and
qualitative evaluation procedures including medical record audit, patient
and staff surveys, direct observation, interviews, and text review (Jaen et al.
2010).

Method level integration commonly relates to the type of design used in
a study. For example, connecting follows naturally in sequential designs, while
merging can occur in any design. Embedding generally occurs in an interven-
tional design. Thus, the design sets parameters for what methodological inte-
gration choices can be made.
Integration at the Interpretation and Reporting Level

Integration of qualitative and quantitative data at the interpretation and reporting level occurs through three approaches: (1) integrating through narrative; (2) integrating through data transformation; and (3) integrating through joint displays. A variety of strategies have been offered for publishing that incorporate these approaches (Stange, Crabtree, and Miller 2006; Creswell and Tashakkori 2007).

When integrating through narrative, researchers describe the qualitative and quantitative findings in a single or series of reports. There are three approaches to integration through narrative in research reports. The weaving approach involves writing both qualitative and quantitative findings together on a theme-by-theme or concept-by-concept basis. For example, in their work on vehicle crashes among the elderly, Classen and colleagues used a weaving approach to integrate results from a national crash dataset and perspectives of stakeholders to summarize causative factors of vehicle crashes and develop empirical guidelines for public health interventions (Classen et al. 2007). The contiguous approach to integration involves the presentation of findings within a single report, but the qualitative and quantitative findings are reported in different sections. For example, Carr and colleagues reported survey findings in the first half of the results section and the qualitative results about contextual factors in a subsequent part of the report (Carr 2000). In their study of a quality improvement approach for implementing evidence-based employment services at specialty mental health clinics, Hamilton and colleagues used this approach but differ by presenting the qualitative results first and the quantitative results second (Hamilton et al. 2013). The staged approach to integration often occurs in multistage mixed methods studies when the results of each step are reported in stages as the data are analyzed and published separately. For example, Wilson and colleagues used an intervention mixed methods framework involving a clinical trial of usual care, nicotine gum, and gum plus counseling on smoking cessation (Wilson et al. 1988). They also used interviews to find the meaning patients attributed to their stopping smoking (Willms 1991). The authors published the papers separately but in the second published paper, the interview paper, they only briefly mention the original clinical trial paper.

Integration through data transformation happens in two steps. First, one type of data must be converted into the other type of data (i.e., qualitative into quantitative or quantitative into qualitative). Second, the transformed data are then integrated with the data that have not been transformed. In qualitative
studies, researchers sometimes code the qualitative data and then count the frequency of codes or domains identified, a process known also as content analysis (Krippendorff 2013). Data transformation in the mixed methods context refers to transforming the qualitative data into numeric counts and variables using content analysis so that the data can be integrated with a quantitative database. Merging in mixed methods goes beyond content analysis by comparing the transformed qualitative data with a quantitative database. Zickmund and colleagues used qualitatively elicited patient views of self transformed to a numerical variable, and mortality data to conduct hierarchical multivariable logistical modeling (Zickmund et al. 2013).

Researchers have used additional variations. Qualitative data can be transformed to quantitative data, then integrated with illustrative examples from the original qualitative dataset. For example, Ruffin and colleagues transformed qualitative responses from focus group data about colorectal cancer (CRC) screening preferences into quantitative variables, and then integrated these findings with representative quotations from three different constituencies (Ruffin et al. 2009). Quantitative data can also be transformed into a qualitative format that could be used for comparison with qualitatively accessed data. For example, Pluye and colleagues examined a series of study outcomes with variable strengths of association that were converted into qualitative levels and compared across the studies based on patterns found (Pluye et al. 2005).

When integrating through joint displays, researchers integrate the data by bringing the data together through a visual means to draw out new insights beyond the information gained from the separate quantitative and qualitative results. This can occur through organizing related data in a figure, table, matrix, or graph. In their quality improvement study to enhance colorectal cancer screening in practices, Shaw and colleagues collocated a series of qualitatively identified factors with CRC screening rates at baseline and 12 months later (Shaw et al. 2013).

"Fit" of Data Integration

When using any of these analytical and representation procedures, a potential question of coherence of the quantitative and qualitative findings may occur. The “fit” of data integration refers to coherence of the quantitative and qualitative findings. The assessment of fit of integration leads to three possible outcomes. Confirmation occurs when the findings from both types of data confirm the results of the other. As the two data sources provide similar conclusions, the results have greater credibility. Expansion occurs when the findings from
the two sources of data diverge and expand insights of the phenomenon of interest by addressing different aspects of a single phenomenon or by describing complementary aspects of a central phenomenon of interest. For example, quantitative data may speak to the strength of associations while qualitative data may speak to the nature of those associations. *Discordance* occurs if the qualitative and quantitative findings are inconsistent, incongruous, contradict, conflict, or disagree with each other. Options for reporting the findings include looking for potential sources of bias, and examining methodological assumptions and procedures. Investigators may handle discordant results in different ways such as gathering additional data, re-analyzing existing databases to resolve differences, seeking explanations from theory, or challenging the validity of the constructs. Further analysis may occur with the existing databases or in follow-up studies. Authors deal with this conundrum by discussing reasons for the conflicting results, identifying potential explanations from theory, and laying out future research options (Pluye et al. 2005; Moffatt et al. 2006).

**Examples Illustrating Integration**

Below, two examples of mixed methods illustrate the integration practices. The first study used an exploratory sequential mixed methods design (Curry et al. 2011) and the second used a convergent mixed methods design (Meurer et al. 2012).

**Example 1. Integration in an Exploratory Sequential Mixed Methods Study—The Survival after Acute Myocardial Infarction Study (American College of Cardiology 2013).** Despite more than a decade of efforts to improve care for patients with acute myocardial infarction (AMI), there remains substantial variation across hospitals in mortality rates for patients with AMI (Krumholz et al. 2009; Popescu et al. 2009). Yet the vast majority of this variation remains unexplained (Bradley et al. 2012), and little is known about how hospitals achieve reductions in risk-standardized mortality rates (RSMRs) for patients with AMI. This study sought to understand diverse and complex aspects of AMI care including hospital structures (e.g., emergency department space), processes (e.g., emergency response protocols, coordination within hospital units), and hospital internal environments (e.g., organizational culture).

*Integration through design.* An exploratory sequential mixed methods design using both qualitative and quantitative approaches was best suited to
gain a comprehensive understanding of how these features may be related to quality of AMI care as reflected in RSMRs. The 4-year investigation aimed to first generate and then empirically test hypotheses concerning hospital-based efforts that may be associated with lower RSMRs (Figure 1).

*Integration through methods.* The first phase was a qualitative study of acute care hospitals in the United States (Curry et al. 2011). Methodological integration occurred through *connecting* as the 11 hospitals in the purposeful sample ranked in either the top 5 percent or bottom 5 percent of RSMRs for each of the two most recent years of data (2005–2006, 2006–2007) from the Centers for Medicare & Medicaid Services (CMS). The qualitative data from 158 key staff interviews informed the generation of hypotheses regarding factors potentially associated with better performance (see Table 3) (Curry et al. 2011). These hypotheses were used to *build* an online quantitative survey that was administered in a cross-sectional study of 537 acute care hospitals (91 per-

Figure 1: Example Illustrating Integration in an Exploratory Sequential Mixed Methods Design from the Survival after Acute Myocardial Infarction Study

- **Aim 1:** Generate hypotheses concerning hospital-based efforts that may be associated with RSMR
  - Qualitative component *connected* to CMS national database to identify positive deviance sample (highest /lowest RSMRs) in 11 hospitals with 158 key hospital staff
  - Analyze data and generate hypotheses

- **Aim 2:** Test hypotheses and determine hospital efforts that are associated with RSMR
  - **Build** survey from qualitative data (68 items)
  - Cognitive test and refine survey (n=8)
  - Distribute survey (n=537 hospitals; 91% response)
  - Analyze data and test hypotheses

- **Qualitative component describes features of high quality discharge processes that may be associated with better hospital care for patients with AMI**
  - In methods, *connected* to CMS national database for positive deviance sampling per Aim 1
  - Resulting paper illustrates *staged integration*, and analysis expands qualitative findings by showing comprehensive discharge processes may reduce RSMR (Cherlin et al. 2013)

- **Qualitative paper describes influence of environmental context, eg, organizational values and goals, senior management involvement, staff expertise, communication and coordination among staff, & problem solving and learning (Curry et al. 2011)**

- **Merge qualitative with quantitative findings. Resulting paper identifies predictors of AMI mortality rates (Bradley et al. 2012b)**
  - Through *weaving narrative*, integrate qualitative findings with quantitative findings that confirm factors influencing RSMRs, and impact on RSMR

- **Qualitative approach describes the nature of the hospital-emergency services relationships in high performance hospitals**
  - In methods, *connected* to the CMS national database using identical positive deviance sampling per Aim 1
  - Resulting paper illustrates *staged integration* and analysis expands previous findings by showing that high performing hospitals use multifaceted strategies to support collaboration with EMS in AMI care (Landman et al. 2013)
Mixed methods were used to characterize the care practices and processes in higher performing organizations as well as the organizational environment where they were implemented. Figure 1 illustrates points in the process of integration. In Aim 1, the qualitative component connected with the CMS database in order to identify a positive deviance sample. The investigators conducted a systematic analysis of the qualitative data using a multidisciplinary team. This provided (point 1, Figure 1) a rich characterization of prominent themes that distinguished higher-performing from lower-performing hospitals and generated hypotheses regarding factors influencing AMI mortality rates (Curry et al. 2011). In Aim 2, the investigators built a 68
item-survey from the qualitative data. Key concepts from the qualitative data (point 2, Figure 1) were operationalized as quantitative items for inclusion in a web-based survey in order to test the hypotheses statistically in a nationally representative sample of hospitals (Bradley et al. 2012). The authors analyzed the quantitative survey data and then merged the quantitative findings (point 3, Figure 1) and qualitative analysis (point 4, Figure 1) in a single paper. The merging of the qualitative and quantitative produced a comprehensive, multifaceted description of factors influencing RSMRs as well as the impact of these factors on RSMRs that was presented using a weaving narrative. For example, problem-solving and learning was a prominent theme that differentiated higher-performing from lower-performing hospitals. In higher-performing hospitals, adverse events were perceived as opportunities for learning and improvement, approaches to data feedback were nonpunitive, innovation and creativity were valued and supported, and new ideas were sought. In the multivariable analysis, having an organizational environment where clinicians are encouraged to creatively solve problems was significantly associated with lower RSMRs (0.84 percentage points). Finally, additional analyses of qualitative data examining organizational features related to high-quality discharge planning (point 5, Figure 1) (Cherlin et al. 2013), and examining collaborations with emergency medical services (point 6, Figure 1) (Landman et al. 2013) were also methodologically connected through sampling of high-performing hospitals in the CMS database.

Integration through Interpretation and Reporting. The authors used primarily a staged narrative approach for reporting their results. The process and outcomes of integration of qualitative and quantitative data were primarily described in the quantitative paper (Bradley et al. 2012). The qualitative data informed the development of domains and concepts for a quantitative survey. Mapping of all survey items to corresponding concepts from the qualitative findings was reported in a web appendix of the published article. In the presentation of results from the multivariate model, multiple strategies that had significant associations with RSMRs were reported, with a summary of how these strategies corresponded to five of the six domains from the qualitative component. Quantitative and qualitative findings were synthesized through narrative both in the results and discussion using weaving. Key aspects of the organizational environment included effective communication and collaboration among groups, broad staff presence, and expertise. A culture of problem solving and learning were apparent in the qualitative findings and statistically associated with higher RSMRs in the quantitative findings. Regarding fit, the quantitative findings (Bradley et al. 2012) primarily confirmed the qualitative
findings (Curry et al. 2011). Thus, higher performing hospitals were not distin-
guished by specific practices, but instead by organizational environments that
could foster higher quality care. An accompanying editorial (Davidoff 2012)
discusses the complementary relationship between the qualitative and quanti-
tative findings, highlighting again the respective purposes of each component.
The additional qualitative analyses were published separately (Cherlin et al.
2013; Landman et al. 2013) and illustrate staged approach to reporting through
narrative with ample referencing to the previous studies. This example also
illustrates expansion of the previously published findings (Stange, Crabtree,
and Miller 2006).

Example 2. Integration in a Convergent Mixed Methods Study—The Adaptive Designs
Accelerating Promising Trials into Treatments (ADAPT-IT) Study. The RCT is con-
sidered by many trialists to be the gold standard of evidence. Adaptive clinical
trials (ACTs) have been developed as innovative trials with potential benefits
over traditional trials. However, controversy remains regarding assumptions
made in ACTs and the validity of results (Berry 2011). Adaptive designs com-
prise a spectrum of potential trial design changes (Meurer et al. 2012). A sim-
ple adaptation involves early trial termination rules based on statistical
boundaries (Pocock 1977), while a complex adaptation in a dose-finding trial
could identify promising treatments for specific subpopulations and tailor
enrollment to maximize information gained (Yee et al. 2012). The overarching
objective of ADAPT-IT is “To illustrate and explore how best to use adaptive
clinical trial designs to improve the evaluation of drugs and medical devices
and to use mixed methods to characterize and understand the beliefs, opin-
ions, and concerns of key stakeholders during and after the development pro-
cess” (Meurer et al. 2012).

