AN INTRODUCTION TO MIXED METHODS STUDY DESIGN

Primafamed Conference

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Mixed methods

/ˈmikst ˈmeTHəd/

A process of research in which the researchers integrate qualitative and quantitative methods of data collection and analysis to best understand a research purpose.

“Our study employed a mixed methods research design.”

A MIXED METHODS INTERVENTION STUDY

Support Care Cancer
DOI 10.1007/s00520-014-2478-7

ORIGINAL ARTICLE

The impact of music therapy versus music medicine on psychological outcomes and pain in cancer patients: a mixed methods study

Joke Bradt · Noah Potvin · Amy Kesslick · Minjung Shim · Donna Radl · Emily Schriver · Edward J. Gracely · Lydia T. Komarnicky-Kocher

Received: 2 August 2014 / Accepted: 6 October 2014

Abstract
Purpose The purpose of this study was to compare the impact of music therapy (MT) versus music medicine (MM) interventions on psychological outcomes and pain in cancer patients and to enhance understanding of patients' experiences of these two types of music interventions.
Methods This study employed a mixed methods intervention design in which qualitative data were embedded within a randomized cross-over trial. Thirty-one adult cancer patients participated in two sessions that involved interactive music making with a music therapist (MT) and two sessions in which MT sessions. The qualitative data indicate that music improves symptom management, embodies hope for survival, and helps connect to a pre-illness self, but may also access memories of loss and trauma. MT sessions helped participants tap into inner resources such as playfulness and creativity. Interactive music making also allowed for emotional expression. Some participants preferred the familiarity and predictability of listening to pre-recorded music.
Conclusions The findings of this study advocate for the use of music in cancer care. Treatment benefits may depend on patient characteristics such as outlook on life and readiness

SUMMARY OF MUSIC THERAPY-MUSIC MEDICINE TRIAL (BRADT, 2015)

- **Purpose**: Mixed methods cross-over trial comparing music therapy with music medicine for cancer patients in academic hospital in US
- **Data collection**: quantitative measures of pain; qualitative semi-structured interview collection
- **Mixed methods analysis**: integrating report of treatment preference (quantitative) with reasons why liked one or the other (qualitative)

EXAMPLE OF INTEGRATING QUALITATIVE DATA INTO A TRIAL TO UNDERSTAND PATIENT EXPERIENCES

Table 4 Joint display of patient experiences per treatment benefits

Treatment benefits	Change in music therapy[a]	Change in music medicine[a]	Patient experiences
↑MT, ↓ MM	0.65 to 1.88	−0.11 to 0.38	• Emphasize the importance of therapeutic relationship and support by therapist • Enjoy the creative aspect of music making • Are hopeful for the future
↑MM, ↓ MT	−0.46 to 0.59	0.33 to 1.63	• Apprehensive about active music making • Prefer familiarity of pre-recorded music • Hesitant about exploring feelings related to cancer
↑MT, ↑ MM	0.61 to 1.07	0.73 to 1.37	• Strong conviction about the power of music to support and give hope • Use music for mental escape • Use music for emotional exploration and value processing of emotions with therapist
↓ MT, ↓ MM	−0.67 to −1.03	−0.52 to −1.06	• Hold little hope for the future • Music evokes sad and traumatic memories • Feel inadequate regarding music making and singing • Prefer aesthetics of original recordings

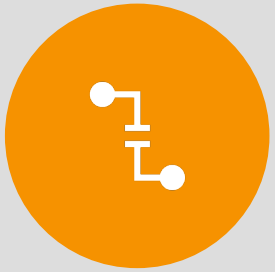
↑ great improvement, ↓ less improvement or worsening

[a] Range of overall *z*-scores (average of *z*-scores for mood, anxiety, relaxation, and pain)

Source: Bradt et al. (2014)

OVERVIEW

WHAT IS MIXED METHODS?



WHAT IS INTEGRATION?

HOW CAN I ACHIEVE MEANINGFUL INTEGRATION?

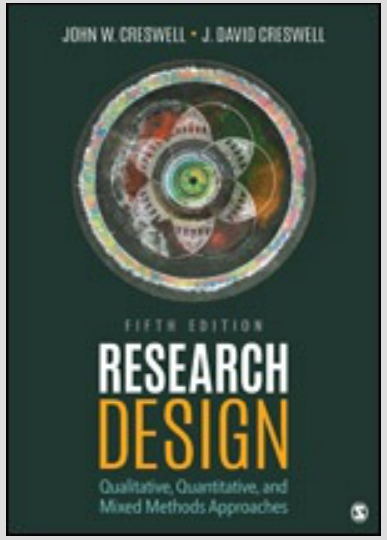
AN EXAMPLE STUDY

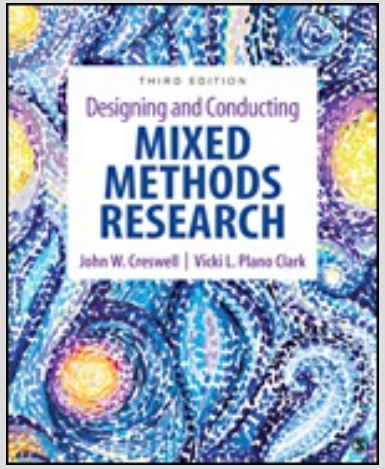
FIELDS USING MIXED METHODS

- Mix of fields represented among mixed methods researchers including:
  - Accounting
  - Agriculture
  - Business
  - Economics
  - Education
  - Evaluation
  - Health sciences
  - Leadership
  - Psychology
  - Sociology
  - Social work

WHAT IS THIS APPROACH CALLED?

- Multi-method
- Integrated
- Combined
- Quantitative and qualitative methods
- Multi-methodology
- Mixed methodology
- Mixed-method
- Mixed methods research





ABOUT ME

- 8 years as an program evaluator-health/human services programs, education
- Applied research methodologist
- Mixed methods research specialization – integration, intersecting qualitative designs, capacity building
- Empirical focus on communication and technology for health and education
- Associate Editor, Journal of Mixed Methods Research

WHAT IS MIXED METHODS?

MIXED METHODS

- A natural approach to decisions, inquiry, and research
- Qualitative and quantitative data are part of our every day lives

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17 reviews
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Central, Hong Kong Island
International Finance Centre Mall & Airport Express Hong Kong Station, 1 Harbour View Street
Hong Kong
+852 2332 3078

From the dining room puts you elbow-to-elbow with whoever happens to be sitting next to you, to the smells that waft from the kitchen window, to the conversations in at least a half dozen…

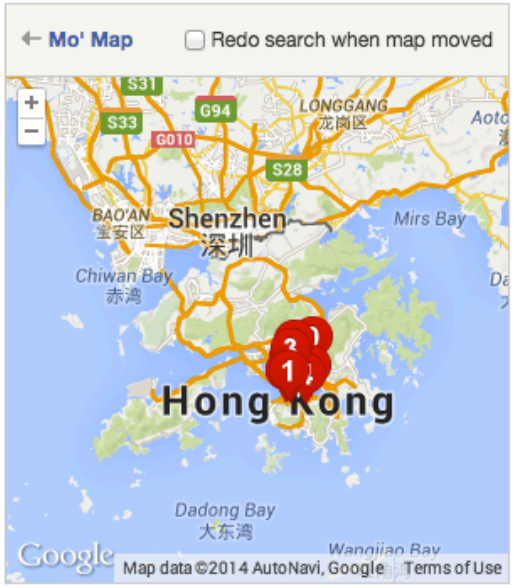
2. Lin Heung Tea House
蓮香樓
10 reviews
$$ · Cantonese, Dim Sum

Central, Hong Kong Island
G/F, 160-164, Wellington Street, Central, Hong Kong
Hong Kong
+852 2544 4556

Who would have thought that in the middle of central food market area, there is one world acclaimed restaurant that looks like it is decades old. It is Lin Heung Tea House, Lun Heung literally…

3. Tim Ho Wan, the Dim-Sum Specialists
添好運點心專門店
8 reviews
Dim Sum

Kowloon, Mong Kok, Olympic
Olympian City, 18 Hoi Ting Road
Hong Kong
+852 2332 2896



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Tim Ho Wan, the Dim-Sum Specialists

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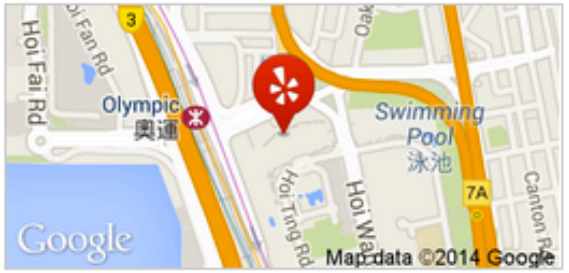

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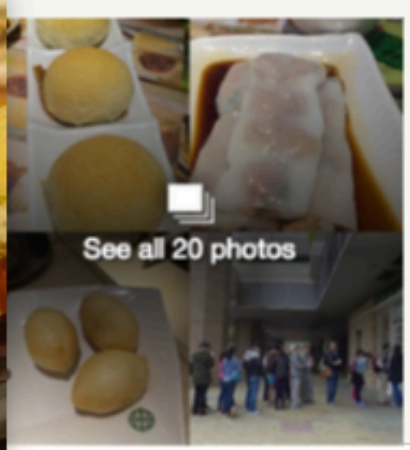

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Brandon N.
Redwood City, CA
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Paperback – June 1, 2006

by H. Douglas Brown (Author)

★★★★☆ 33 customer reviews

4 out of 5 stars

4.0 out of 5 stars

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4 star		8
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2 star		1
1 star		4

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"*This book is excellent for developing a solid foundation as a language teaching professional.*"
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n: 5th

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TS
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Principles of Language Learning and Teaching, Fifth Edition, by H. Douglas Brown, is the classic second language acquisition text used by teacher education programs worldwide. Principles introduces key concepts through definitions of terms, thought-provoking questions, charts, and

CHARACTERISTICS OF MIXED METHODS

Collect and analyze qualitative and quantitative data

Use rigorous qualitative and quantitative methods

Use a mixed methods design

Integrate the two forms of research

Use philosophy or theory as a lens

Creswell & Plano Clark, 2018

COLLECT AND ANALYZE QUANTITATIVE AND QUALITATIVE DATA

QUANTITATIVE (CLOSED-ENDED)

- Surveys
- Instruments
- Tests
- Observational checklists
- Reports with numbers

QUALITATIVE (OPEN-ENDED)

- Open-ended interviews
- Open-ended observations
- Documents
- Audio-visual materials (e.g. photos, videos)

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USE RIGOROUS QUALITATIVE AND QUANTITATIVE METHODS: THE INTENT OF THE RESEARCH

Qualitative

- Understand meaning that individuals give to a phenomenon inductively
- Learn participants views of a phenomenon

Quantitative

- Test a theory deductively to support or refute it
- Measure a phenomenon, construct or variable

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

QUALITATIVE AND QUANTITATIVE RESEARCH: HOW INTENT IS FOCUSED?

