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Mixed methods in gerontological research: Do the qualitative and quantitative data “touch”?

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Abstract

This paper distinguishes between parallel and integrated mixed methods research approaches. Barriers to integrated mixed methods approaches in gerontological research are discussed and critiqued. The author presents examples of mixed methods gerontological research to illustrate approaches to data integration at the levels of data analysis, interpretation, and research reporting. As a summary of the methodological literature, four basic levels of mixed methods data combination are proposed. Opportunities for mixing qualitative and quantitative data are explored using contemporary examples from published studies. Data transformation and visual display, judiciously applied, are proposed as pathways to fuller mixed methods data integration and analysis. Finally, practical strategies for mixing qualitative and quantitative data types are explicated as gerontological research moves beyond parallel mixed methods approaches to achieve data integration.

Keywords

mixed methods; research methods; gerontology; ageing research; qualitative; quantitative

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Mixed methods research approaches are gaining popularity in health research in general, and in gerontological research in particular. This trend has been attributed to increased attention to the psychosocial and behavioral aspects of health and illness (Lingard, Alvert & Levinson, 2008). Others contend that additional methods are needed to offset the weaknesses of a singular quantitative or qualitative approach. Mixed methods designs use quantitative and qualitative methods within a single project (Tashakkori & Teddlie 2003). Elements from both quantitative and qualitative paradigms are represented in convergent or explanatory findings (Lingart et al 2008); however, one paradigm typically dominates (Morse, 2003). Researchers who combine qualitative and quantitative approaches must carefully negotiate between two approaches that originate from very different traditions and sets of assumptions (Lingard et al 2008).

Investigations in geriatrics and gerontology frequently focus on complex circumstances of interaction (e.g., caregiving) and are often conducted in complicated systems (e.g., families or nursing homes) that lend well to mixed methods approaches. Mixed methods research approaches have been evolving over the last 50 years with recent attention and interest in mixed data combination and analysis (Creswell & Plano-Clark, 2007; Caracelli & Greene, 1998; Tashakkori & Teddlie, 2003; Morgan, 1998). Unfortunately, researchers are often hampered in truly integrating qualitative and quantitative approaches within a single research project or

report. Specifically, the extent to which researchers “genuinely” integrate data in the analysis, interpretation, and written reports is quite variable (Bryman, 2007).

This paper uses exemplars from mixed methods studies in geriatrics and gerontology to illustrate approaches to data integration at the levels of data analysis, interpretation and research reporting. Figure 1 presents a basic schema of levels of mixed methods data combination. First, I identify and present examples of parallel mixed methods approaches in gerontological research. Opportunities for mixing qualitative and quantitative data are explored using contemporary examples from published studies. Finally, strategies for mixing qualitative and quantitative data types are explicated as gerontological research moves beyond parallel mixed methods approaches to achieve data integration.

Identifying Mixed Methods in Gerontological Studies

Mixing qualitative and quantitative data types or research approaches is not new in gerontological research. For example, Kayser-Jones and colleagues’ (1989) classic anthropological study of acute care hospitalization events among nursing home residents used both quantitative numeric and qualitative observational data to identify and analyze clinical and social-structural factors contributing to the hospitalization of nursing home residents. A pragmatic approach to mixing methods is particularly appealing in applied science fields such as gerontology. Mixed methods offer a variety of design options utilizing strategies from the full methodological repertoire to answer practice-based research questions (Creswell & Plano, 2007; Morgan, 2007). Although the gerontological research literature reveals many examples of mixed methods studies, the term “mixed methods” has not consistently been used to describe this type of research design. Mixed approaches are often imbedded in the methods descriptions as researchers in gerontology have focused more on describing what is done than on naming the designs. There may be several reasons that gerontological studies are not identified as employing mixed methods. Most prominently, the language, nomenclature and typology of mixed methods designs are still evolving. Additionally, there is little standardization of mixed methods research practices and relatively little guidance for data combination or integration. This is an area that provides opportunities for methodological creativity; however, it also creates considerable methodological confusion.