Integration through design. One study from the mixed methods evaluation
aim of the investigation seeks to describe and compare the beliefs and perspec-
tives of key stakeholders in the clinical trial enterprise about potential ethical
advantages and disadvantages of ACT approaches. A mixed methods conver-
gent design was utilized to collect quantitative data through a 22-item ACTs
beliefs survey using questions with a 100-point visual analog scale, and qualita-
tive data from unstructured open-response questions on the survey and mini
focus group interviews. The scales on the survey instrument assessed beliefs
about ethical advantages and disadvantages of adaptive designs from the
patient, research, and societal perspectives. The qualitative questions on the
survey and in the interview guides elicited why participants feel there are
advantages or disadvantages to using adaptive designs. A mixed methods approach was implemented to elucidate participants’ beliefs, to identify the reasoning behind the beliefs expressed, and to integrate the data together to provide the broadest possible understanding. Fifty-three individuals participated from the four stakeholder groups: academic clinicians \((n = 22)\); academic biostatisticians \((n = 5)\); consultant biostatisticians \((n = 6)\); and other stakeholders, including FDA and NIH personnel and patient advocates \((n = 20)\).

**Integration through methods.** The quantitative and qualitative data were collected concurrently, and the approach to integration involved **merging.** With the content of the scales on the survey in mind, the mixed methods team developed the open-ended responses on the survey and interview questions for mini focus groups to parallel visual analog scale (VAS) questions about ethical advantages and disadvantages. By making this choice intentionally during the design, integration through **merging** would naturally follow. The research team conducted separate analyses of the quantitative and qualitative data in parallel. For the quantitative analytics, the team calculated descriptive statistics, mean scores, and standard deviations across the four stakeholder groups. Box plots of the data by group were developed to allow intra- and intergroup comparisons. For the qualitative analytics, the investigators immersed themselves in the qualitative database, developed a coding scheme, and conducted thematic searches using the codes. Since the items on the VASs and the questions on the qualitative interview guides were developed in tandem, the codes in the coding scheme were similarly developed based on the items on the scales and the interview questions. As additional themes emerged, codes to capture these were added. The methodological procedures facilitated thematic searches of the text database about perceived ethical advantages and disadvantages that could be matched and **merged** with the scaled data on beliefs about ethical advantages and disadvantages.

**Integration through Interpretation and Reporting Procedures.** Having organized the quantitative and the qualitative data in a format based on thematic relevance to allow **merging**, higher order integration interpretation was needed. Two approaches were used. First the results from the quantitative and qualitative data were integrated using a joint display. As illustrated in Figure 2, the left provides the participants’ quantitative ratings of their beliefs about the ethical advantages as derived from the visual analog scales, with the lowest anchor of 0 signifying definitely not agreeing with the statement and the highest anchor of 100 signifying definite agreement with the statement. The right side provides illustrative qualitative data from the free-text responses on the
survey and the mini focus groups. Color matching (see online version) of the box plots and text responses was devised to help the team match visually the quantitative and qualitative responses from the constituent groups. Multiple steps in developing the joint display contributed to an interpretation of the data.

In the final report, the quantitative data integration uses a narrative approach that describes the quantitative and qualitative results thematically. The specific type of narrative integration is weaving because the results are connected to each other thematically, and the qualitative and quantitative data weave back and forth around similar themes or concepts. The narrative provides intragroup comparisons of the results from the scales about beliefs that are supported by text from the qualitative database. Each of the six sections of the results contain quantitative scores with intergroup comparisons among the four groups studied, that is, academic researchers, academic biostatisticians, consultant biostatisticians, and “other” stakeholders and quotations from each group.

Regarding the fit of the quantitative and qualitative data, the integration resulted in an expansion of understanding. The qualitative comments provided information about the spectrum of opinions about ethical advantages and dis-
advantages, but the scales in particular were illustrative showing there was polarization of opinion about these issues among two of the constituencies.

**Implications for Practice**

This article provides an update on mixed methods designs and principles and practices for achieving integration at the design, methods, and interpretation and reporting levels. Mixed methodology offers a new framework for thinking about health services research with substantial potential to generate unique insights into multifaceted phenomena related to health care quality, access, and delivery. When research questions would benefit from a mixed methods approach, researchers need to make careful choices for integration procedures. Due attention to integration at the design, method, and interpretation and reporting levels can enhance the quality of mixed methods health services research and generate rigorous evidence that matters to patients.

**ACKNOWLEDGMENTS**

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*Disclosures:* None.

*Disclaimers:* None.

**REFERENCES**


SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.
To assess decision-making for cancer treatment among racial/ethnic minority patients, we systematically reviewed and synthesized evidence from studies of “shared decision-making,” “cancer,” and “minority groups,” using PubMed, PsycINFO, CINAHL, and EMBASE. We identified significant themes that we compared across studies, refined, and organized into a conceptual model.

Five major themes emerged: treatment decision-making, patient factors, family and important others, community, and provider factors. Thematic data overlapped categories, indicating that individuals’ preferences for medical decision-making cannot be authentically examined outside the context of family and community.

The shared decision-making model should be expanded beyond the traditional patient–physician dyad to include other important stakeholders in the cancer treatment decision process, such as family or community leaders. (Am J Public Health. 2013;103:e15–e29. doi:10.2105/AJPH.2013.301631)

IN SPITE OF DECLINING CANCER incidence and mortality in the United States, minority patients continue to have lower 5-year survival rates than non-Hispanic Whites. Although differences in stage at diagnosis may partly account for survival differences, a large proportion of the disparity in survival has been attributed to poorer quality of care, delay in receipt of treatment, or no receipt of treatment among minority patients. Specific health systems or individual providers no doubt contribute to unnecessary delays in care. However, patients also may have reason to delay or refuse treatment, such as a poor patient–provider relationship or dissatisfaction with the treatment plan.

Effective patient-centered communication and a positive patient–provider relationship have been associated with improved treatment adherence, survival, and health-related quality of life among cancer patients. Racial and ethnic minority patients are at higher risk than White patients for poor communication and a strained patient–provider relationship, which in turn can lead to delayed or nonstandard care. Incorporating cultural and individual patient preferences into cancer treatment planning through shared decision-making (SDM) may improve adherence to treatment recommendations and reduce delays in care.

The SDM model emphasizes the physician’s facilitation of the patient’s involvement in treatment decision-making to improve quality of care and patient centeredness, and thereby improve health outcomes. (In health care, “patient centeredness” includes viewing and treating the patient as a whole and unique person, rather than simply focusing on the disease process.) As opposed to the historical paternalistic or informed decision-making models, the SDM model is defined by a 2-way information exchange between the physician and the patient, followed by discussion of treatment preferences by both parties until they reach consensus on a treatment decision. However, cancer patients’ preferred level of involvement in treatment decision-making may vary. A recent review found mixed effects of the impact of SDM interventions on patients’ satisfaction and medication adherence. Alignment between patients’ preferred and actual decisional role may be more important to patients’ satisfaction than decisional autonomy.

Taken together, these data suggest that the SDM approach may not be right for every cancer patient. Indeed, the available evidence suggests substantial cultural variation in the cancer treatment decision-making process, including culture-specific differences in communication style, desired amount and type of information, and preferred decisional role. For patients living in a defined social and cultural context such as an American Indian/Alaska Native (AI/AN) tribe, cultural congruence includes recognition of the decision-making role played by other important stakeholders outside of the patient–physician dyad.

To better assess SDM among racial/ethnic minority cancer patients, we performed a systematic review of the literature on SDM for cancer treatment in ethnic minority groups. We created a conceptual model to expand the SDM model and to identify the multilevel determinants of cancer treatment decision-making among ethnic minority groups, which include factors at the level of the patient, family and significant others, community, and provider. We summarized the literature at each level of the model to determine what is currently known about cultural variation in cancer treatment decision-making, to expose the relevant gaps in knowledge, and to make recommendations for future research.

METHODS

The present systematic literature review followed guidelines put forth by the Institute of Medicine. In July 2011, we initiated a search of the published literature using PubMed, PsycINFO, CINAHL, and EMBASE, without applying date limits. As a first step, we searched broadly for “shared decision-making” and “cancer.” Because shared decision-making is a relatively recent concept and therefore is not a standardized keyword search term, we built a search string that captured “shared decision-making”
Inclusion and Exclusion Criteria for a Systematic Literature Review on Shared Decision-Making in Cancer Treatment Among Minority Populations

Inclusion Criteria

• Fit the definition of “shared decision-making.”
• Reported data on cancer treatment decision-making.
• Collected primary data.
• Included results related to decision-making in a racial/ethnic or cultural minority group.
• Published in a peer-reviewed journal.

Exclusion Criteria

• Conducted on decision-making for cancer treatment in children.
• Data not stratified by race/ethnicity or study did not include a minority group in study population.
• Conducted on palliative or end-of-life care in cancer treatment.

Shared decision-making is defined as a 2-way information exchange between the physician and the patient followed by discussion of treatment preferences by both parties until they reach consensus on a treatment decision.

A racial/ethnic or cultural minority group is defined as a population that was the racial, ethnic, or cultural minority population in the country where the study took place.

RESULTS

A final total of 23 articles—11 quantitative studies and 12 qualitative studies—fulfilled criteria and were included in the study (Table 1). Most of the 11 quantitative studies focused solely on breast cancer (n = 8), followed by multiple cancer sites (n = 2) and prostate cancer (n = 1). Similarly, most of the 12 qualitative studies focused on breast cancer (n = 9), followed by prostate cancer (n = 1), lung cancer (n = 1), and unreported (n = 1). Most studies were conducted in the United States (n = 19). Ten of the quantitative studies compared more than 1 minority group; African Americans were the most commonly represented minority (n = 14), followed by Latinos (n = 6), Asians (n = 1), and an unspecified “other” (n = 3) minority group. Latina populations were frequently divided into low-acculturated and high-acculturated subgroups, defined by language preference (English vs Spanish). By contrast, only 4 of the qualitative studies compared multiple minority groups. Again, African Americans were most frequently represented (n = 5), followed by Asian (n = 4), Latina (n = 3), and Jewish (n = 1) populations. Within the Asian minority group, Chinese were represented in the most studies, followed by Punjabis.

Thematic analysis of the quantitative and qualitative papers revealed 5 major themes: treatment decision-making process, patient factors, factors related to family and important others, study type (quantitative vs qualitative). We report confidence intervals for the findings where available. We also describe racial, ethnic, and gender differences, when available.
community factors, and provider factors. We organized the themes into a conceptual model of the decision-making process for cancer treatment among racial/ethnic minority patients (Figure 2). Several subthemes emerged, particularly among patient factors, which are described in detail in this section. Examples of dominant subthemes include spirituality, attitudes toward treatment, self-efficacy, acculturation, and advocacy (Table 2).

**Treatment Decision-Making Process**

The 3 subthemes of treatment decision-making process were decisional role, decisional regret or satisfaction, and decisional role conflict. Among the quantitative studies, shared and patient-based decision-making were most frequently used for cancer treatment decisions (Table 3). Patients’ decisional roles varied among minority groups and non-Hispanic White patients, but racial differences were not always explicit in the studies. Adoption of an SDM model was reported by 33% to 42% of low-acculturated Latina, high-acculturated Latina, and African American respondents. Patient-based decision-making was reported less often among low-acculturated Latina patients (29%–37%) compared with high-acculturated Latina patients (39%–75%).

High-acculturated Latina patients were more likely to report patient-based decision-making than any other decision-making model, across several studies. Provider-based decision-making was less common, reported by only 10% to 33% of low-acculturated Latina patients, 7% to 27% of high-acculturated Latina patients, and 24% to 27% of African American patients.

Women in all minority groups were significantly less satisfied than White women with their decisions and with the decision-making process. Relative to their White counterparts, low-acculturated Latina patients reported the highest dissatisfaction, with odds ratios ranging from 3.6 (95% confidence interval [CI] = 2.9, 6.9) to 5.5 (95% CI = 2.9, 10.5), and highest decisional regret (odds ratio [OR] = 4.1; 95% CI = 2.2, 8.0), followed by high-acculturated Latina patients (dissatisfaction OR range = 1.3 [95% CI = 1.0, 1.9] to 3.8 [95% CI = 1.6, 5.1]; regret OR = 2.0 [95% CI = 1.2, 3.7]) and African American patients (dissatisfaction OR range = 2.1 [95% CI = 1.3, 3.4] to 2.2 [95% CI = 1.7, 3.9]; regret OR = 1.8 [95% CI = 1.1, 3.0]).