Qualitative

- Ask open-ended questions
- Understand the complexity of a single idea or phenomenon
- Develop a theory to explain a phenomenon

Quantitative

- Ask closed-ended questions
- Test for specific variables that form hypotheses or questions

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

QUALITATIVE AND QUANTITATIVE RESEARCH: HOW LITERATURE IS USED?

Qualitative

- Describe the justification of the problem
- Identify theory that informs the research

Quantitative

- Justifies the problem
- Identifies and supports questions and hypotheses

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

QUALITATIVE AND QUANTITATIVE RESEARCH: HOW DATA ARE COLLECTED?

Qualitative

- Words and images
- From a few participants in a few settings
- Studying participants in their own setting
- Following iterative procedures and processes

Quantitative

- Numerically
- From many participants often from many sites
- Sending or administering instruments to participants
- Following strict procedures and rigid processes

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

QUALITATIVE AND QUANTITATIVE RESEARCH: HOW DATA ARE ANALYZED?

Qualitative

- Text or image analysis
- Through development of themes
- Developing larger patterns or generalizations

Quantitative

- Numerical statistical analysis
- Rejecting hypotheses or determining effect size

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

QUALITATIVE AND QUANTITATIVE RESEARCH: ROLE OF RESEARCHER?

Qualitative

- Researcher is the instrument of data collection
- Identifies personal stance (personal inventory)
- Reports and uses biases

Quantitative

- Remains in background, often blinded
- Takes steps to remove or reduce bias

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

QUALITATIVE AND QUANTITATIVE RESEARCH: HOW DATA ARE VALIDATED?

Qualitative

- Procedures rely on the participants, researchers and/or readers
- Trustworthiness, verisimilitude

Quantitative

- Using validity procedures based on external standards such as judges, past research, statistics
- Validity, reliability

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

MATCHING RESEARCH PROBLEMS TO DESIGNS

QUANTITATIVE

- Experimental
- Quasi-experimental
- Correlational
- Survey
- Case control

QUALITATIVE

- Grounded theory
- Case study
- Narrative research
- Ethnography
- Phenomenology
- Qualitative descriptive

TYPES OF QUALITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What are features of a culture-sharing group?

Types of methods/designs

- Designs?
- Examples?

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

TYPES OF QUALITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem	Types of methods/designs
• What are features of a culture-sharing group?	• Ethnography • Japanese couples experiences and beliefs with the birthing process in the United States

Yoshioka T, Yeo S, Fetters MD. Experiences with epidural anesthesia of Japanese women who had childbirth in the United States. *J Anesth*, 26(3):326-33, 2012.

TYPES OF QUALITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- Need to generate a theory of a process

Types of methods/designs

- Design?
- Example?

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

TYPES OF QUALITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- Need to generate a theory of a process

Types of methods/designs

- Grounded theory
- Develop a testable theory for how domestic students became interested in engineering PhD programs

Howell-Smith, M. C. (2011). *Factors that facilitate or inhibit interest of domestic students in the engineering PhD: A mixed methods study.* (Dissertation), University of Nebraska.

TYPES OF QUALITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What is the story of a particular person?

Types of methods/designs

- Design?
- Example?

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

TYPES OF QUALITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What is the story of a particular person?

Types of methods/designs

- Narrative Research
- Life history, "The last Confederate Widow"

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

TYPES OF QUANTITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- Is a treatment effective?

Types of methods/designs

- Design?
- Examples?

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

TYPES OF QUANTITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem	Types of methods/designs
• Is a treatment effective?	• Experimental design, RCT • Comparison virtual vs. traditional learning • Effectiveness of a web-based educational program on cancer screening and screening rates

Creswell and Plano Clark, Designing and Conducting Mixed Methods Research, Sage, 2018, Chapter 2.

TYPES OF QUANTITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What factors influence an outcome?

Types of methods/designs

- Designs?
- Examples?

Creswell & Plano Clark, *Designing and Conducting Mixed Methods Research*, Sage, 2018 Chapter 2.

TYPES OF QUANTITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What factors influence an outcome?

Types of methods/designs

- Correlation design
- Comparison of individuals who do and do not go to university
- Correlation of socioeconomic status and health outcomes

Creswell & Plano Clark, *Designing and Conducting Mixed Methods Research*, Sage, 2018 Chapter 2.

TYPES OF QUANTITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What are specific trends in a broad population of study

Types of methods/designs

- Design?
- Example?

Creswell & Plano Clark, *Designing and Conducting Mixed Methods Research*, Sage, 2018 Chapter 2.

TYPES OF QUANTITATIVE RESEARCH PROBLEMS AND MATCHING METHODS/DESIGNS

Type of research problem

- What are specific trends in a broad population of study?

Types of methods/designs

- Survey
- Political opinion polls
- Stakeholder attitudes about a type of research

Legocki, L. J., Meurer, W. J., Frederiksen, S., Lewis, R. J., Durkalski, V. L., Berry, D. A., . . . Fetters, M. D. (2015). Clinical trialist perspectives on the ethics of adaptive clinical trials: A mixed-methods analysis. *BMC Medical Ethics, 16*(1), 27.

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Creswell & Plano Clark, 2018

USE A MIXED METHODS DESIGN

3 Core Designs

- Convergent
- Explanatory Sequential
- Exploratory Sequential

Numerous Complex Design

- Multistage
- Intervention
- Case Study
- Participatory – Community-Based Participatory Research, Transformative

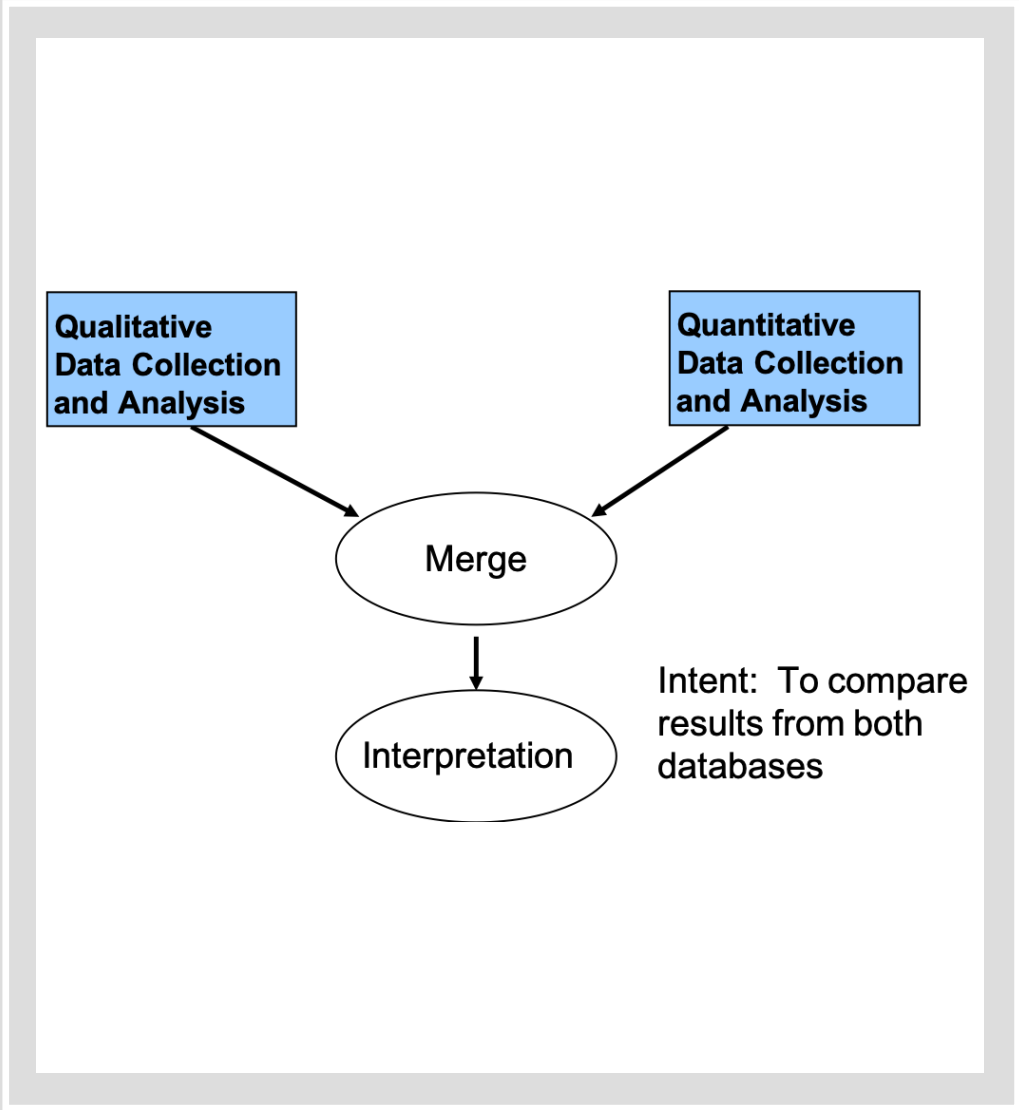
CONVERGENT DESIGN

Characteristics

- Collecting both quantitative and qualitative data in similar timeframe
  - 1) data collection and analysis occurs in *parallel* with merging after respective analyses
  - 2) data collection and analysis is *interactive* with analysis typically of one, eg, qualitative, informing data collection and analysis of the other, eg quantitative