Two quantitative studies specifically examined conflict or alignment between patients’ preferred decisional role and their actual decisional role. Most respondents (69%–93%) reported a match between their actual and preferred level of decisional involvement, although low-acculturated Latina women
were more likely to report too little involvement. Women whose decision-making role matched their preferences had the highest satisfaction with treatment received, the highest satisfaction with decision-making process, and the lowest decisional regret. By contrast, women whose decision-making role was less or more than they preferred were at increased risk of treatment dissatisfaction (OR range = 1.5–2.6; P < .005), decision-making process dissatisfaction (OR range = 2.5–3.2; P < .001), and high decisional regret (OR range = 1.7–2.4; P < .001). Qualitative studies indicated cultural variation in the adoption of different decision-making models and offered some explanatory insights (Table 4). High-acculturated Asian American women preferred a more active decisional role, believing that active engagement was necessary to ensure that the provider presented all treatment options. A study of low-acculturated Punjabi women reported low decisional involvement, insufficient information about treatments, and a lack of full engagement in the decision-making process. Many (though not all) low-acculturated Chinese and Korean American cancer patients preferred a provider-based decision-making model. Another study concurred that Chinese American women reported discomfort with the multiple treatment options presented. They felt it indicated a lack of authority and expertise and they tried to interpret the “real” recommendation. Although 1 study found that the majority of Latina and African American cancer patients preferred a significant amount of provider involvement in decision-making, overall, these populations reported feeling disempowered in the decision-making process. They expressed the need for more information, empowerment to self-advocate, and physicians’ respect for patients’ autonomy. In a study of Haredi Ashkenazi Jewish women, respondents reported that, although they preferred a rabbi-as-agent model similar to the provider-based decision-making model, they struggled with the consequences and benefits of delegating their decision to an authority figure. One study of African American women with breast cancer found that lack of participation in decision-making led many of them to reject chemotherapy. Thus, the sense of disempowerment from poorly aligned decision-making preferences and roles could sometimes result in nonadherence to cancer treatment.

### Patient Factors

Patient factors that influenced the cancer treatment decision-making process were primarily focused on attitudes and deeply held beliefs, as well as tangible aspects of a marginalized social status. The dominant subthemes within patient factors included level of acculturation or language issues, spirituality and fatalism, attitudes about treatment and decision-making, and self-efficacy. We investigated socioeconomic status (SES) as a potential subtheme, but the limited literature did not enable an in-depth investigation of the effect of SES indicators on the decision-making process among racial/ethnic minority patients. One study of African American patients reported similar decisional involvement by SES status, although the small sample size (n = 26) limited the conclusions that could be drawn from the findings.

#### Level of acculturation and language issues

Six quantitative studies included an analytic component to investigate differences in decision-making by minority patients’ level of acculturation and preferred language. Five of the studies investigated decision-making differences between low-acculturated and high-acculturated Latino breast cancer patients. As detailed previously, investigators found statistically significant differences in decision-making, decision-making outcomes, and decision-making factors by acculturation and language. For example, compared with low-acculturated Latino patients, more high-acculturated patients reported patient-based decision-making and fewer reported provider-based decision-making. Low-acculturated patients tended to be least satisfied with their decision-making role and outcome. One potential explanatory mechanism for these differences by level of acculturation was the need for translation in clinical encounters. In 1 study, only 6% of high-acculturated Latina patients reported needing translation in the clinical encounter, compared with 89% of low-acculturated Latina patients. A doctor or staff member translated for 52% of low-acculturated patients, and 36% reported

### TABLE 1—Characteristics of Articles Included in a Systematic Literature Review on Shared Decision-Making in Cancer Treatment Among Minority Populations

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Quantitative Studies (n = 11), No. (%)</th>
<th>Qualitative Studies (n = 12), No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer site</td>
<td>Breast 8 (73) Prostate 1 (9) Lung 0 Multiple 2 (18) Not reported 0</td>
<td>United States 10 (91) Outside United States 1 (9)</td>
</tr>
<tr>
<td></td>
<td>Patients 11 (100) Patients’ family and others 0 Health care providers 1 (9)</td>
<td>Study populationa Patient 11 (100) Community 0</td>
</tr>
<tr>
<td></td>
<td>Minority race/ethnicity of study populationa African American 9 (82) Latina/Latino 6 (55) Asian 1 (9) Haredi Ashkenazi Jewish 0 Non-Hispanic White 9 (82) Other (not specified) 3 (27)</td>
<td>Family and others 5 (45) Community 0</td>
</tr>
<tr>
<td></td>
<td>Level of decision-makinga Patient 11 (100) Family and others 5 (45) Community 0</td>
<td>Community 0</td>
</tr>
</tbody>
</table>

a Some studies had more than 1 subcategory.
translation by family or friends. The final study examined the role of low acculturation in nondisclosure of diagnosis among minority patients in Singapore, and by extension deferment of decision-making to family members. Not speaking English was associated with 7.6 greater odds (95% CI = 1.7, 34.5; \( P = .009 \)) of nondisclosure of diagnosis among Chinese, Malay, and other minority patients in Singapore.

**Spirituality and fatalism.** A single quantitative study among African Americans explored intrinsic religiosity, defined as the degree to which participants believe that they have internalized, and live in accordance with, their religious principles. In this study, patients who shared decision-making had lower average religiosity scores than those who reported physician-based decision-making (mean score = 13.5 and 14.7 units, respectively; \( P = .02 \)).

Several qualitative studies explicat the role of patient spirituality or “faith in God” in cancer treatment decision-making.\(^{26,40,43,45,47}\) Spirituality was cited repeatedly as both a coping mechanism and a factor in the decision-making process. Spirituality was a particularly strong coping mechanism among African Americans.\(^{30,42}\) Specifically, spirituality played a strong role in having faith in the providers, strengthening the relationship with providers, and following the providers’ recommendations for treatment. In these studies, prayer was not viewed as a sufficient treatment option by itself.\(^{40,45}\) For several minority groups, spirituality may have limited patients’ role in decision-making by causing them to put their trust in their providers and in their religious faith; alternatively, highly spiritual patients may have had a psychological characteristic that also stimulated a high level of faith in their providers. For example, in a study of low-acculturated Asian Americans, providers reported that patients were more passive in treatment decision-making.\(^{36}\) According to their providers, these patients often viewed their cancer diagnosis and treatment outcome as part of “God’s will” and relied heavily on prayer, which limited their active participation in decision-making.

**Attitudes about treatment and decision-making.** Three quantitative studies explored the impact of patients’ attitudes about treatment and decision-making on the decisional process, with mixed findings.\(^{27,29,34}\) One study of African American men and women found that patients held strong supportive attitudes for autonomy in information seeking, but not autonomy in decision-making.\(^{34}\) Patients with higher educational levels had stronger supportive attitudes for autonomy in information seeking and decision-making, but attitudes were similar across income level. Concerns about recurrence, survival, and radiation were self-reported as the most significant attitudinal factors influencing treatment decision-making for Latina, African American, and White women.\(^{27,29}\) One study of breast cancer patients\(^{27}\) found that, compared with low-acculturated Latina and White women, significantly more African American and high-acculturated Latina women reported concerns about recurrence (61.4%–64.1% vs 55.6%–55.8% of patients; \( P \) for overall trend = .044) and body image (22.3%–25.3% vs 17.2%–19.8%; \( P \) for overall trend = .01) as important factors in decision-making. Significantly fewer White women reported radiation concerns as a major decisional influence than low-acculturated Latina, high-acculturated Latina, and African American women (17.2% vs 26.8%–30.9%; \( P \) for overall trend < .001). Another study\(^{29}\) found that, although concerns about survival and radiation did not significantly differ between groups, low-acculturated Latina women rated concerns about appearance (i.e., body image; \( P \leq .001 \)), surgical consequences (\( P \leq .001 \)), and cost (\( P \leq .001 \)) as greater decisional influences than did high-acculturated Latina and White women.

Four qualitative studies explored the theme of patients’ attitudes in treatment and treatment decision-making in greater detail. Many of the factors or concerns around decision-making were in direct conflict, thereby heightening patients’ anxiety.\(^{36,38,43,44}\) For example, a study with low-acculturated Korean and Chinese American patients and high-acculturated Asian American patients found that adopting a “positive attitude” played a central role in treatment and treatment decision-making for Korean patients and for highly acculturated patients.\(^{36}\) The highly acculturated
TABLE 2—Organization of References Into Conceptual Model Themes in a Systematic Literature Review on Shared Decision-Making in Cancer Treatment Among Minority Populations

<table>
<thead>
<tr>
<th>Theme and Subthemes</th>
<th>Quantitative References</th>
<th>Qualitative References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment decision-making process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decisional role</td>
<td>26-28,30-34, 36,38-47</td>
<td>39,41,43,45,46</td>
</tr>
<tr>
<td>Conflict between actual and preferred decisional role</td>
<td>28,31</td>
<td>39,41,43,46</td>
</tr>
<tr>
<td>Satisfaction or regret with decision-making or decision</td>
<td>28,31,48</td>
<td>39,41,43</td>
</tr>
<tr>
<td>Patient factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of acculturation and language</td>
<td>26-29,33,48</td>
<td>36,37,41,42,44</td>
</tr>
<tr>
<td>Spirituality and fatalism</td>
<td>34</td>
<td>36,40,43-45,47</td>
</tr>
<tr>
<td>Attitudes about treatment and decision</td>
<td>27,29,34</td>
<td>36,38,43,45</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>32,33</td>
<td>44</td>
</tr>
<tr>
<td>Factors of family and important others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation or advocacy of others in decision-making</td>
<td>26-29,33,35</td>
<td>37-39,41,42,44,45,47</td>
</tr>
<tr>
<td>Participation or advocacy of others and receipt of treatment</td>
<td>26-29,33,35</td>
<td></td>
</tr>
<tr>
<td>Consequences of ceding decision-making autonomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vicarious experiences</td>
<td>35</td>
<td>40,43,45</td>
</tr>
<tr>
<td>Community factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural or community norms and values</td>
<td></td>
<td>36-38,40,41,45</td>
</tr>
<tr>
<td>Communication with the community</td>
<td></td>
<td>36,37,42,45</td>
</tr>
<tr>
<td>Decision-making as a collective experience</td>
<td></td>
<td>37,39,45</td>
</tr>
<tr>
<td>Provider factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provider preferences and recommendations</td>
<td>27,29,30,35</td>
<td>36,39,41,43,47</td>
</tr>
<tr>
<td>Provider communication and information giving</td>
<td>30,32,35</td>
<td>36,39,41,43,46</td>
</tr>
<tr>
<td>Conflict and cultural congruence in the patient-provider relationship</td>
<td></td>
<td>41,42,44</td>
</tr>
</tbody>
</table>

Factors Regarding Family and Important Others

Family and important others played a role in the cancer treatment decision-making process. The dominant subthemes within this level of factors included participation and advocacy in decision-making, impact of participation and advocacy on receipt of treatment, consequences of ceding decision-making autonomy to important others, and the experiences of important others.

Participation and advocacy of important others in decision-making. Six quantitative studies examined the role of family and important others in the clinical encounter in general and decision-making specifically. Quantitative studies that explored this level of factors included participation and advocacy on receipt of treatment, consequences of ceding decision-making autonomy to important others, and the experiences of important others.

Group defined a positive attitude as taking an active decisional role, whereas the Korean group viewed it as deferring to the provider in decision-making. Concurrent with the desire to adopt or display a positive attitude were concerns about pain and suffering (Korean and high-acculturated Asian American patients), public displays of suffering (Koreans), and survival (Chinese and high-acculturated Asian Americans). In studies of Latina women with breast cancer, fear of chemotherapy and side effects was a significant factor in treatment decision-making. Concurrent with deep fears of recurrence (presumably reduced by use of chemotherapy). Self-efficacy. Two quantitative studies with similar study populations examined patients’ self-efficacy in communication with surgeons as a factor in cancer treatment decision-making. In 1 study, White, Latina, and African American women who felt efficacious in their ability to communicate with their surgeons had lower odds of deferring the final treatment decision to family members (OR = 0.95; 95% CI = 0.91, 0.99; P = .009) than women who did not feel efficacious. The other study found no association between self-efficacy and cancer knowledge or treatment outcomes across White, Latina, and African American women. Neither reported the distribution of self-efficacy scores across racial/ethnic groups. A qualitative study of Latina breast cancer patients indicated that self-efficacy in making decisions and communicating with providers was a key theme discussed in the focus groups.

High-acculturated Latina women (59.3%) were more likely to indicate that their spouse or partner played an important role in decision-making than low-acculturated Latina women (54.3%), White women (51.6%), and African American women (44.5%; P for overall trend = .032). Despite the apparent importance of spouse or partner in decision-making, another study found that no high-acculturated Latina women and very few low-acculturated Latina women (4.2%) or African American women (3.0%) identified the spouse or partner as the final treatment decision-maker (P for group differences = .19). Family and friends appeared to play a more significant role than spouses or partners in decision-making, especially among low-acculturated Latina patients. Low-acculturated Latina women were much more likely to report family (75.9%) and friends (45.4%) as important in decision-making than African American women (50.3% and 25.6%, respectively), high-acculturated Latina women...
## TABLE 3—Summarization of Findings on Shared Decision-Making From the Quantitative Literature

<table>
<thead>
<tr>
<th>Article</th>
<th>Main Outcome Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back and Huak[26]</td>
<td>Nondisclosure of diagnosis</td>
<td>A “family-centered decision-making model” was important, with family-initiated nondisclosure of diagnosis to patients in 58 of 66 cases. Nondisclosure occurred more often when patients were older (OR = 7.7; 95% CI = 3.5, 16.8), female (OR = 6.0; 95% CI = 2.7, 13.7), non-English speaking (OR = 7.6; 95% CI = 1.7, 34.5), and in palliative care (OR = 3.2; 95% CI = 1.3, 7.9).</td>
</tr>
<tr>
<td>Hawley et al.[28]</td>
<td>Match between actual and preferred decision-making role; satisfaction with decision or decision-making process</td>
<td>Decision-making: 37% of patients reported shared decision-making. Low-acculturated Latina women were more likely to report surgeon-based decision-making (31% vs 22%–26%; P not reported) and less likely to report patient-based decision-making (30% vs 33%–41%; P &lt; .1). 93% of patients reported a match between preferred and actual involvement. Dissatisfaction and regret: low-acculturated Latina women had the greatest likelihood of dissatisfaction (OR = 5.5; 95% CI = 2.9, 10.5) and regret (OR = 4.1; 95% CI = 2.2, 8.0). Companion presence was associated with lower dissatisfaction (OR = 0.65; 95% CI = 0.44, 0.96).</td>
</tr>
<tr>
<td>Hawley et al.[27]</td>
<td>Treatment received</td>
<td>Patient-provider decision-making: surgeon-based decision-making was highest (33.1% vs 24.0%–26.7%) and patient-based decision-making lowest (29.5% vs 33.4%–39.8%) among low-acculturated Latina women. Decision-making role of family and important others: African Americans had the significantly lowest frequency of being accompanied by anyone to a consultation (71.2% vs 77.5%–79.2%; P = .032). Family role in decision-making was significantly highest among low-acculturated Latina women (75.9%), followed by African American (50.3%), high-acculturated Latina (49.4%), and White women (34.1%; P for overall trend &lt; .001). Accompaniment to the consultation was associated with greater receipt of mastectomy (relative risk = 1.62; 95% CI = 1.14, 2.21).</td>
</tr>
<tr>
<td>Kaplan et al.[29]</td>
<td>Type of treatment received</td>
<td>Patient-provider decision-making: more White women reported that the provider indicated radiation as optional (32.2%) than did high-acculturated Latina (18.7%) and low-acculturated Latina (10.2%) women. Provider recommendation and concerns about survival were the most important influences on surgery decision-making reported by all ethnicities. Compared with a recommendation that radiation was optional, provider indication that radiation was necessary was significantly associated with radiation therapy (OR = 8.05; 95% CI = 4.04, 16.03). Among patients with breast-conserving surgery who did not undergo radiation therapy, low-acculturated Latina (67%) and high-acculturated Latina (69%) patients more frequently reported lack of provider recommendation as the reason than White women (57%). Family influence on decision-making: low-acculturated Latina women rated family influences (P ≤ .01) as a greater influence on decision-making than other groups.</td>
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<td>Katz et al.[30]</td>
<td>Type of treatment received; treatment delay; satisfaction with decision or decision-making process</td>
<td>Low-acculturated Latina women had highest odds of low satisfaction with the decision-making process (OR = 3.6; 95% CI = 2.9, 6.9), followed by African American women (OR = 2.2; 95% CI = 1.7, 3.9) and high-acculturated Latina women (OR = 1.3; 95% CI = 1.0, 1.9; P for overall trend &lt; .001).</td>
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<tr>
<td>Katz et al.[48]</td>
<td>Treatment received</td>
<td>Decision-making: 37.1% of all women reported shared decision-making, 41.0% reported patient-based decision-making, and 21.9% reported provider-based decision-making. Patient-based decision-making was associated with the highest rate of mastectomy receipt. Communication with surgeons: ethnic differences in mastectomy receipt were partially related to information exchange with surgeons. Among women who reported surgeon-based decision-making, more White women reported a discussion only about breast-conserving surgery (50.7%) than did African American (31.4%) and “other” women (26.0%; P = .029). Surgeons were more likely to recommend breast-conserving surgery to White women (51.6%) than to African American (41.7%) and “other” women (41.0%; P &lt; .001).</td>
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Moreover, significantly more low-acculturated Latina women identified family or friend as the final decision-maker (49.3%) than African American women (3.0%), high-acculturated Latina women (17.9%), and White women (2.2%; P for overall trend < .001). A study of Asian patients in Singapore found that a “family-centered” decision-making model was most important to this population. Only 1 study adjusted for potential confounders to study the role of important stakeholders outside the patient–provider dyad in minority patient cancer treatment decision-making. Adjusting for demographic and clinical factors, patients’ self-efficacy, social support, and providers’ participatory style, the authors found that both low-acculturated Latina women (OR = 7.97; 95% CI = 2.43, 26.20) and high-acculturated Latina women (OR = 4.48; 95% CI = 1.09, 18.45) were significantly more likely than White and African American women to have family making the cancer treatment decision. Women who felt efficacious in their ability to communicate with surgeons were less likely to have the family as the final decision-maker (OR = 0.95; 95% CI = 0.91, 0.99). Women whose surgeons had a participatory decision-making style were less likely to have the family as the final decision-maker (OR = 0.98; 95% CI = 0.97, 0.997). Family decision-making was associated with lower odds of breast-conserving surgery (OR = 0.39; 95% CI = 0.18, 0.85).

Note. CI = confidence interval; OR = odds ratio.
<table>
<thead>
<tr>
<th>Article</th>
<th>Research Question</th>
<th>Main Findings for Decision-Making</th>
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<tr>
<td>Ashing et al.</td>
<td>What are the cultural and socio-ecological factors that influence the breast cancer experience of Chinese, Korean, and “mixed” Asian American women?</td>
<td>Health care professionals’ perspective: Asian American patients (1) exhibited passivity in decision-making and fatalism toward their cancer; (2) tended to rely on word-of-mouth over provider recommendations. Patients’ perspective: less-acculturated patients depended on the provider for treatment decisions because of the provider’s authority. More acculturated women preferred a more active decisional role. Attitudes (concern about burdening the family, sexual health, concern for cost of treatment) influenced treatment decision-making.</td>
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<td>Balneaves et al.</td>
<td>What are the experiences and responses of the family members of immigrant Punjabi women diagnosed with breast cancer?</td>
<td>The accepted cultural norm is nondisclosure of a cancer diagnosis to the community and in some cases to the patient. Family advocated for women in the clinical encounter, had to be assertive with providers, and helped with language barriers.</td>
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<td>Coleman-Brueckheimer et al.</td>
<td>To what extent and in what way do Haredi rabbinical authorities participate in breast cancer treatment decision-making?</td>
<td>Involving a rabbi in the decision-making process provided cultural meaning and relieved guilt and blame, but carried the risk of a binding decision. Involving a culture broker in the decision-making was considered advantageous because of high levels of trust in the broker, the broker’s experience interacting with the medical world, and nonbinding decisions, but patients were concerned about confidentiality and gender role conflicts.</td>
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<td>Howard et al.</td>
<td>What are the experiences of Punjabi women with breast cancer, as described by their personal narratives?</td>
<td>Many patients reported following the providers’ treatment advice without question. For some women, family’s decisions took precedence over their own preferences. The women were focused more on the collective, rather than the individual, experiences of breast cancer. However, they felt that they were not given enough information and did not feel fully engaged in the decision-making process.</td>
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<td>Jones et al.</td>
<td>What are the cultural beliefs and attitudes of African American prostate cancer survivors regarding the use of complementary alternative medicine?</td>
<td>Spirituality played a significant role in treatment decision-making for patients who used complementary alternative medicine. Almost all of the men believed that prayer helped to fight again prostate cancer, but none thought that prayer by itself would be sufficient. They believed that God works through health care providers. Trust in providers and in their knowledge was very important for treatment decision-making. Patients reported that changing cultural beliefs have changed treatment decision-making intergenerationally.</td>
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<td>Killoran and Moyer</td>
<td>What are the cultural factors that influence the treatment decision-making by Chinese American patients and the presentation of treatment options by providers?</td>
<td>There was a cultural belief that vanity is dangerous and therefore mastectomy is safer than breast-conserving therapy, which was considered vain. Family, friends, and community reinforced these beliefs among the patients, affecting treatment decision-making and regret. Patient-provider miscommunication: patients felt in conflict with the provider’s decision because the provider did not respect their choice for mastectomy, their fears, and their beliefs. This resulted in a loss of faith in provider, dissatisfaction with treatment, or uncertainty regarding treatment choice, and consideration of nonadherence. Provider presentation of treatment: triangulation of multiple data sources showed that providers did not use the mandated handbook on treatment options correctly. Providers conveyed more bias in the discussion of treatment options than they realized. There was a wide variation in providers’ opinions and presentation of options. There was also wide variation in providers’ views about Asian American patients and how to present information to them, including using the family as a guide for nondisclosure. Patients felt uncomfortable with being presented multiple options, thinking that it indicated a lack of authority and expertise.</td>
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<td>Kreling et al.</td>
<td>What are older breast cancer patients’ attitudes toward chemotherapy, and what factors influenced their treatment decision-making?</td>
<td>Most patients reported a provider-based decision-making style, which they preferred. Decision-making for chemotherapy was promoted by (1) tailored communication, which included family members; (2) provision of support services for women without support networks; and (3) culturally sensitive provider communication. Latina women faced barriers to chemotherapy use that included employment, insurance, and language issues. They felt little empowerment to seek information. African American women reported that class and education were important determinants of how providers treated them and that they had to be advocates for themselves to be treated well. African American women tended to keep their diagnosis secret, resulting in lack of support from the community.</td>
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TABLE 4—Continued

Nápoles-Springer et al.43 How do understanding of ductal carcinoma in situ diagnosis, treatment decision-making processes, and satisfaction with care compare between Latina and White women? Understanding diagnosis, prognosis, and treatment: White women had a greater understanding of diagnosis, prognosis, and treatment than Latina women. Low-acculturated Latina women wanted more information about surgical treatment.

Treatment decision-making process: most White women reported shared decision-making and were more likely to report patient-based decision-making than Latina women. Latina women reported equal occurrence of shared decision-making and provider-based decision-making, and were more likely than White women to report provider-based decision-making. Significant factors affecting decision-making were friends’ and others’ prior experiences, fear of recurrence, and providers’ recommendation. Less-cited factors included attitudes about the procedure, spiritual beliefs, and cost. The factors did not differ by ethnicity.

Treatment and decisional role satisfaction: patients were satisfied with their lack of decisional involvement and with their treatment decisions when providers’ rationale for the decision was explained clearly and when patients believed themselves to be well informed. Patients were dissatisfied with their lack of involvement if they did not know the other treatment options or providers’ rationale. Patients were dissatisfied with their treatment if they perceived that the providers were unable to commit to a specific treatment recommendation.

A common theme was cultural identity and the importance of empowering African American women with information to self-advocate during the decision-making process. Negative perceptions of breast cancer treatment were based primarily on the observation of others receiving treatment. Non-African American providers more often reported their patients as fatalistic. Strong spiritual beliefs were not a primary decision-making resource for these women.

Patients were less confident in treatment decisions if they reported poor communication with their providers. Good communication was associated with treatment satisfaction, treatment knowledge, and use of recommended adjuvant treatment. Lack of decision-making participation, passivity in the interaction with providers, and limited questioning led several women to reject chemotherapy.

Collectivism, family, the faith community, and others played important roles.

Sheppard et al.45 What are the key perceptions, enablers, and nurturers that influence African American women’s breast cancer adjuvant therapy decisions? A common theme was cultural identity and the importance of empowering African American women with information to self-advocate during the decision-making process. Negative perceptions of breast cancer treatment were based primarily on the observation of others receiving treatment. Non-African American providers more often reported their patients as fatalistic. Strong spiritual beliefs were not a primary decision-making resource for these women.

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Sheppard et al.44 What are the factors that influence Latinas’ factors that influence Latinas’ breast cancer treatment decision-making? Women needed better communication with providers and more information about the disease and treatment in Spanish. The family played a significant decisional role for Latina women. Factors that affected treatment decision-making included for following: positive provider-patient interactions, knowledge of diagnosis and treatment options, self-efficacy in decision-making, low communication skills or language barriers, cancer fatalism, and cultural incongruence with the providers. Patients reported not enough time for decision-making.

Provider-patient communication and quality of life: Participants stressed the importance of effective provider-patient communication for quality of life, including recognizing the patient’s individuality and tailoring communication.