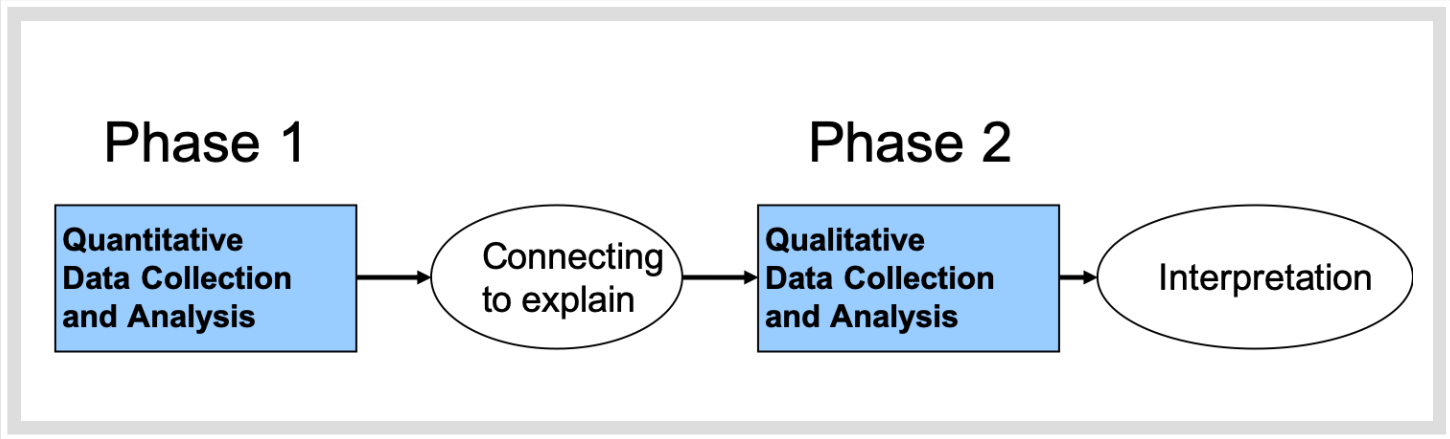
Applications

- To acquire quantitative (trends, large numbers, generalization) with qualitative (detail, small numbers, in-depth)
- To validate or explain quantitative findings with qualitative data collected contemporaneously
- When you want to expand your quantitative findings with some open-ended qualitative data (e.g., survey with closed- and open-ended data)



EXPLANATORY SEQUENTIAL DESIGN

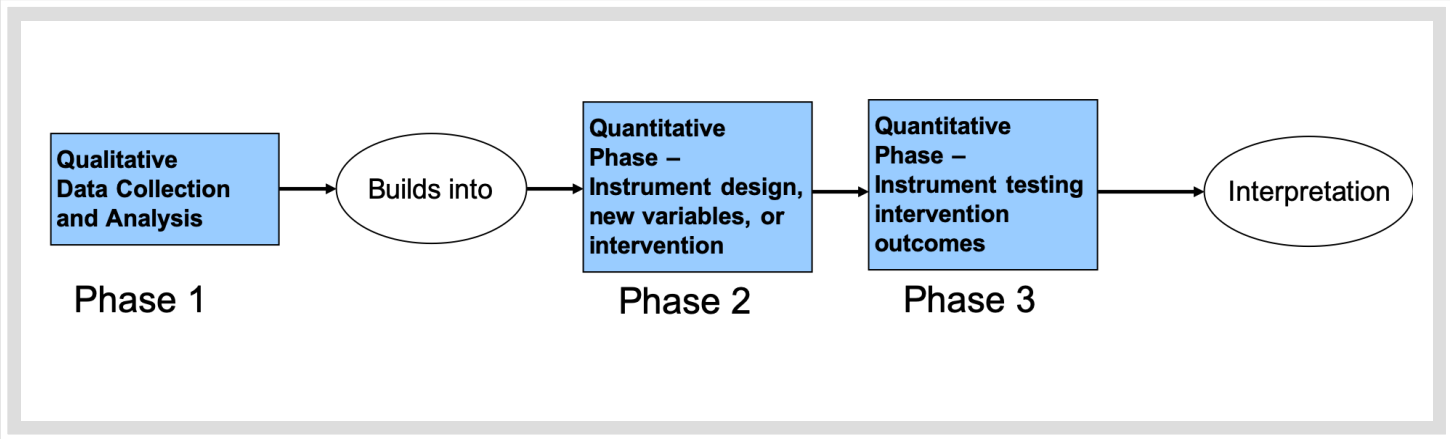
- Characteristics
  - Two-phase project
  - Collecting quantitative data first followed by collecting qualitative data second
- Applications
  - To explain the quantitative results in more depth with qualitative data (e.g., statistical differences among groups, individuals who scored at extreme levels)
  - To identify appropriate participants to study in more depth qualitatively



EXPLORATORY SEQUENTIAL DESIGN

- Characteristics
  - Two-phase project
  - Collecting qualitative data first followed by collecting quantitative data second

- Applications
  - To develop a classification or typology for testing quantitatively
  - To identify variables to study quantitatively when these variables are not known
  - To cognitively test instruments prior to a study
  - To develop a theory or model and then to test it later



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Creswell & Plano Clark, 2018

THE CHALLENGE OF INTEGRATION

- Integration: intentionally combining qualitative and quantitative research
- Meta-inferences: the result of synergy, new inferences from integrating the two forms

Editorial

The 1 + 1 = 3 Integration Challenge

Journal of Mixed Methods Research
2015, Vol. 9(2) 115–117

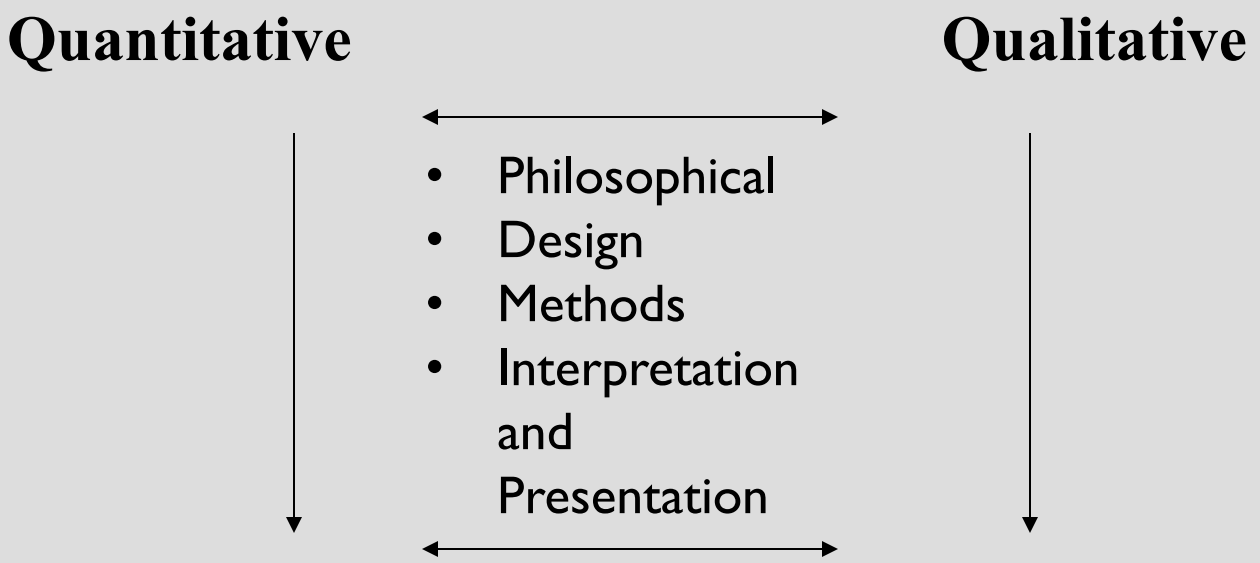
DOI: 10.1177/1558689815581222
mmr.sagepub.com
SAGE

Michael D. Fetters[1] and Dawn Freshwater[2]

INTEGRATION OF DATA

- Investigators intentionally integrate or combine the quantitative and qualitative data rather than keeping them separate
- Assumes integration leads to maximizing the strengths of the quantitative and qualitative data and minimizing their weaknesses

MIXED METHODS RESEARCH MEANS INTEGRATING QUANTITATIVE AND QUALITATIVE RESEARCH



INTEGRATION IS THE CENTRAL FEATURE OF MIXED METHODS RESEARCH

- Integration is mixed methods analysis
- Intentionally bringing together quantitative and qualitative research
  - **Merging** Results
  - **Connecting** data through sampling
  - **Building** one form of data collection based on the other
- Synergy - beyond what either alone could generate
  - New inferences
    - Ex. Treatment benefits + experiences
    - Ex. Program outcomes + process
  - One phase informs the other

Fetters, Curry, & Creswell, 2013

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Creswell & Plano Clark, 2018

USE PHILOSOPHY OR THEORY AS A LENS

- Guiding data collection and analysis
- Matching data sources to theoretical constructs
  - Quantitatively and qualitatively
  - Ensuring parallel concepts in qualitative and quantitative component
- Guiding integrative (i.e., mixed methods) analysis
- Philosophical worldviews (e.g., community-based participatory research)
  - Guiding the entire process of research