Decision-making: effective communication, a sense of control (i.e., desire for shared decision-making), and providers’ respect for patients’ autonomy was important for effective decision-making. Respondents noted that not all patients have the capacity to self-advocate because of old age, poverty, or low education.

African American families exerted limited pressure on providers. By contrast, White families disagreed with providers on many issues, with or without patients’ concurrence. No African American patients switched doctors. In contrast, 38% of White patients switched doctors and more than 66% were persuaded by caregivers to do so. African American patients and caregivers reported following providers’ recommendations closely and relying heavily on their faith in God.

Family discordance in treatment decision-making was common (not stratified by race).

Williams et al.46 What are the perceptions of communication and decision-making with providers among African American patients living with cancer and their families? A common theme was cultural identity and the importance of empowering African American women with information to self-advocate during the decision-making process. Negative perceptions of breast cancer treatment were based primarily on the observation of others receiving treatment. Non-African American providers more often reported their patients as fatalistic. Strong spiritual beliefs were not a primary decision-making resource for these women.

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Zhang and Siminoff47 What are the major differences of opinion between patients and family members while making treatment decisions, and why do they exist? Participation and advocacy of others and receipt of treatment. Six quantitative studies examined the impact of a companion’s presence and decision-making participation on treatment-related outcomes, with mixed results.26–29,33,35 One study found that a companion’s presence at the decision-making clinical encounter was associated with lower decision dissatisfaction among cancer patients (OR = 0.65; 95% CI = 0.44, 0.96), but not regret (OR = 0.72; 95% CI = 0.43, 1.1).28 A companion’s presence was positively associated with receipt of mastectomy (relative risk [RR] = 1.62; 95% CI = 1.14, 2.21), whereas a strong spousal decision-making role was
negatively associated with mastectomy (RR = 0.53; 95% CI = 0.36, 0.78).27 The spousal role was not associated with any treatment of prostate cancer.35 Interactions between others’ decision-making role and race/ethnicity were not reported in the studies.

Consequences of ceding decision-making autonomy. Eight qualitative studies explored nuances and consequences of the role of family and other important stakeholders outside the patient—provider dyad in decision-making. For racial and ethnic minority cancer patients, family members were important advocates in the clinical encounter and provided social and decisional support, facilitated communication with providers, and helped overcome language barriers.37–39,41,42,44,45 Family members commonly had a substantial impact on treatment decision-making and outcomes,37,39,41,42,44,45 and in some cases impeded receipt of treatment42,45 or requested nondisclosure of diagnosis to the patient.37 In several studies, the treatment preferences of family and other dominated patients’ preferences, specifically with Chinese, Punjabi, and Haredi Ashkenazi patients.38,39,41 For the most part, deferring to others’ decisions for their cancer treatment appeared to give patients more satisfaction with treatment and the decision-making process, whereas opposing others’ recommendations or preferences could lead to decisional regret.38,39,41 However, a number of patients also expressed anxiety or regret associated with leaving the decision up to others, particularly when the treatment preferences of the patients and others were conflicted.38,41

Vicarious experiences. In addition to directly affecting treatment decision-making through decisional participation and recommendations, family, friends, and other important stakeholders indirectly influenced patients’ cancer treatment decision-making through their personal experiences with cancer. In 1 small quantitative study of prostate cancer treatment among African American men, patients were more likely to choose brachytherapy because they had friends who had received this treatment (OR = 2.04; P ≤ 0.1).35

Three qualitative studies investigated the theme of others’ cancer experiences and treatment decision-making with African American prostate cancer patients,40 Latina and White breast cancer patients,43 and African American breast cancer patients.45 Prior experiences of friends and family,43 as well as cancer survivor mentors,45 substantially influenced decision-making about treatments and sometimes engendered a fatalistic attitude toward treatment. Similarly, vicarious experiences were cited as reasons for the use of complementary and alternative medical cancer treatments,40 sometimes without the knowledge of the biomedical provider.

Community Factors

In addition to main partners, family, friends, and other important stakeholders, the patients’ community played both positive and negative roles in the cancer treatment decision-making process. Studies used the term “community” to describe a variety of types of groups of individuals, including the faith community, neighborhoods, cancer survivors, and an unspecified “community.” The dominant subthemes included cultural and community norms and values, communication with the community, and decision-making as a collective process.

Cultural and community norms and values. One way through which the community influenced the decision-making process was the formation and communication of collective norms and values, which was explored in 5 qualitative studies.37,38,40,41,45 Cultural norms and values actively shaped which treatment to receive for Chinese American and Haredi breast cancer patients in 2 studies.38,41 Many Chinese American breast cancer patients reported cultural pressure to receive modified radical mastectomy instead of breast-conserving surgery, even if the former procedure was not medically required, because breast-conserving surgery was seen as “vain” and oncologically less safe.41 The desire to adhere to religious law figured prominently in Haredi breast cancer patients’ decisions about what treatment to receive and when to receive it.38 Moreover, rabbis and cultural brokers served as sources of information for cultural norms and values for treatment decision-making and, for some patients, made the treatment decision.

Among these women, concerns about guilt, blame, and confidentiality and fears about a binding and disagreeable treatment decision were important in identifying which, if any, religious authority figure they would defer their treatment decision-making to.38 A study of African American men found that increased formal education compared with previous generations and changing cultural norms about medical treatment resulted in a new preference for allopathic medicine over root and folk medicine to treat cancer.40

In addition to influencing which treatments to receive, cultural norms shaped disclosure and others’ involvement. The cultural norm of collectivism—defined as a social, communal way of living characterized by mutual obligations and expectations within groups—played a positive role through the support and involvement of family and the faith community.35 However, it could also play an adverse role if family involvement was negative, leading to treatment delay and limited disclosure of the condition to the family.

Communication with the community. Four qualitative studies explored communication with the community during the cancer treatment decision-making process in minority populations.36,37,42,45 Fear of stigmatization influenced many patients not to disclose their cancer diagnosis to the community, which resulted in lack of community support.37,45 Many breast cancer patients reported little or no communication about their diagnosis and treatment with their neighbors36; however, communication with the community of cancer survivors was viewed as important.45

Decision-making as a collective experience. For Punjabi and African American breast cancer patients, the cancer diagnosis and treatment decision-making was viewed as a collective experience shared with their family, but most Punjabi and some African American patients kept the diagnosis secret from the community to avoid stigmatization.37,45 Because of their desire to adhere to Jewish law, Haredi breast cancer patients viewed treatment decision-making and the treatment experience as a collective experience shared within their religious community.38

Provider Factors

Providers’ preferences and recommendations. Five large
surveys confirm that providers’ recommendations were the most important positive influence on treatment decision-making overall.\textsuperscript{29–31,35,48} Conversely, the perceived absence of providers’ advocacy of a particular treatment was associated with reduced uptake of that treatment. In some studies, the strength of the provider’s advocacy varied by the patient’s ethnicity. For example, among breast cancer patients who had breast-conserving therapy but did not undergo radiation therapy, 67% of low-acculturated Latina patients, 69% of high-acculturated Latina patients, and 57% of White patients reported lack of provider recommendation as the reason.\textsuperscript{29} Compared with a recommendation that radiation was optional, providers’ indication that radiation was necessary was significantly associated with receipt of radiation therapy (OR = 8.05; 95% CI = 4.04, 16.03). Providers’ indication that it was unnecessary (or no indication) was significantly associated with nonreceipt of radiation (OR = 0.09; 95% CI = 0.04, 0.19). In another large survey, racial differences in the operation type appeared to be related to perceived communication content.\textsuperscript{30} Compared with Whites, African American breast cancer patients reported that surgeons placed less emphasis on breast-conserving therapy. These patients in turn were more likely to opt for mastectomy over breast-conserving therapy. Notably, abdicating the decision-making role to providers was also associated with the highest rates of decisional regret and dissatisfaction.\textsuperscript{31}

Five qualitative studies underscored the perceived importance of displaying respect for the providers’ status as an authority figure across racial and ethnic groups.\textsuperscript{36,39,41,43,47} In a study of patients with advanced lung cancer, African American patients were more likely than Whites to follow providers’ recommendations even when in conflict with the family.\textsuperscript{47} The authors interpreted higher compliance among minority patients as a sign of reduced agency and fewer advocates within the hospital and health care system. Similarly, in studies of Asian women with breast cancer, patients often consented to the provider-recommended treatment even when it was in conflict with personal or community values.\textsuperscript{36,41}

Provider communication and information giving. Provider communication permeated nearly all aspects of the decision-making process. Three quantitative studies reported on dimensions of communication that went beyond simple information giving. Compared with White women with breast cancer, African American women in a population-based survey reported less optimal engagement from their surgeons about their desires and expectations for surgery, leading to more decisional uncertainty.\textsuperscript{30} These findings were confirmed and extended by another study of White, Latina, and African American women\textsuperscript{32} that found that interactive information giving on the part of the surgeon was associated with higher odds of knowledge (OR = 1.15; 95% CI = 1.03, 1.27), lower odds of delay in treatment (OR = 0.81; 95% CI = 0.72, 0.91), and higher odds of breast-conserving therapy (OR = 1.18; 95% CI = 1.05, 1.31). Racial/ethnic differences in knowledge and use of breast-conserving therapy disappeared after adjustment for provider communication style. Finally, a survey of African American and White men with prostate cancer\textsuperscript{35} found that African American men were 4 times more likely to report poor communication with their providers (OR = 3.95; 95% CI = 1.52, 10.30), and this in turn was highly associated with nonreceipt of treatment (OR = 5.77; 95% CI = 1.88, 11.46).

Eight qualitative studies explored the effect of provider communication on the cancer treatment decision-making process.\textsuperscript{36,39,41–46} Across studies, the theme of needing more provider time, individualized attention, and culturally sensitive communication was commonly iterated. Study participants indicated that provider-based decision-making was acceptable provided the providers’ rationale was clearly explained to them.\textsuperscript{43–45} Patients wanted informative communication that included both elicitation of their values and guidance for treatment.

Supportive communication from the provider was as important for treatment adherence as informative communication. In a study comparing Latina and White women with ductal carcinoma in situ, Latinas consistently reported more distress than White women, which was alleviated when providers were sensitive to their emotional needs.\textsuperscript{43} Participants were dissatisfied when providers did not provide supportive communication and highly appreciative when it was provided.\textsuperscript{30}

Conflict and cultural congruence in the patient–provider relationship. Three qualitative studies\textsuperscript{41,42,44} discussed conflict related to the presence or absence of cultural congruence (defined as cultural diversity, awareness, sensitivity, and competence) at the level of the health care provider.\textsuperscript{49} In some instances, the cultural focus was SES, as in a study of African American breast cancer patients who reported that class and education were important determinants in how providers treated them.\textsuperscript{42} They felt that they had to advocate in the clinical encounter to be treated well by the clinician. In other instances, language barriers contributed to culturally incongruent interactions. For example, Latina women reported that the lack of supportive communication, language barriers, and otherwise incongruent interactions made them fearful of asking questions and leaving the decision to the provider.\textsuperscript{44} Patients who perceived that providers did not respect their choices, fears, or beliefs lost faith in their providers and considered nondisclosure to treatment recommendations.\textsuperscript{41}

\textbf{DISCUSSION}

We reviewed a broad array of studies examining treatment decision-making among racial/ethnic minorities with cancer and found several commonalities across studies. Common themes fit into multiple categories, including treatment decision-making process, individual patient factors, factors related to family and important others, community factors, and provider factors. Thematic data overlapped categories substantially, indicating that individuals’ perceptions and preferences for medical decision-making cannot be authentically examined outside the context of family and community—and that this may be especially so among ethnic minority patients. In addition, the SDM process is operationalized during communication between the patient and the provider. Thus, the important linkages between themes were social support, communication, and cultural congruence.
Social Support

Social support was generally provided by spouse and family but could also include friends, community members, and members or leaders of a religious community. Although several studies noted that social support had the potential of reducing individual autonomy and contributing to nonreceipt of treatment, strong social support more commonly resulted in decision-making for more aggressive treatment. These findings are supported across other diseases and have been expanded by studies indicating that providers are more likely to recommend more aggressive treatment when they perceive strong social support. In fact, the presence of strong social support was associated robustly with improved cancer survival, suggesting that social support may be an appropriate area for intervention in a patient-centered approach to cancer care.

Communication

Among cancer patients, effective provider communication was associated with improved psychological outcomes (e.g., reduced anxiety, improved psychological adjustment to diagnosis), quality of life, and physiological functioning. As well as significantly increased adherence to treatment recommendations. Despite these benefits, we found that cancer patients continued to have high rates of unmet communication needs from their providers, and these unmet needs were amplified among racial/ethnic minority patients. Our findings are supported by the few studies conducted on provider communication with indigent patients worldwide, which identify significant challenges and a high prevalence of miscommunication.

Challenges to communication include different communication styles, different medical belief models, language barriers, lack of provider skills in cross-cultural communication, lack of patients’ control, lack of providers’ knowledge of indigenous culture and history, distrust of providers and the health care system, lack of a personal relationship between the provider and patient, and an alienating health care environment. Cultural values and norms among racial/ethnic minority populations may have a significant impact on patient—provider communication, which warrants further investigation.

Cultural Congruence

We found that cultural congruence was primarily explored in terms of language among quantitative studies. Across studies, low-aculturated minority women reported less participation in and satisfaction with cancer treatment decision-making, which sometimes led to nonadherence to care. The qualitative studies were more likely to explore nuances of cultural competence and to offer examples of how providers might bridge cultural divides. Given that a culturally congruent approach to care has been associated with improved communication, less use of costly services (such as clinic vs emergency department), and better health outcomes, the case for understanding and strengthening cultural congruence among providers is strong. This is especially so among socially vulnerable minority patients, for whom family and community relationships are an important source of identity and support.

This systematic review was initially motivated by an inquiry into cancer treatment decision-making processes among AI/AN patients, but our search was limited by a dearth of relevant data. Although AI/AN groups have the lowest cancer rates among racial/ethnic minority populations in the United States, they also have the highest mortality and lowest 5-year survival rates after diagnosis. As with other racial/ethnic minority groups, differences in quality of treatment, delay in receipt of treatment, and lack of treatment likely play a significant role in cancer survival disparities and enhancing the patient—provider relationship and satisfaction with the treatment plan may play an important role in addressing these disparities. In our experience, traditional models of SDM may be inappropriate to AI/AN communities. The community and family play significant roles in health care decision-making for AI/AN patients. Moreover, miscommunication between health care providers and indigenous populations is pervasive and often unrecognized, with negative consequences for the clinical encounter and treatment adherence. Incorporating cultural and individual preferences into the treatment decision-making process may substantially improve cross-cultural communication between providers and AI/AN patients. The SDM model should therefore be extended beyond the traditional patient—physician dyad, especially among AI/AN cancer patients.

Our review has limitations that must be noted. First, as with any systematic review, our search may have been subject to publication bias. To mitigate this, we used comprehensive search terms, searched several large databases linked to different disciplines in which the topic is studied, and carefully reviewed the reference lists of included publications. However, it is possible that important data may not have been published or that papers may have been missed. Second, we included studies with a broad variety of racial and ethnic minority patients, which certainly cannot represent the experiences or perspectives of a single group. However, with a broad search we can understand common experiences and themes in cancer treatment decision-making among all minority patients. Furthermore, the findings of our review are limited by the available literature. Most of the studies included in our review were on breast cancer, based in the United States, and conducted among African Americans, which may limit the generalizability of the findings to other cancer sites, countries, and racial and ethnic minority groups. Because our review was motivated by treatment decision-making in AI/AN populations, the model needs to be applied and further refined in this group to enhance utility.

In spite of these limitations, we believe that the synthesized data present a compelling need to expand the SDM model beyond the traditional patient—provider dyad to other significant stakeholders, including the family, social supporters, and the minority community. Decision aids for treatment and screening decisions have been found to improve the decision-making process and further work is needed to develop such aids to include important stakeholders outside the patient—provider dyad. An extended, shared decision-making approach may be particularly appropriate among AI/ANs, who are at higher risk for nonadherence to cancer care and for cancer mortality than any other ethnic group in the United States. Although individual AI/ANs may choose not to reside
on reservation lands or not to participate in tribal activities. AI/ANs who are more strongly affiliated with traditional native culture have been significantly less likely to be adherent to cancer-screening regimens. The sensitive inclusion of family members or tribal leaders in the cancer treatment decision process could facilitate communication and cultural congruence, and may ultimately have an impact on adherence to recommended cancer care.

**Human Participant Protection**

No protocol approval was required because no human participants were involved.

**References**


Methodological Reporting in Qualitative, Quantitative, and Mixed Methods Health Services Research Articles

Jennifer P. Wisdom, Mary A. Cavaleri, Anthony J. Onwueghuzie, and Carla A. Green

Objective. Methodologically sound mixed methods research can improve our understanding of health services by providing a more comprehensive picture of health services than either method can alone. This study describes the frequency of mixed methods in published health services research and compares the presence of methodological components indicative of rigorous approaches across mixed methods, qualitative, and quantitative articles.

Data Sources. All empirical articles \((n = 1,651)\) published between 2003 and 2007 from four top-ranked health services journals.

Study Design. All mixed methods articles \((n = 47)\) and random samples of qualitative and quantitative articles were evaluated to identify reporting of key components indicating rigor for each method, based on accepted standards for evaluating the quality of research reports (e.g., use of \(p\)-values in quantitative reports, description of context in qualitative reports, and integration in mixed method reports). We used chi-square tests to evaluate differences between article types for each component.

Principal Findings. Mixed methods articles comprised 2.85 percent \((n = 47)\) of empirical articles, quantitative articles 90.98 percent \((n = 1,502)\), and qualitative articles 6.18 percent \((n = 102)\). There was a statistically significant difference \(\chi^2(1) = 12.20, \ p = .0005, \text{ Cramer’s } V = 0.09, \text{ odds ratio } = 1.49 \ [95\% \text{ confidence interval } = 1.27, 1.74]\) in the proportion of quantitative methodological components present in mixed methods compared to quantitative papers (21.94 versus 47.07 percent, respectively) but no statistically significant difference \(\chi^2(1) = 0.02, \ p = .89, \text{ Cramer’s } V = 0.01\) in the proportion of qualitative methodological components in mixed methods compared to qualitative papers (21.34 versus 25.47 percent, respectively).

Conclusion. Few published health services research articles use mixed methods. The frequency of key methodological components is variable. Suggestions are provided to increase the transparency of mixed methods studies and the presence of key methodological components in published reports.

Key Words. Health services, research methodology, mixed methods, qualitative methods
As the health services research field continues to evolve, so too does its methods. Mixed methods research capitalizes on the strengths of both qualitative and quantitative methodologies by combining approaches in a single research study to increase the breadth and depth of understanding (Johnson, Onwuegbuzie, and Turner 2007). Mixed methods can be a better approach to research than either quantitative-only or qualitative-only methods when a single data source is not sufficient to understand the topic, when results need additional explanation, exploratory findings need to be generalized, or when the complexity of research objectives are best addressed with multiple phases or types of data (Brannen 1992; Creswell and Plano Clark 2011). Rigorous mixed methods approaches require that individual components (qualitative or quantitative) adhere to their respective established standards (Curry, Nemhhard, and Bradley 2009; Creswell and Plano Clark 2011). Despite recent guidelines on frameworks for conducting mixed methods research (e.g., Curry, Nemhhard, and Bradley 2009; Creswell and Plano Clark 2011), a critical challenge has been ensuring that reports from mixed methods studies transparently discuss the methodological components integral to the conduct of the studies. Health services researchers and reviewers need clear guidelines regarding research methodology, including methodological components that should be expected in mixed methods papers to indicate that they are sufficiently rigorous.

Mixed Methods in Health Services Research

Health services research is the study of how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to health care, the quality and cost of health care, and ultimately, health and well-being (Lohr and Steinwachs 2002). As a result of the breadth of topics addressed, health services research draws upon methods and concepts from many fields, including medicine, epidemiological and
economic studies, and the evaluation of services and interventions (Field, Tranquada, and Feasley 1995). Health services researchers increasingly work in interdisciplinary partnerships (e.g., Aboelela et al. 2007) and use innovative methods, including mixed methods, to more fully understand health services phenomena. Mixed methods approaches are also consistent with suggestions to extend scientific and contextual health knowledge beyond randomized trials (Berwick 2005).

Mixed methods research capitalizes on the strengths of both qualitative and quantitative methodology by combining both components in a single research study to increase breadth and depth of understanding (Johnson, Onwuegbuzie, and Turner 2007). Qualitative and quantitative methods can be integrated for different purposes to provide a more comprehensive picture of health services than either method can alone. Mixed methods are appropriate in the following situations: (1) when researchers would like to converge different methods or use one method to corroborate the findings from another about a single phenomenon (triangulation); (2) when researchers would like to use one method to elaborate, illustrate, enhance, or clarify the results from another method (complementarity); (3) when researchers would like to use results from one method to inform another method, such as in creating a measure (development); (4) when researchers would like to use one method to discover paradoxes and contradictions in findings from another method that can suggest reframing research questions (initiation); and (5) when researchers seek to expand the breadth and depth of the study by using different methods for different research components (expansion) (Greene, Caracelli, and Graham 1989). Bryman (2006) modified and expanded this list to add that mixed methods can also be useful in obtaining diversity of views, illustrating concepts, and developing instruments.

Quantitative and qualitative research can be distinguished by the philosophical assumptions brought to the study (e.g., deductive versus inductive), the types of research strategies (e.g., experiments versus case studies), and the specific research methods used in the study (e.g., structured survey versus observation) (Creswell 2008). Qualitative health services research, for example, is a method in which the researcher collects textual material derived from speech or observation and attempts to understand the phenomenon of interest in terms of the meanings people bring to them (Denzin and Lincoln 1994; Shortell 1999; Giacomini and Cook for the Evidence-Based Medicine Working Group 2000; Malterud 2001; Bradley, Curry, and Devers 2007). Certain characteristics are typical of qualitative research, including a naturalistic setting (as opposed to a laboratory), a focus on participants’
perspectives and their meaning, the outcome as a process rather than a product, and data collected as words or images (Padgett 2008).

**Guidelines for Conducting Mixed Methods Research**

The National Institutes of Health noted the need for rigor in combining qualitative and quantitative methods to study complex health issues in their recent publication, *Best Practices for Mixed Methods in Health Sciences* (Creswell, Klassen, Plano Clark, and Smith for the Office of Behavioral and Social Sciences Research 2011). There are several frameworks to guide the rigorous conduct and evaluation of mixed methods research (Collins, Onwuegbuzie, and Sutton 2006; Curry, Nemhard, and Bradley 2009; Tashakkori and Teddlie 2010; Creswell and Plano Clark 2011). Collectively, these frameworks recommend that the conduct of mixed method studies—and reports of mixed method research, including peer-reviewed publication—demonstrates explicit rationales for all decisions regarding study design, including the purpose of including both qualitative and quantitative methods. They specifically advise that each component (qualitative or quantitative) should be conducted with a level of rigor in accordance with established principles in its field, and that researchers be transparent in methodological reporting. For example, sampling design should be specified as identical, parallel, nested, or mixed (Onwuegbuzie and Collins 2007); the level of mixing methods (fully versus partially) should be described, as should time orientation (sequential or concurrent components of research) and emphasis (equal importance of methodological approaches or one more dominant) (Leech and Onwuegbuzie 2009).

Conducting and evaluating mixed methods research have unique methodological challenges, particularly related to rigor. Quantitative studies typically rely on quality criteria such as internal validity, generalizability, and reliability (Campbell 1957; Campbell and Stanley 1963; Messick 1989, 1995; Onwuegbuzie and Daniel 2002, 2004; Onwuegbuzie 2003), whereas qualitative studies have roughly comparable quality criteria of credibility, transferability, and dependability (Lincoln and Guba 1985; Guba and Lincoln 1989; Miles and Huberman 1994; Maxwell 2005; Pope and Mays 2006). For example, questions asked when evaluating a qualitative study might include the following: “Were participants relevant to the research question and was their selection well reasoned?” and “Was the data collection comprehensive enough to support rich and robust descriptions of the observed events?” (Giacomini and Cook for the Evidence-Based Medicine Working Group 2000). In addition to determining whether methodological approaches unique to qualitative
or quantitative research were employed, an evaluation of a mixed methods study should assess aspects unique to mixed methods, such as how multiple components are integrated and how consistency and discrepancy between findings from each method are managed (Sale and Brazil 2004; O’Cathain, Murphy, and Nicholl 2007). Qualitative, quantitative, and mixed methodologists agree that study procedures should be reported transparently, including sufficient detail to allow the reader to make inferences about study quality (Lincoln and Guba 1985; Giacomini and Cook for the Evidence-based Medicine Working Group 2000; O’Cathain, Murphy, and Nicholl 2007; Armstrong et al. 2008; Creswell 2008; Curry, Nembhard, and Bradley 2009; Leech et al. 2009; Teddlie and Tashakkori 2009).

Several researchers have proposed specific techniques to assess the overall methodology of mixed methods research and assess the methodological components of the qualitative, quantitative, and mixed portions of the studies (e.g., Pluye et al. 2009; O’Cathain 2010; Tashakkori and Teddlie 2010; Creswell and Plano Clark 2011; Leech, Onwuegbuzie, and Combs 2011). For example, O’Cathain (2010) assessed quality of mixed methods research by evaluating transparency and clarity in reporting planning, design, data, interpretive rigor, inference transferability, reporting quality, synthesizability, and utility. Others have suggested alternative methods for assessing quality, but criteria often are not elucidated or are vague. Further, those frameworks typically address quality of the study design as opposed to the characteristics provided in the published article. By contrast, Sale and Brazil (2004) proposed a structured framework for the evaluation of mixed methods publications by identifying key methodological components that should be included for both qualitative and quantitative portions of studies. Despite these advances, we found few published accounts of the rigor of published mixed methods research. Our article has three specific research questions: (1) How has the frequency of mixed methods studies published in health services journals changed over time? (2) How are mixed methods articles being used to elucidate health services? and (3) To what extent do mixed methods reports differ in methodological content compared to qualitative-only or quantitative-only articles?