AN EXAMPLE STUDY

A MIXED METHODS STUDY - HEROIC

- **Background**: Risk-standardized survival after in-hospital cardiac arrest (IHCA) varies substantially (median, 23.7%; range, 9.2%-37.5%)
- **Purpose**: understand how top-performing hospitals organize their resuscitation teams to achieve high survival rates
- **Data sources**: quantitative registry data, qualitative interviews though site visits at US hospitals
- **Integration:** connecting using quantitative results to drive sampling and interview protocol

The study was supported by the National Institutes of Health:
5R01HL123980-03 and K01 LM012739-01

EXPLANATORY SEQUENTIAL DESIGN

Quantitative Phase

- n = 400 hospitals
- Registry data
- Predictors of risk adjusted survival

Aim 1: Identify top-performing hospitals in incidence and survival for IHCA

Connecting

Sampling: Maximal variation by performance tertile (high, middle, low) academic status, size

Data collection: developed interview protocol

Qualitative Phase

- n = 158 staff at 9 hospitals
- Interviews, observations
- Thematic analysis
- Type-building analysis

MM Interpretation

What distinguishes top versus bottom performing hospitals

TO READ MORE ABOUT THIS STUDY:

ORIGINAL RESEARCH

Nursing roles for in-hospital cardiac arrest response: higher versus lower performing hospitals

Timothy C Guetterman,[1,2] Joan E Kellenberg,[3] Sarah L Krein,[3,4] Molly Harrod,[5] Jessica Lehrich,[6] Theodore J Iwashyna,[3,5] Steven Kronick,[7] Saket Girotra,[8] Paul Chan,[9] Brahmajee K Nallamothu[2]

ABSTRACT

Background Good outcomes for in-hospital cardiac arrest (IHCA) depend on a skilled resuscitation team, prompt initiation of high-quality cardiopulmonary resuscitation and defibrillation, and organisational structures to support IHCA response. We examined the role of nurses in resuscitation, contrasting higher versus lower performing hospitals in IHCA survival.

Methods We conducted a descriptive qualitative study at nine hospitals in the American Heart Association's Get With The Guidelines-Resuscitation registry, purposefully sampling hospitals that varied in geography, academic status and risk-standardised IHCA survival. We conducted 158 semistructured interviews with nurses, physicians, respiratory therapists, pharmacists, quality improvement staff and administrators. Qualitative thematic text analysis followed by type-building text analysis identified distinct nursing roles in IHCA care and support for roles.

Results Nurses played three major roles in IHCA response: bedside first responder, resuscitation team member and clinical or administrative leader. We found distinctions between higher and lower performing hospitals in support for nurses. Higher performing hospitals emphasised training and competency of nurses at all levels; provided organisational flexibility and responsiveness with nursing roles; and empowered nurses to operate at a higher scope of clinical practice (eg, bedside defibrillation). Higher performing hospitals promoted nurses as leaders—administrators supporting nurses in resuscitation care at the institution, resuscitation team leaders during resuscitation and clinical champions for resuscitation care. Lower performing hospitals had more restrictive nurse roles with less emphasis on systematically identifying improvement needs.

Conclusion Hospitals that excelled in IHCA survival emphasised mentoring and empowering front-line nurses and ensured clinical competency and adequate nursing training for IHCA care. Though not proof of causation, nurses appear to be critical to effective IHCA response, and how to support their role to optimise outcomes warrants further investigation.

INTRODUCTION

Good clinical outcomes for in-hospital cardiac arrest (IHCA) depend on a highly skilled team, prompt initiation of high-quality cardiopulmonary resuscitation (CPR) and defibrillation, and an organisational structure that supports resuscitation care. Early initiation of CPR within 1 min, defibrillation within 2 min and epinephrine administration within 5 min have been linked to improved survival after IHCA.[1–3] However, wide variation in survival rates persists across hospitals[4 5] despite American Heart Association (AHA) guidelines supporting these interventions.[6] A likely reason is that implementation of the guidelines occurs in a complex hospital environment and requires the participation of multiple providers.[7 8] Yet, little empirical work to date has evaluated IHCA healthcare provider roles beyond that of physicians.

One of the most critical,[9–11] yet understudied, groups in improving IHCA outcomes is nurses. Nurses can improve resuscitation outcomes in multiple ways. First, bedside nurses are often the first providers to encounter an IHCA or identify a decompensating patient.[12] As first responders, they can initiate resuscitation in a timely manner, which has been linked to improved survival. Second, nurses are members of rapid response and resuscitation teams and lead the resuscitation team response prior to, and after, physicians arrive.[13] Third, nurses often serve as leaders in hospital quality improvement and patient safety efforts. Nursing leaders can also remove barriers to care and facilitate hospital-wide initiatives.[14] Nonetheless, despite nurses' essential involvement in resuscitation, a clear understanding of their diverse roles and ways in which hospitals could better support their participation to enhance resuscitation outcomes is lacking.

Accordingly, we used data previously collected from the Hospital Enhancement of Resuscitation Outcomes for In-Hospital

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bmjqs-2019-009487).

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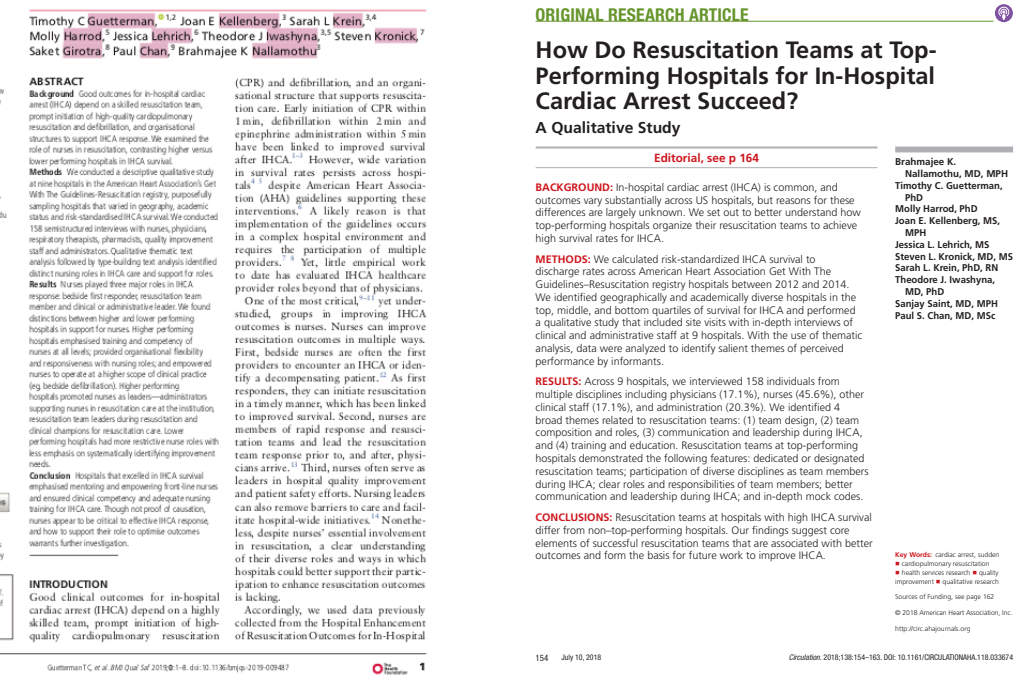
Received 22 February 2019
Revised 1 August 2019
Accepted 6 August 2019

To cite: Guetterman TC, Kellenberg JE, Krein SL, *et al*. *BMJ Qual Saf* Epub ahead of print: [please include Day Month Year]. doi:10.1136/bmjqs-2019-009487



Circulation

ORIGINAL RESEARCH ARTICLE

How Do Resuscitation Teams at Top-Performing Hospitals for In-Hospital Cardiac Arrest Succeed?

A Qualitative Study

Editorial, see p 164

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BACKGROUND: In-hospital cardiac arrest (IHCA) is common, and outcomes vary substantially across US hospitals, but reasons for these differences are largely unknown. We set out to better understand how top-performing hospitals organize their resuscitation teams to achieve high survival rates for IHCA.

METHODS: We calculated risk-standardized IHCA survival to discharge rates across American Heart Association Get With The Guidelines–Resuscitation registry hospitals between 2012 and 2014. We identified geographically and academically diverse hospitals in the top, middle, and bottom quartiles of survival for IHCA and performed a qualitative study that included site visits with in-depth interviews of clinical and administrative staff at 9 hospitals. With the use of thematic analysis, data were analyzed to identify salient themes of perceived performance by informants.

RESULTS: Across 9 hospitals, we interviewed 158 individuals from multiple disciplines including physicians (17.1%), nurses (45.6%), other clinical staff (17.1%), and administration (20.3%). We identified 4 broad themes related to resuscitation teams: (1) team design, (2) team composition and roles, (3) communication and leadership during IHCA, and (4) training and education. Resuscitation teams at top-performing hospitals demonstrated the following features: dedicated or designated resuscitation teams; participation of diverse disciplines as team members during IHCA; clear roles and responsibilities of team members; better communication and leadership during IHCA; and in-depth mock codes.

CONCLUSIONS: Resuscitation teams at hospitals with high IHCA survival differ from non–top-performing hospitals. Our findings suggest core elements of successful resuscitation teams that are associated with better outcomes and form the basis for future work to improve IHCA.