METHOD

This systematic review assessed the frequency of mixed methods publications in top health services research journals and compared the frequency of key methodological components in qualitative, quantitative, and mixed method
studies. We first reviewed articles in health services research journals to determine the prevalence of mixed methods designs and the presence of key methodological components. Then, we conducted statistical analyses of trends over time in the frequency of mixed methods articles and in the presence of key methodological components of those articles. Because this was an analysis of published data, no ethical oversight was required.

**Identification of Mixed Methods Articles**

We examined four journals: *Health Affairs, Health Services Research, Medical Care,* and *Milbank Quarterly,* which had 5-year impact factors of 2.94–4.71. Journals were selected by reviewing the Institute for Scientific Information (2007) rankings for the top 10 journals in health care sciences and services. Of these 10, we included all journals that focused generally on health services research and excluded journals with narrower foci (*Value in Health, Journal of Health Economics, Journal of Pain and Symptom Management, Statistical Methods in Medical Research, Quality and Safety in Health Care,* and *Quality of Life Research*). Although 2001 marked a turning point in the proliferation of mixed methods studies published in major electronic bibliographic databases such as PubMED (Collins, Onwuegbuzie, and Jiao 2007), we chose to examine articles from 2003 to 2007 because 2003 marks publication of the first edition of Tashakkori and Teddlie’s landmark *Handbook of Mixed Methods in Social and Behavioral Research,* which provided the first comprehensive collection of mixed method theory, methodology, and application. Five years represents a sufficient period of time to examine trends of published articles following the publication of a landmark methodological work.

We reviewed empirical articles to determine whether each represented a quantitative, qualitative, or mixed methods study. This entailed using all the information presented in the abstract and the body of the article to identify the research design either as stated or implied by the author(s). We excluded non-empirical articles (book reviews, literature reviews, commentaries and opinion articles, letters to the editor, policy statements) and articles from a special issue of *Milbank Quarterly* (Volume 83, Number 4) that included only articles published between 1932 and 1998.

We classified articles as quantitative if they included (1) a primary goal of testing theories or hypotheses about relationships between/among variables, or (2) quantitative data and methodology, such as hierarchical linear modeling, multiple regression, or Markov modeling. We classified articles as qualitative if they included either (1) a primary goal of exploring or under-
standing the meaning ascribed to a specific phenomenon or experience, or (2) qualitative data such as observations, unstructured or semi-structured interviews, or focus group interviews or methodologies such as thematic analysis. Although more complex definitions of mixed method studies exist (e.g., Johnson, Onwuegbuzie, and Turner 2007; Creswell and Plano Clark 2011), we classified articles as mixed methods if they integrated or combined both quantitative and qualitative methods in a single study (Sale and Brazil 2004). This definition reflects the general definitions of mixed methods and the lack of consensus on a specific definition across all multidisciplinary mixed methods researchers.

We used spreadsheets to track classifications, with cells containing articles’ abstracts and our field notes. Two authors read and classified articles in batches of 50 according to type, conferring as needed until agreement was achieved \( (n = 300 \text{ articles}) \); the remaining articles \( (n = 1,351) \) were each coded by one author. For the few articles for which methodology was ambiguous \( (n = 58, 3.5 \% \text{ of all empirical articles}) \), classification was resolved in consultation with a third author. Similar methods have been used in other evaluations of mixed methods articles (Powell et al. 2008).

**Assessments of Articles**

We identified all mixed methods articles \( (n = 47) \) and equal random samples \( (n = 47) \) of quantitative articles (from 1,502 articles) and qualitative articles (from 102 articles) \( (\text{total} n = 141) \) in the four journals. Random samples of qualitative and quantitative articles were selected using a random number generator and did not adjust for journal or year. We assessed the frequency of key methodological components reported across articles, then compared rates by article type. The methodological components we focused on were drawn from two conceptual frameworks. The first included Sale and Brazil’s (2004) criteria: (1) internal validity for quantitative findings and credibility for qualitative findings, (2) external validity for quantitative findings and transferability or fittingness for qualitative findings, (3) reliability for quantitative findings and dependability for qualitative findings, and (4) objectivity for quantitative findings and confirmability for qualitative findings (specific criteria are listed in Table 3). The second was O’Cathain’s transparency criteria for mixed methods studies (O’Cathain, Murphy, and Nicholl 2007; O’Cathain 2010), which specify that mixed methods studies should state the (1) priority of methods (primarily quantitative, primarily qualitative, or equal priority), (2) purpose of mixing methods (e.g., triangulation, complementarity, initiation,
development, or expansion), (3) sequence of methods (qualitative first, quantitative first, or simultaneous), and (4) stage of integration of both types of data (e.g., data collection, analysis, interpretation). We assessed four additional components of mixed methods studies: (1) whether qualitative and quantitative components were integrated, (2) whether limitations of design were detailed, (3) whether areas of consistency between qualitative and quantitative components were elucidated, and (4) whether areas of inconsistency between components were described.

We assessed components using categories of 0 (not described), 1 (described), or not applicable (e.g., for criteria referencing control groups in a study that had none, or ethical review for a study with no human subjects data) (O’Cathain, Murphy, and Nicholl 2007). We identified only whether the study contained or did not contain each methodological component and did not attempt to assess quality or appropriateness of each component within the context of the study. For example, we assessed whether the publication stated that missing data were addressed but not whether the methods to address missing data were the best methods for that particular research design. Similar to initial article classification, two authors read and coded articles to assess presence/absence of each criterion, with any ambiguity resolved in consultation with a third author.

Quantitative Analyses of Trends and Rigor

Once all articles were coded, we conducted a statistical analysis to determine whether there were trends over time in the prevalence of mixed methods articles. To assess this, we used linear regression to test the hypothesis that there would be an increase in the prevalence of the number of mixed methods articles over time. We also conducted chi-square tests to assess differences between mixed methods, qualitative, and quantitative articles on both quantitative and qualitative criteria. We tested whether each criterion was present in the same proportion of quantitative studies as in the quantitative portion of the mixed methods studies and in the same proportion of qualitative studies as in the qualitative portion of the mixed methods studies.

RESULTS

In general, coders could easily categorize the type of study. Challenges arose when transparency about methods was inadequate ($N = 58$, 3.5 percent of all
empirical articles). For example, some papers indicated that data from inter-
views were included but did not provide details about who was interviewed,
what was asked in the interviews, how the interview data were analyzed, or
how the interview data were integrated into the overall study.

**Research Question 1:** How has the frequency of mixed methods studies published
in health services journals changed over time?

Table 1 presents a summary of the types of articles published in four
major health services research journals from 2003 through 2007. Only 2.85
percent \( (n = 47) \) of empirical articles were mixed methods studies; 6.18 per-
cent \( (n = 102) \) of empirical studies represented qualitative research. Quantita-
tive research represented 90.98 percent \( (n = 1,502) \) of empirical articles. The
journal containing the highest proportion of empirical studies employing a
mixed methods design was *Milbank Quarterly* \( (8.33 \text{ percent}) \), followed by
*Health Affairs* \( (6.91 \text{ percent}) \), *Health Services Research* \( (4.03 \text{ percent}) \), and *Medical
Care* \( (0.78 \text{ percent}) \). Chi-square test showed a significant difference in these
proportions \( (\chi^2 = 34.67, df = 3, p < .0001) \).

To detect temporal trends in the frequency of mixed methods research
in the health services literature, articles were collapsed across journal and
examined by publication year. Table 2 presents the frequency of article type
for each of the 5 years. All journals combined published an average of 10.8
mixed method articles per year, or 3.27 percent of empirical articles annually.
A quadratic trend was seen across the 5 years \( (R^2 = 0.65) \), indicating a slight
increase in mixed method articles in the first 2 years and then a decrease for
the remaining years.

<table>
<thead>
<tr>
<th>Journal</th>
<th>Quant</th>
<th>Qual</th>
<th>Mixed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Affairs</td>
<td>305</td>
<td>49</td>
<td>21</td>
<td>375</td>
</tr>
<tr>
<td></td>
<td>81.33%</td>
<td>13.07%</td>
<td>5.60%</td>
<td></td>
</tr>
<tr>
<td>Health Services Research</td>
<td>428</td>
<td>26</td>
<td>17</td>
<td>471</td>
</tr>
<tr>
<td></td>
<td>90.87%</td>
<td>5.52%</td>
<td>3.61%</td>
<td></td>
</tr>
<tr>
<td>Medical Care</td>
<td>751</td>
<td>12</td>
<td>6</td>
<td>769</td>
</tr>
<tr>
<td></td>
<td>97.66%</td>
<td>1.56%</td>
<td>0.78%</td>
<td></td>
</tr>
<tr>
<td>Milbank Quarterly</td>
<td>18</td>
<td>15</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>50.00%</td>
<td>41.67%</td>
<td>8.33%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,502</td>
<td>102</td>
<td>47</td>
<td>1,651</td>
</tr>
<tr>
<td></td>
<td>90.98%</td>
<td>6.18%</td>
<td>2.85%</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Mixed, mixed method articles; Qual, qualitative articles; Quant, quantitative articles.
Research Question 2: How are mixed methods articles being used to elucidate health services research?

Mixed methods articles were categorized into four overlapping categories: Articles on organizational and individual decision making processes (n = 18 studies) combined qualitative interviews with quantitative administrative data analyses to assess decision making about processes or impediments to processes. Examples include a study of formulary adoption decisions (Dandrove, Hughes, and Shanley 2003) and states’ decisions to reduce Medicaid and other public program funding (Hoadley, Cunningham, and McHugh 2004).

Sixteen articles described outcomes or effects of policies or initiatives by combining administrative health record or performance data with interviews of health administrators, providers, or executives. Examples include papers describing outcomes of pay-for-performance changes to Medicaid (Felt-Lisk, Gimm, and Peterson 2007; Rosenthal et al. 2007) and hospital patient safety initiatives (Devers, Pham, and Liu 2004).

Thirteen measurement development articles employed mixed methods to create measurement tools to assess, for example, caregiver burden (Cousineau et al. 2003), patient activation (Hibbard et al. 2004), and the development of a Healthcare Effectiveness Data and Information Set (HEDIS) smoking measure (Pbert et al. 2003). These studies typically examined qualitative data from individual or focus group interviews first to inform creation and testing of a survey.

Table 2: Type and Design of Empirical Articles Published in Four Health Services Research Journals from 2003 to 2007, Data Presented by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Quant</th>
<th>Qual</th>
<th>Mixed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>260</td>
<td>21</td>
<td>7</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>90.28%</td>
<td>7.29%</td>
<td>2.43%</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>295</td>
<td>18</td>
<td>13</td>
<td>326</td>
</tr>
<tr>
<td></td>
<td>90.49%</td>
<td>5.52%</td>
<td>3.99%</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>282</td>
<td>17</td>
<td>8</td>
<td>307</td>
</tr>
<tr>
<td></td>
<td>91.86%</td>
<td>5.54%</td>
<td>2.61%</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>321</td>
<td>25</td>
<td>10</td>
<td>356</td>
</tr>
<tr>
<td></td>
<td>90.17%</td>
<td>7.02%</td>
<td>2.81%</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>344</td>
<td>21</td>
<td>9</td>
<td>374</td>
</tr>
<tr>
<td></td>
<td>91.98%</td>
<td>5.61%</td>
<td>2.41%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,502</td>
<td>102</td>
<td>47</td>
<td>1,651</td>
</tr>
<tr>
<td></td>
<td>90.98%</td>
<td>6.18%</td>
<td>2.85%</td>
<td></td>
</tr>
</tbody>
</table>

Note. Mixed, mixed method articles; Qual, qualitative articles; Quant, quantitative articles.
Articles on experiences and perceptions were the least common category \((n = 8)\), typically combining surveys and interviews. These included family physicians’ perceptions of the effect of medication samples on their prescribing practices (Hall, Tett, and Nissen 2006); caregivers’ experiences of the termination of home health care for stroke patients (Levine et al. 2006); and consumer enrollment experiences in the Cash and Counseling program (Schore, Foster, and Phillips 2007).

Only five mixed methods articles (10.64 percent) of the total mixed methods sample used the terms “mixed method” or “multimethod” in the abstract or text, although four articles (8.51 percent) referred to “qualitative and quantitative” data.

Research Question 3: Do mixed methods articles report qualitative and quantitative methodology differently than methodology is reported in qualitative-only or quantitative-only articles?