Key Words: cardiac arrest, sudden ■ cardiopulmonary resuscitation ■ health services research ■ quality improvement ■ qualitative research

Sources of Funding, see page 162

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Research

JAMA Internal Medicine | Original Investigation

Assessment of Rapid Response Teams at Top-Performing Hospitals for In-Hospital Cardiac Arrest

Kimberly Dukes, PhD; Jacinda L. Bunch, PhD, RN; Paul S. Chan, MD, MSc; Timothy C. Guetterman, PhD, MA; Jessica L. Lehrich, MS; Brad Trumpower, MS; Molly Harrod, PhD; Sarah L. Krein, PhD, RN; Joan E. Kellenberg, MS, MPH; Heather Schacht Reisinger, PhD; Steven L. Kronick, MD, MS; Theodore J. Iwashyna, MD, PhD; Brahmajee K. Nallamothu, MD, MPH; Saket Girotra, MD, SM

IMPORTANCE Rapid response teams (RRTs) are foundational to hospital response to deteriorating conditions of patients. However, little is known about differences in RRT organization and function across top-performing and non-top-performing hospitals for in-hospital cardiac arrest (IHCA) care.

OBJECTIVE To evaluate differences in design and implementation of RRTs at top-performing and non-top-performing sites for survival of IHCA, which is known to be associated with hospital performance on IHCA incidence.

DESIGN, SETTING, AND PARTICIPANTS A qualitative analysis was performed of data from semistructured interviews of 158 hospital staff members (nurses, physicians, administrators, and staff) during site visits to 9 hospitals participating in the Get With The Guidelines-Resuscitation program and consistently ranked in the top, middle, and bottom quartiles for IHCA survival during 2012-2014. Site visits were conducted from April 19, 2016, to July 27, 2017. Data analysis was completed in January 2019.

MAIN OUTCOMES AND MEASURES Semistructured in-depth interviews were performed and thematic analysis was conducted on strategies for IHCA prevention, including RRT roles and responsibilities.

RESULTS Of the 158 participants, 72 were nurses (45.6%), 27 physicians (17.1%), 27 clinical staff (17.1%), and 32 administrators (20.3%). Between 12 and 30 people at each hospital participated in interviews. Differences in RRTs at top-performing and non-top-performing sites were found in the following 4 domains: team design and composition, RRT engagement in surveillance of at-risk patients, empowerment of bedside nurses to activate the RRT, and collaboration with bedside nurses during and after a rapid response. At top-performing hospitals, RRTs were typically staffed with dedicated team members without competing clinical responsibilities, who provided expertise to bedside nurses in managing patients who were at risk for deterioration, and collaborated with nurses during and after a rapid response. Bedside nurses were empowered to activate RRTs based on their judgment and experience without fear of reprisal from physicians or hospital staff. In contrast, RRT members at non–top-performing hospitals had competing clinical responsibilities and were generally less engaged with bedside nurses. Nurses at non-top-performing hospitals reported concerns about potential consequences from activating the RRT.

CONCLUSIONS AND RELEVANCE This qualitative study's findings suggest that top-performing hospitals feature RRTs with dedicated staff without competing clinical responsibilities, that work collaboratively with bedside nurses, and that can be activated without fear of reprisal. These findings provide unique insights into RRTs at hospitals with better IHCA outcomes.

JAMA Intern Med. doi:10.1001/jamainternmed.2019.2430
Published online July 29 2019.

Supplemental content

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IHCA ROLES FOR NURSES

Bedside first responder → Resuscitation team member → Clinical or administrative leader

DISTINGUISHING HIGHER PERFORMING HOSPITALS

Emphasized of training and competency of nurses at all levels

- Mentoring of nurses
- CA Simulation and debriefing
- Training programs and needs assessment

Provided organizational flexibility and responsiveness with nursing roles

- Review of data and implement changes
- Risks/new programs with potential to improve care
- Speediness of response

Empowered nurses to operate at a higher scope of clinical practice

- Make decisions and think critically
- Defibrillate
- Hold leadership roles
- Requires change of institutional culture

JOINT DISPLAY OF THEMES BY QUANTITATIVE GROUPS – EXPLAIN VARIATION

Theme	Higher Performing	Lower Performing
Education and Training	Mentoring, debriefing, and identification of training needs was more systematic and definitive. "*They've also done a very good job of teaching the staff when they would like to be called; 'don't wait until the patient has coded, let's call now versus later when this is happening so that they can get in there and maybe prevent the code…'" (Training Center Manager, Higher Performing)*	Attention to training and educational needs tended to be more of an ad hoc process. *"What we usually just tell our nurses, and I don't think that there's an actual class on this that they go through…if they have a patient that they just really feel like something's wrong, even they can't put a finger on what it is, it's not going to hurt to call a rapid response." (Director of Critical Care Unit, Lower Performing)*
Organizational Flexibility and Responsiveness	Hospitals use data systematically to evaluate IHCA outcomes and address training and other nursing needs. *"We as an organization value that and value date-driven decisions and processes as part of that…it informs us to where we need to focus our educational programs… And I think [Quality Director, RN] and her team, we're lucky to have that resource available." (Medical Leader, Higher Performing)*	Responsiveness and willingness to change, even based on data, was less prominent. *"From my perspective, and that's only from my perspective, I don't think the data drives anything. Like we've been part of [the AHA GWTG] national registry …since whenever national registry started. I don't see people calling and saying, how are we doing with that?" (Advanced Practice Nurse, Lower Performing)*
Nurse Empowerment	Higher performing sites envision nurses in IHCA leadership roles or as clinical champions. Leaders set culture and empower nurses to assume responsibility in alignment with their scope of practice. *"If they can get it on, if they're soon enough, they will shock…But, yeah, they're pretty empowered. They'll do it. If there's not a house [officer] or somebody there, they're going to go ahead and do it. They're not going to wait." (Nursing Unit Director, Higher Performing)*	At lower performing sites, there was variation in nurses' scope of practice. *"Our med-surg nurses are not defibrillation certified, our critical care nurses are, so technically they can defibrillate before somebody gets there. The ICU nurses will do that; the med-surg nurses will not." (Advanced Practice Nurse, Lower Performing)*

INTEGRATION AND DATA ANALYSIS IN MIXED METHODS RESEARCH

LEARNING OBJECTIVES

You will be able to

- Describe integration strategies
- Identify at least one integration strategy that applies to your project
- Apply joint displays to achieve integration

KEY FEATURE OF MIXED METHODS: INTEGRATION

Intentionally collect *both* quantitative and qualitative data and combines the strengths of each to answer research questions

Integration generates something new

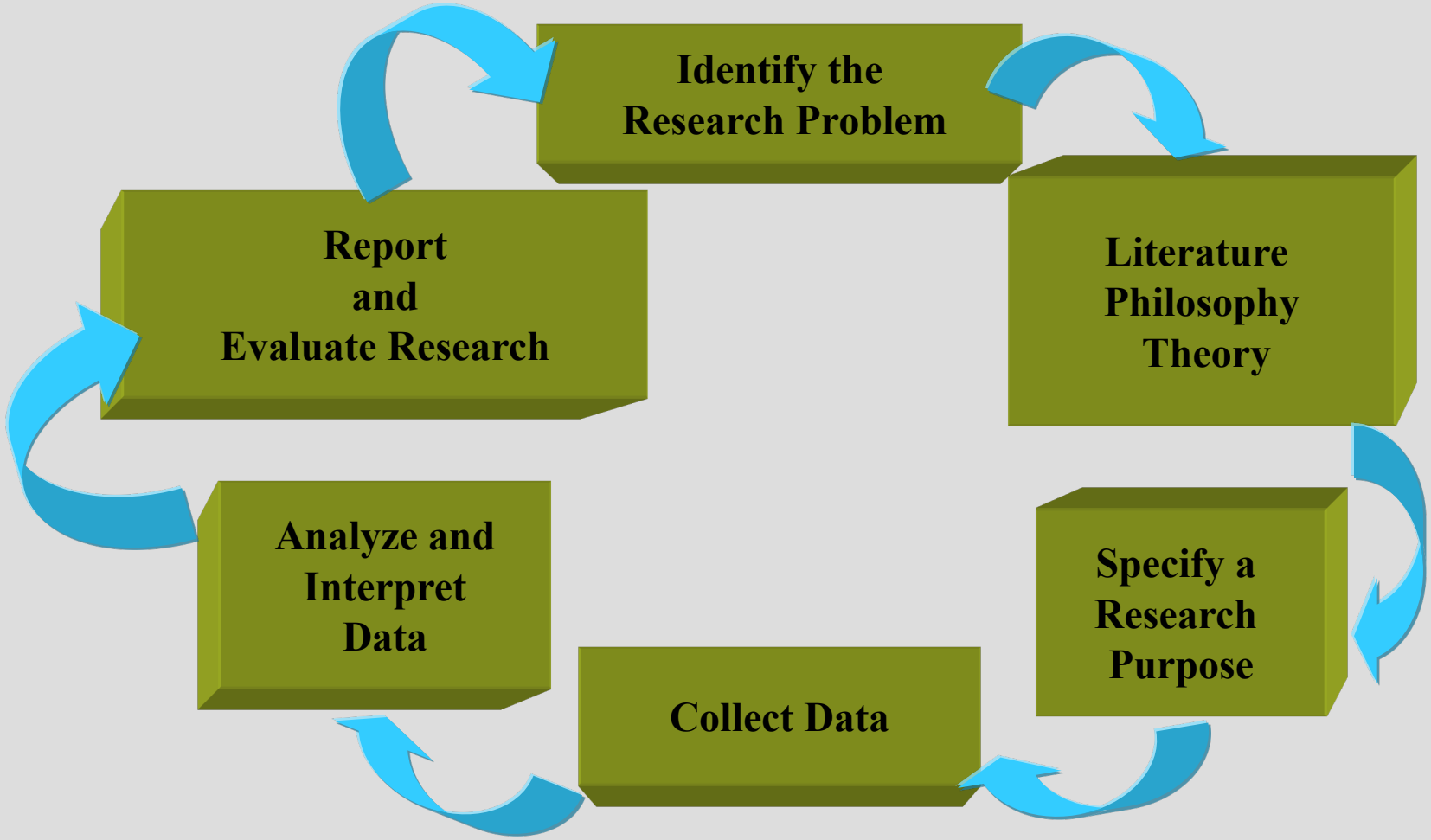
Qualitative follow-up studies

Instruments

Meta-inferences

Meta-inferences: result from integrating results or data

INTEGRATION OCCURS THROUGHOUT THE PROCESS OF RESEARCH



INTEGRATION THROUGH DATA COLLECTION, ANALYSIS, AND REPORTING

How one brings together the quantitative and qualitative results in a mixed methods study

- **Merging**
- **Connecting (i.e., explaining)**
- **Building**

Source: Fetters, Curry, & Creswell (2013)

REPRESENTING INTEGRATION WHEN REPORTING FINDINGS

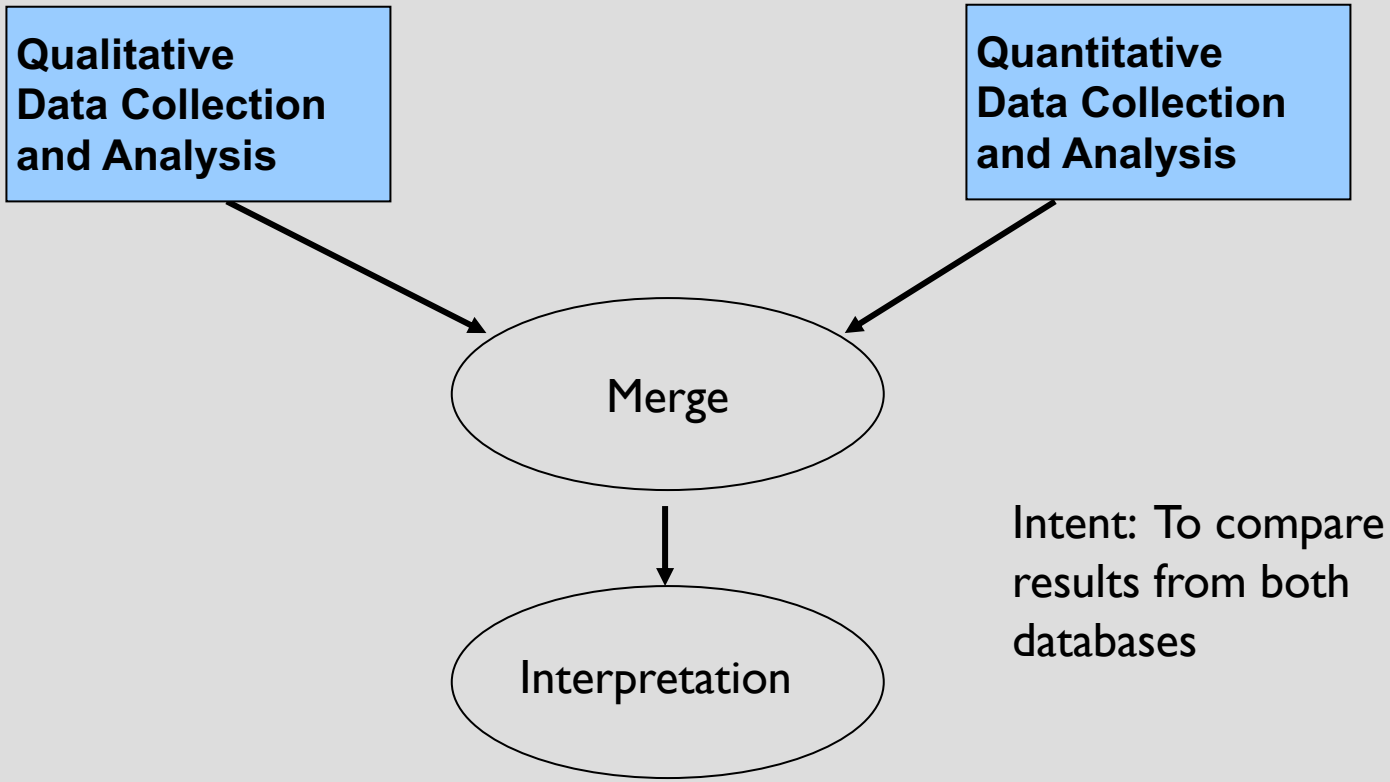
- **Narrative discussion**
- **Visual joint displays**

Connecting Integration to Designs

Design	Approach	Description of Intent
Convergent	Comparing (merging)	• Collecting data about similar ideas to look for confirmation, contradiction. • Or, obtain a broader understanding than possible with single method.
Sequential	Explaining (connecting)	• One database links to the other through sampling
	Exploring (building)	• One database informs the data collection approach of the other
Intervention Evaluation Multiphase	Embedding	• Data collection and analysis link at multiple points

MERGING INTEGRATION

- Bring qualitative and quantitative data together for analysis and comparison
  - e.g., Wittink et al. (2006) reported themes with respect to quantitative scores or statistics



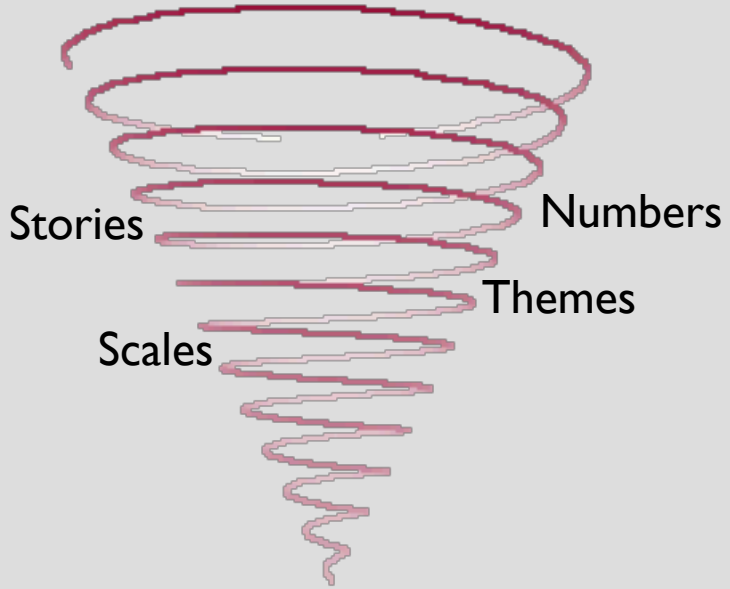
Intent: To compare results from both databases

WAYS TO MERGE THE DATA

- **Merge** Quantitative and qualitative
- Comparing results side-by-side
- Transforming data
  - Qualitative to quantitative (common)
  - Quantitative to qualitative (uncommon)
- Relating qualitative to quantitative results
- Constructing joint displays
  - Tables
  - Figures

INTEGRATION THROUGH COMPARISON

- Bring together qualitative and quantitative data **iteratively**
- Determine the extent to which the two forms of data **confirm**, **contradict**, or **expand**
- **Continuous comparison** of findings between the qualitative and quantitative data



Source: MD Fetters, Mixed Methods Workshop 3/31-4/2/2016

WHEN YOU INTEGRATE THROUGH MERGING

You bring databases are together for analysis

- Comparing results on **common** themes
- Comparing results on **different** themes

You make an interpretation

- Confirmation
- Contradiction
- Expansion

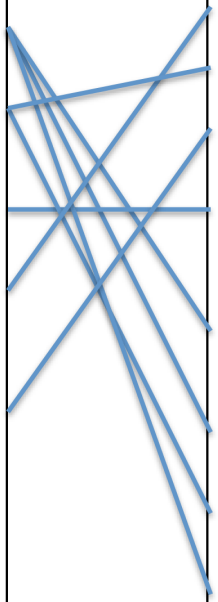
FIRST STEPS IN MERGING THROUGH MAKING COMPARISONS

- Inventory your own data
  - What are your qualitative data
  - How are the data organized?
  - What are your quantitative data
  - How are the data organized?
- Find commonality in qualitative and quantitative data

HOW TO LINK THEMES AND CONSTRUCTS

- What are the connections between the qualitative themes and quantitative constructs?

Merging of Qualitative Themes and Quantitative Constructs by building a joint display