Table 3 presents a summary of the frequency of key methodological components present in quantitative articles, qualitative articles, and mixed methods articles (each \(n = 47\)). For quantitative methodological components (32 items), mixed methods articles \((M = 7.02 [21.94 \text{ percent}], \ SD = 6.24)\) averaged statistically significantly fewer \((t(92) = -4.50, p < .00001, \text{Cohen’s } d \text{ effect size} = 0.93)\) components than did quantitative articles \((M = 15.06 [47.07 \text{ percent}], \ SD = 10.53)\). For qualitative methodological components (35 items), mixed methods articles \((M = 7.17 [21.34 \text{ percent}], \ SD = 6.36)\) did not average a statistically significantly different proportion of components \((t(92) = -1.10, p = .14, \text{ } d = 0.23)\) than did qualitative articles \((M = 8.91 [25.47 \text{ percent}], \ SD = 8.83)\). No article met all criteria, and no criterion was met by all articles. For comparative analyses at a statistical significance level of \(\alpha = 0.05\), power to detect a medium difference (Cohen’s \(h = 0.50\)) and a large difference (Cohen’s \(h = 0.80\)) was 78 and 99 percent, respectively.

Of quantitative components, mixed methods studies were most likely to describe sources of data and data collection instruments (61.70 percent of studies), state the purpose/objective of the paper (59.57 percent), state the source of subjects (58.70 percent), and define/describe the study population (51.06 percent). Most mixed methods studies did not include control and intervention groups, which excluded related criteria. Quantitative studies tended to contain more key methodological components, with more than 90 percent of studies defining outcome measures (93.48 percent), defining/describing study population (91.49 percent), describing statistical procedures (95.74 percent), and stating hypotheses (97.87 percent). Quantitative studies were more likely than the quantitative portion of mixed methods studies to describe study characteristics.
Table 3: Key Methodological Components in Mixed Methods, Quantitative, and Qualitative Health Services Research Articles

<table>
<thead>
<tr>
<th>Key quantitative methodological components</th>
<th>Mixed Method Studies (n = 47)</th>
<th>Quantitative Studies (n = 47)</th>
<th>Qualitative Studies (n = 47)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Ethical review undertaken</td>
<td>9</td>
<td>37</td>
<td>1</td>
</tr>
<tr>
<td>Informed consent stated</td>
<td>5</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Identifying or controlling for extraneous/confounding variables***</td>
<td>7</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Confidentiality protected</td>
<td>3</td>
<td>42</td>
<td>2</td>
</tr>
<tr>
<td>Comparability of control to intervention groups at baseline</td>
<td>0</td>
<td>0</td>
<td>47</td>
</tr>
<tr>
<td>Control/comparison groups treated similarly</td>
<td>7</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Outcome measures defined</td>
<td>7</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Control/comparison group described</td>
<td>2</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Data collection instruments/source of data described***</td>
<td>29</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Statement of purpose/objective**</td>
<td>28</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Source of subjects stated (sampling frame)**</td>
<td>27</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Study population defined or described***</td>
<td>24</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Source of control/comparison group stated</td>
<td>1</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>Selection of control/comparison group described</td>
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<td>1</td>
<td>45</td>
</tr>
<tr>
<td>Data gathering procedures described*</td>
<td>23</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

continued
Table 3.  Continued

<table>
<thead>
<tr>
<th>Description of setting/conditions under which data collected*</th>
<th>Mixed Method Studies (n = 47)</th>
<th>Quantitative Studies (n = 47)</th>
<th>Qualitative Studies (n = 47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>% with Component†</td>
</tr>
<tr>
<td>---------</td>
<td>-----</td>
<td>-----</td>
<td>-----------------</td>
</tr>
<tr>
<td>Description of setting/conditions under which data collected*</td>
<td>22 24 1 47.83</td>
<td>32 15 0 68.09</td>
<td></td>
</tr>
<tr>
<td>Statistical procedures referenced or described***</td>
<td>19 28 0 40.43</td>
<td>45 2 0 95.74</td>
<td></td>
</tr>
<tr>
<td>Subject recruitment or sampling selection described***</td>
<td>17 30 0 36.17</td>
<td>35 12 0 74.47</td>
<td></td>
</tr>
<tr>
<td>Statement about nonrespondents, dropouts, deaths</td>
<td>16 31 0 34.04</td>
<td>21 25 1 45.65</td>
<td></td>
</tr>
<tr>
<td>p-Values stated***</td>
<td>16 31 0 34.04</td>
<td>41 6 0 87.23</td>
<td></td>
</tr>
<tr>
<td>Both statistical and clinical significance acknowledged***</td>
<td>13 34 0 27.66</td>
<td>41 6 0 87.23</td>
<td></td>
</tr>
<tr>
<td>Study design stated explicitly**</td>
<td>11 36 0 23.40</td>
<td>26 21 0 55.32</td>
<td></td>
</tr>
<tr>
<td>Inclusion/exclusion criteria stated explicitly***</td>
<td>10 36 1 21.74</td>
<td>28 19 0 59.57</td>
<td></td>
</tr>
<tr>
<td>Missing data addressed</td>
<td>10 37 0 21.28</td>
<td>18 29 0 38.30</td>
<td></td>
</tr>
<tr>
<td>At least one hypothesis stated*</td>
<td>10 37 0 21.28</td>
<td>23 24 0 48.94</td>
<td></td>
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Note. *p < .05; **p < .01; ***p < .001.
†Percent with quality indicator is calculated as \( n(\text{yes})/n - n(\text{n/a}) \).
(e.g., study design, subject recruitment), identify or control for confounding variables, provide probability values or confidence intervals, state hypotheses, or acknowledge both statistical and clinical significance (see Table 3).

For qualitative methodological components, mixed methods studies were most likely to state the purpose/objective of the paper (72.34 percent), triangulate qualitative sources (e.g., use both individual and focus group interviews; 53.19 percent), and describe data-gathering procedures (53.19 percent). More than 50 percent of qualitative studies triangulated qualitative sources (57.45 percent), stated the purpose/objective of the paper (57.45 percent), and described the study setting (80.43 percent), how the setting was selected (63.04 percent), the participants (55.56 percent), and data-gathering procedures (76.60 percent). Qualitative studies were more likely than the qualitative portions of the mixed methods studies to describe the study setting, justify the sampling strategy, participants, and data-gathering procedures.

For criteria regarding method integration, few authors justified the use of mixed methods or clearly described the priority, purpose, and sequence of methods, and the stage of integration. Most articles, however, integrated qualitative and quantitative components (85.11 percent); examination of articles indicated components were most frequently integrated in the interpretation phase. Across all studies, few articles stated that informed consent was obtained, ethical review was undertaken, or that subjects’ confidentiality was protected.

**DISCUSSION**

Previous reports indicate mixed methods articles comprised <1 percent of empirical health articles examined in 2000 (McKibbon and Gadd 2004). Since then, however, the National Institutes of Health has increased funding for mixed methods research, with the proportion of funded research projects up to 5 percent of studies in some institutes (Plano Clark 2010). In the United Kingdom, the proportion of funded research that uses mixed methods is at 17 percent and continuing to increase (O’Cathain, Murphy, and Nicholl 2007). We found that the use of mixed methods in articles published in top health services research journals was generally consistent between 2003 and 2007 at approximately 3 percent of all empirical articles, lower than would be expected given the complexity and depth of health services research questions for which mixed methods would be appropriate. The presence of key methodological components was variable across type of article, but the quantitative
portion of mixed methods articles included consistently fewer methodological components than quantitative-only studies and the qualitative portion of mixed methods articles included about the same proportion of methodological components as qualitative-only articles. Mixed methods articles also generally did not address the priority, purpose, and sequence of methods or the integration of methods as suggested by experts in mixed methods (e.g., Creswell and Tashakkori 2008; O’Cathain 2010; Creswell and Plano Clark 2011).

Key methodological components that cut across qualitative and quantitative methodologies were often missing from mixed methods publications. Descriptions of sample selection and sampling procedures, the study context, and data-gathering procedures are essential aspects of interpreting study findings, and mixed methods studies should not be exempt from these basic research requirements. Many mixed methods studies did not include the level of detail that would likely be required for a qualitative or quantitative paper to be accepted in these high-ranking journals. Further, the studies appeared not to follow available guidance on the structure and components of mixed methods studies that discuss basic quality criteria, data collection strategies, methods of data analysis, procedures for integration of methods, processes of making inferences from text, and recommendations for adequate reporting of results (e.g., Giacomini and Cook for the Evidence-based Medicine Working Group 2000; Curry, Nembhard, and Bradley 2009; O’Cathain 2010; Tashakkori and Teddlie 2010; Creswell and Plano Clark 2011). In some ways this finding is not surprising because guidance on mixed methods standards is still emerging. We expect that the National Institutes of Health publication, Best Practices for Mixed Methods in Health Sciences (Creswell, Klassen, Plano Clark, and Smith for the Office of Behavioral and Social Science Research) will lead to increased standardization of mixed methods approaches.

Although they reported more key methodological components on average than the mixed methods articles, quantitative articles in this analysis had some surprising gaps as well, including low reporting of power analyses, how missing data were addressed, and descriptions of control/comparison groups. It should be noted, however, that quantitative articles with large sample sizes do not necessarily need power analyses. With regard to single-method qualitative articles, low proportions described the study context, coding techniques, or data analysis. Few articles with human subjects involvement included statements that the research was conducted with ethical oversight, promised confidentiality, or obtained consent. These findings suggest that the issue of poor transparency in reporting methodology is not limited to mixed methods studies.
**Recommendations for Mixed Methods Reporting**

The methodological components reported here are not optimal indicators of the quality of mixed methods publications; an article could conceivably have all of these components and yet still be a poor research study. These components are, however, a useful starting point for a systematic evaluation of the rigor of qualitative and quantitative portions of mixed methods studies. Some journals require inclusion of other criteria (e.g., Consolidated Standards of Reporting Trials 2010) to guide reporting of highly structured methodologies (e.g., randomized clinical trials); it would be useful to examine researchers’ and editors’ perspectives on the validity of the methodological components in this study for mixed method publications. It is difficult, however, to identify measurable criteria that capture the breadth of study designs in health services. Further, determination of what indicators of rigor would be appropriate might reasonably vary by study design, topic, scope, and even journal, and qualified judgment is required to determine which criteria are appropriate for each study. These findings suggest mixed methods researchers should provide enough detail on methodology and methodological decisions to allow reviewers to judge quality.

Researchers face challenges writing and publishing mixed methods articles, including communicating with diverse audiences who are familiar with only one methodological approach (i.e., quantitative research or qualitative research), determining the most appropriate language and terminology to use, complying with journal word counts, and finding appropriate publishing outlets with reviewers who have expertise in mixed methods research techniques and who are not biased against mixed methods studies (Leech and Onwuegbuzie 2010; Leech, Onwuegbuzie, and Combs 2011). Our findings suggest that Sale and Brazil’s (2004) criteria and existing guidance on conducting mixed methods research (e.g., Collins, Onwuegbuzie, and Sutton 2006; Tashakkori and Teddlie 2010; Creswell and Plano Clark 2011) might be useful frameworks for health services researchers as they work to improve methodological rigor. Journal editors might also encourage the publication of mixed methods projects by (1) publishing guidelines for rigor in mixed methods articles (e.g., Sale and Brazil 2004), (2) identifying experienced reviewers who can provide competent and ethical reviews of mixed methods studies, and (3) requiring transparency of methods for all studies so that (4) rigor and quality can be can be assessed to the same extent they are in quantitative studies. These modifications might require (5) some flexibility in word count or allowance of online appendices to allow mixed methods researchers to describe...
fully and concisely both qualitative and quantitative components, methods for integrating findings, and appropriate details.

Limitations

In this study, assessment was limited to only published articles. We did not contact authors to determine specific study activities, and studies may have included methodological components (e.g., consenting) not reported in publications. We assessed only whether publications reported the methodological component, but we did not evaluate whether each component was fully and appropriately implemented in the research.

CONCLUSIONS

Mixed methods studies have utility in providing a more comprehensive picture of health services than either method can alone. Researchers who use mixed methods techniques should use rigorous methodologies in their mixed methods research designs and explicitly report key methodological components of those designs and methods in published articles. Similarly, journal editors who publish mixed methods research should provide guidance to reviewers of mixed methods articles to assess the quality of manuscripts, and they must be prepared to provide adequate space for authors to report the necessary methodological information. Frameworks are now available to guide both the design and evaluation of mixed methods research studies and published works. Whatever frameworks are used, it is essential that authors who engage in mixed methods research studies meet two primary goals (developed by the American Educational Research Association 2006): Mixed methods researchers should (1) conduct and report research that is warranted or defensible in terms of documenting evidence, substantiating results, and validating conclusions; and (2) ensure that the conduct of research is transparent in terms of clarifying the logic underpinning the inquiry.

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Disclosures: None.

Disclaimers: None.

REFERENCES


SUPPORTING INFORMATION

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Appendix SA1: Author Matrix.

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