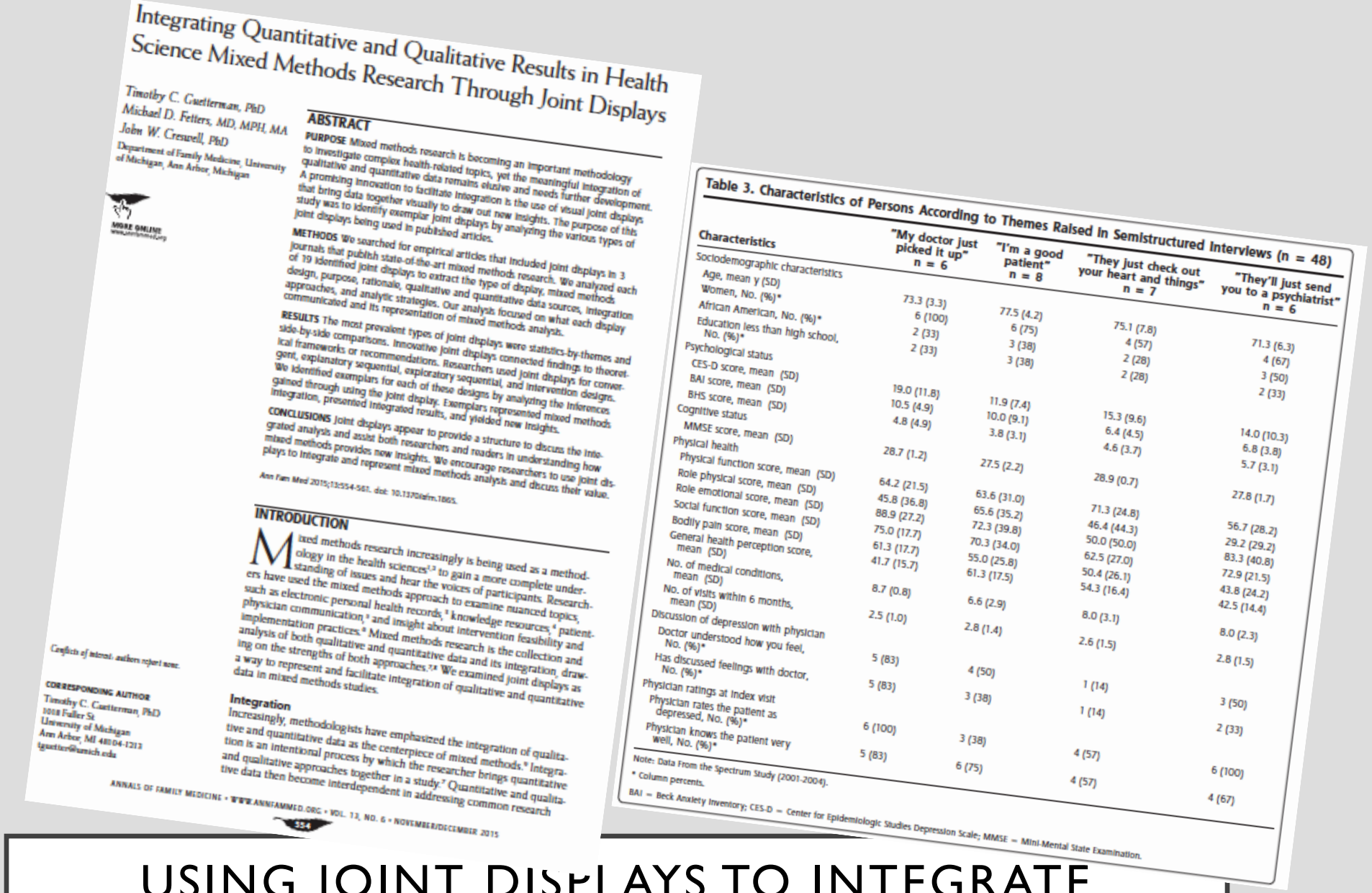
Qualitative Sources	Qualitative Themes	Connect with lines	Quantitative Constructs	Quantitative Sources
Student reflections	Verbal communication Nonverbal communication Engagement of training Supplemental training Immediate feedback		Clarity Purpose Utility Reaction to learning experience Openness/ defensiveness Collaborative/ competitive Nonverbal communication Presence	Attitudinal Scale OSCE MPathic Score

INTEGRATION THROUGH RELATING

- Examine qualitative themes by statistics
- Examine statistics by qualitative themes
- **Array the two in a crosstab to look for patterns**

WHAT IS A JOINT DISPLAY?

- Bring quantitative and qualitative approaches together through a visual means
- Draw out new insights-synergistic
- Framework to integrate and represent MM analysis
- Types and applications in research are developing



Integrating Quantitative and Qualitative Results in Health Science Mixed Methods Research Through Joint Displays

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ABSTRACT

PURPOSE Mixed methods research is becoming an important methodology to investigate complex health-related topics, yet the meaningful integration of qualitative and quantitative data remains elusive and needs further development. A promising innovation to facilitate integration is the use of visual joint displays that bring data together visually to draw out new insights. The purpose of this study was to identify exemplar joint displays by analyzing the various types of joint displays being used in published articles.

METHODS We searched for empirical articles that included joint displays in 3 journals that publish state-of-the-art mixed methods research. We analyzed each of 19 identified joint displays to extract the type of display, mixed methods design, purpose, rationale, qualitative and quantitative data sources, integration approaches, and analytic strategies. Our analysis focused on what each display communicated and its representation of mixed methods analysis.

RESULTS The most prevalent types of joint displays were statistics-by-themes and side-by-side comparisons. Innovative joint displays connected findings to theoretical frameworks or recommendations. Researchers used joint displays for convergent, explanatory sequential, exploratory sequential, and intervention designs. We identified exemplars for each of these designs by analyzing the inferences gained through using the joint display. Exemplars represented mixed methods integration, presented integrated results, and yielded new insights.

CONCLUSIONS Joint displays appear to provide a structure to discuss the integrated analysis and assist both researchers and readers in understanding how mixed methods provides new insights. We encourage researchers to use joint displays to integrate and represent mixed methods analysis and discuss their value.

Ann Fam Med 2015;13:554-561. doi: 10.1370/afm.1865.

INTRODUCTION

Mixed methods research increasingly is being used as a methodology in the health sciences[1,2] to gain a more complete understanding of issues and hear the voices of participants. Researchers have used the mixed methods approach to examine nuanced topics, such as electronic personal health records,[3] knowledge resources,[4] patient-physician communication,[5] and insight about intervention feasibility and implementation practices.[6] Mixed methods research is the collection and analysis of both qualitative and quantitative data and its integration, drawing on the strengths of both approaches.[7,8] We examined joint displays as a way to represent and facilitate integration of qualitative and quantitative data in mixed methods studies.

Integration

Increasingly, methodologists have emphasized the integration of qualitative and quantitative data as the centerpiece of mixed methods.[9] Integration is an intentional process by which the researcher brings quantitative and qualitative approaches together in a study.[7] Quantitative and qualitative data then become interdependent in addressing common research

Conflicts of interest: authors report none.

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Table 3. Characteristics of Persons According to Themes Raised in Semistructured Interviews (n = 48)

Characteristics	"My doctor just picked it up" n = 6	"I'm a good patient" n = 8	"They just check out your heart and things" n = 7	"They'll just send you to a psychiatrist" n = 6
Sociodemographic characteristics				
Age, mean y (SD)	73.3 (3.3)	77.5 (4.2)	75.1 (7.8)	71.3 (6.3)
Women, No. (%)*	6 (100)	6 (75)	4 (57)	4 (67)
African American, No. (%)*	2 (33)	3 (38)	2 (28)	3 (50)
Education less than high school, No. (%)*	2 (33)	3 (38)	2 (28)	2 (33)
Psychological status				
CES-D score, mean (SD)	19.0 (11.8)	11.9 (7.4)	15.3 (9.6)	14.0 (10.3)
BAI score, mean (SD)	10.5 (4.9)	10.0 (9.1)	6.4 (4.5)	6.8 (3.8)
BHS score, mean (SD)	4.8 (4.9)	3.8 (3.1)	4.6 (3.7)	5.7 (3.1)
Cognitive status				
MMSE score, mean (SD)	28.7 (1.2)	27.5 (2.2)	28.9 (0.7)	27.8 (1.7)
Physical health				
Physical function score, mean (SD)	64.2 (21.5)	63.6 (31.0)	71.3 (24.8)	56.7 (28.2)
Role physical score, mean (SD)	45.8 (36.8)	65.6 (35.2)	46.4 (44.3)	29.2 (29.2)
Role emotional score, mean (SD)	88.9 (27.2)	72.3 (39.8)	50.0 (50.0)	83.3 (40.8)
Social function score, mean (SD)	75.0 (17.7)	70.3 (34.0)	62.5 (27.0)	72.9 (21.5)
Bodily pain score, mean (SD)	61.3 (17.7)	55.0 (25.8)	50.4 (26.1)	43.8 (24.2)
General health perception score, mean (SD)	41.7 (15.7)	61.3 (17.5)	54.3 (16.4)	42.5 (14.4)
No. of medical conditions, mean (SD)	8.7 (0.8)	6.6 (2.9)	8.0 (3.1)	8.0 (2.3)
No. of visits within 6 months, mean (SD)	2.5 (1.0)	2.8 (1.4)	2.6 (1.5)	2.8 (1.5)
Discussion of depression with physician				
Doctor understood how you feel, No. (%)*	5 (83)	4 (50)	1 (14)	3 (50)
Has discussed feelings with doctor, No. (%)*	5 (83)	3 (38)	1 (14)	2 (33)
Physician ratings at index visit				
Physician rates the patient as depressed, No. (%)*	6 (100)	3 (38)	4 (57)	6 (100)
Physician knows the patient very well, No. (%)*	5 (83)	6 (75)	4 (57)	4 (67)

Note: Data From the Spectrum Study (2001-2004).
* Column percents.
BAI = Beck Anxiety Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; MMSE = Mini-Mental State Examination.

USING JOINT DISPLAYS TO INTEGRATE QUALITATIVE AND QUANTITATIVE APPROACHES

JOINT DISPLAY OF STATISTICS BY QUALITATIVE THEMES

- Design: Convergent
- Setting: Primary Care, patients with depression 65 and older
- Data collection: Semi-structured interviews and scores in standardized instruments
- Integration: Linkage of patient demographics, scores on measures, and qualitative themes.

Table 3. Characteristics of Persons According to Themes Raised in Semistructured Interviews (n = 48)

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* Column percents.

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CONNECTING INTEGRATION

- **Connecting**: links data through sampling
  - e.g., Petros (2012) purposively selected the qualitative follow-up sample based on the individuals who provided unexpected survey responses
- Intent is to explain or further understanding quantitative results.

CONNECTING TO EXPLAIN QUAN RESULTS

- First obtain quantitative results
- Identify what needs further exploration
- Based on quantitative results, decide **who to sample** for follow-up interviews, focus groups, etc.
  - Unexpected results
  - Extreme responses
  - Significant results
  - Nonsignificant results
  - Typical results
- Consistent with your research questions

CONNECTING TO EXPLAIN QUAN RESULTS

- Based on quantitative results, decide **what questions to ask**
  - Write interview questions
  - Write focus group questions
  - Develop an observational protocol
- Consistent with your research questions

EXPLAIN QUANTITATIVE RESULTS

- Interpretation after the follow-up qualitative phase
- How do qualitative results explain or expand on quantitative results?
  - E.g., explain variation in high vs. low scores

A JOINT DISPLAY COMBINING THEMES, HIGH AND LOW SCORES (QUAN), EXPLANATORY QUOTES

Table 4. Quotes Related to Lanham et al's Relationship Characteristics in Clinics with High and Low WRS Scores

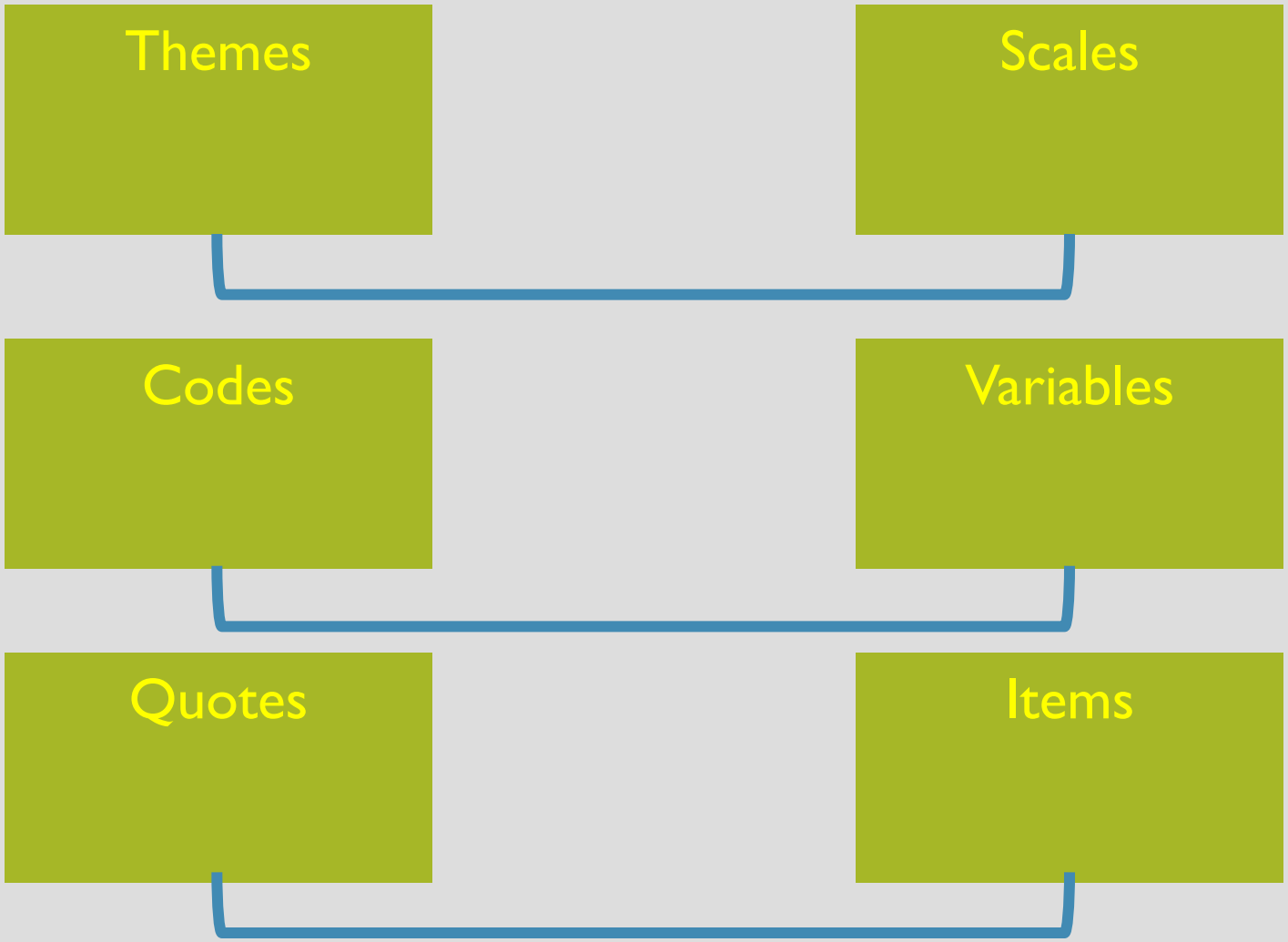
Rich communication	
Communication through face-to-face conversation; most effective when messages are unclear or ambiguous	
Low WRS score clinics	"I think that some days we should just sit down and say, 'Okay, this is what's going on. What do you know—how do you perceive this is supposed to be done?' ...[S]ometimes the hurdles that we run into are just, they could have been easily avoided if there had been a little bit better communication."
High WRS score clinics	"Well, you know we have what's called huddle every morning and any problems from the day before are discussed in huddle with all the team members and the clerical staff, social workers, the pharmacist. So we all get to know anything that's going on at that time."
Heedful interrelating	
Individuals are attentive to their work tasks and sensitive to how their roles and actions affect and intersect with those around them	
Low WRS score clinics	"...[T]here's a whole lot of tension and a lot of it has to do with, 'That ain't my job and you're messing in my area and you don't belong in my area and you need to back out and just stay in your own business.'"
High WRS score clinics	"I think the teamwork here is just excellent. You know we really pitch

Source: Finley et al (2013)

BUILDING INTEGRATION

- **Building**: The results of one component informs the data collection of the other
  - e.g., Haggerty (2012) used qualitative studies to identify exiting and new items to measure continuity of care

BUILDING: GOING FROM QUALITATIVE FINDINGS TO A QUANTITATIVE INSTRUMENT



A JOINT DISPLAY IN AN EXPLORATORY SEQUENTIAL INSTRUMENT DEVELOPMENT MIXED METHODS STUDY

Qualitative Findings		Quantitative Instrument	
Qualitative Theme	Codes	Instrument Scale	Instrument Variables
Day-to-Day Issues	Emotions	Day-to-Day Issues	Emotions
	Education		Education
	Interests		Personal Interests
	Money and Finances		Money
	Religion and Spirituality		Religion
	Significantly Positive		Positivity
Interview Guide Topics	Health	Satisfaction Scale	Health Satisfaction
	Recreation		Recreation Satisfaction
	Home Life		Home Life Satisfaction
	Relationship		Relationship Satisfaction
	Work Issues		Work Satisfaction
	Overall		Overall Satisfaction
People	Friends	People and Relationships	Friends
	Parents		Parents
	Partner		Partner
	Siblings		Siblings

WHAT ABOUT INTEGRATION IN COMPLEX DESIGNS?

Merging, connecting, and building form the basis

You will likely use multiple types of integration

Mixed Methods Research Association

mmira.org

- International conference every two years
- Regional conferences in off years
- Webinars monthly

THE MIXED METHODS RESEARCH PROCESS: (PLANO CLARK AND IVANKOVA)

- Research purpose and objectives
  - Discipline specific – purpose statement, objective, aims
- Research questions
  - Further narrow the purpose
- Research purpose and questions
  - Drive the design and methods

PRACTICAL CONSIDERATIONS

- Timing
- Integration
- Priority
- Inferences

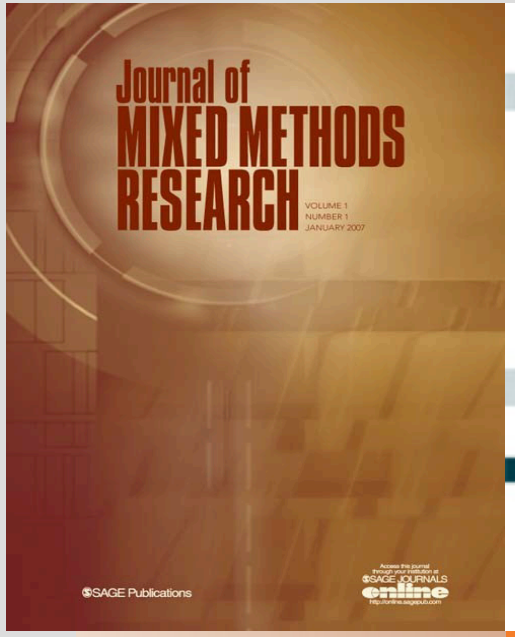
ISSUES AND DEBATES ABOUT THE MMR PROCESS

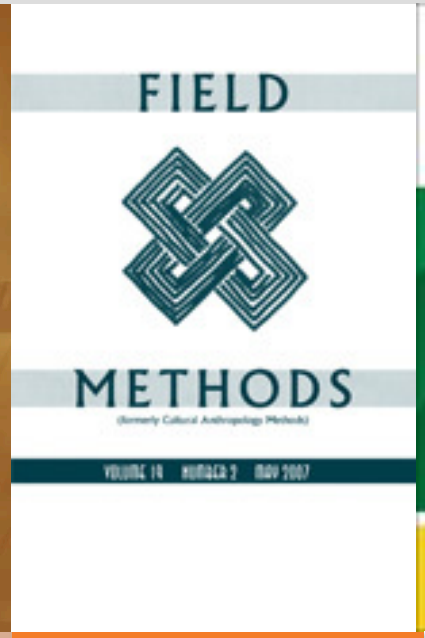
1. How to write research questions?
2. What is the meaning of timing?
   - What about a convergent/concurrent design that draws a subset and interacts?
3. How should priority be considered?
   - "cannot be completely determined before the study is implemented"?
   - Can it be determined after?
   - Does it matter?
4. What is the process for drawing inferences?

DISCUSSION AND QUESTIONS

Selected Mixed Methods Research Books

Journals Publishing Mixed Methods **Methodology**





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2018 Impact Factor: 3.524

#1 in Social Sciences, Interdisciplinary

Journal Citation Reports® (Web of Science Group, 2019)

http://jmmr.sagepub.com

Frequency: Quarterly
January, April, July, October
ISSN: 1558-6898

Co-Chief Editors
Michael D. Fetters, *University of Michigan, USA*
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The *Journal of Mixed Methods Research* (JMMR) is an innovative, quarterly, interdisciplinary, international publication that focuses on empirical methodological articles methodological/theoretical articles, and commentaries about mixed methods research across the social, behavioral, health, and human sciences. The scope includes delineating where mixed methods research may be used most effectively, illuminating design and procedure issues, and determining the logistics of conducting mixed methods research.

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