Mixed Methods as Parallel Play

Because there are few standards or expectations for mixed methods data combination and analysis, many mixed methods research reports do not show evidence of data integration until late in the interpretation phase if at all. Studies that purport to employ mixed methods may use different data types but present the analysis quantitatively (Liang, Kasman, Wang, Yuan, & Mandelblatt, 2006). Conversely, quantitative data may be used primarily to describe sample characteristics in qualitative dominant studies without further integration of data types in the analysis (Chapin, Reed, & Dobbs, 2004). Researchers employing mixed methods may choose to limit a particular report or article to a single (quantitative or qualitative) approach for simplicity or as a step in a series of papers without any evidence of data integration (Level 1 in Figure 1). While separation of qualitative and quantitative data in single reports is pragmatic, the full power of mixing methods in a single study may not be realized. Moreover, because mixed methods are often used to offset the weaknesses of a single method, the individual, single method phases of a mixed methods study may not be particularly strong as stand-alone projects.

Sequential mixed methods studies are commonly used in aging research to develop and test instruments. In this design, analysis of qualitative interviews or focus group transcripts provide the concepts and/or conceptual framework that are developed into a survey or questionnaire which is subsequently tested for psychometric stability and feasibility (Cox, Green, Seo, Inaba, & Quillen, 2006; Bishop et al 2008; Howes, 2008; Hwakek, Straub, & Kosniewski 2008;

Ingersoll-Dayton, Saengtienchai, Kespichayawattana, & Aurgsurach, 2004). For example, Cox and colleagues (2006) were interested in learning about how work is managed in “better” nursing homes and the impact that work structure had on nursing assistant job satisfaction and resident care. The team first conducted focus groups with nursing assistants and semi-structured interviews with nursing home administrators and front-line supervisors in 8 Massachusetts nursing homes that were identified as “good places to live and work” (Bishop et al. 2008, p.37). An extensive (82-item) nursing assistant survey concerning workplace relationships, job satisfaction, and resident care was designed based on information from the interviews, and was administered in 15 nursing homes across the state. The instrument development approach has distinct phases and qualitative data are appropriately separated from quantitative data in the analyses. Most studies of this nature would be classified as Level 2 (Figure 1).

Situated somewhere between parallel methods and data mixing, mixed methods studies in gerontology commonly reserve mixed data integration for the interpretive level of analysis, depicted as Level 3 in Figure 1. For example, in a sequential explanatory mixed methods study, a focus group of nursing home staff (e.g. nursing assistants, physical therapists, charge nurse, social worker) provided context and explanation for dressing behaviors that were quantitatively rated from videotaped observations of nursing home resident dressing episodes (Cohen-Mansfield et al., 2006). Focus group data and analysis were not fully described. However, the contextual information about dressing policies and routines gleaned from the focus group discussions were integrated at the level of interpretation in the discussion section of the research report. For instance, the mean dressing time was calculated from the videotapes at 4.13 minutes (range = 1.5 – 9.0 minutes). Focus group data, integrated into the discussion, provided contextual information that nursing assistants in one of the study nursing homes were required to dress patients before their 8:30am breakfast. This policy partially explained a shorter dressing process that affected the quality ratings of the dressing interaction.

Mixing the data

Separate analyses of qualitative and quantitative data may be appropriate first steps in mixed methods studies and serve to answer singular research questions within a larger mixed purpose. Data integration is necessary, however, to address the mixed methods research question(s) and/or purpose (Creswell & Plano Clark, 2007). For example, in an exploratory mixed methods study of family presence during weaning from long-term mechanical ventilation, we asked “what impact does family presence have on duration of daily weaning trials?” (Happ et al., 2007). This was a qualitatively-driven study in which the primary analysis produced a typology of family presence behaviors. To answer the mixed methods question, we reduced family presence to a dichotomous variable and used the continuous variable of recorded duration (time in hours) of daily ventilator weaning trials employing hierarchical regression analysis as the statistical procedure. A doctoral student recently described it best as, “the qualitative and quantitative data *need to touch*.” Several authors have provided guidance, practical strategies, and exemplars for data integration within a mixed analysis framework (Caracelli & Green, 1993; Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007; Happ, DeVito Dabbs, Tate, Hricik, & Erlen, 2006; Onwuegbuzie & Teddlie, 2003; Sandelowski, 2003), yet this remains an underdeveloped area requiring continued methodological work and creative thought.

The following example of a sequential mixed methods study in which a quantitative study is preliminary to a qualitative study illustrates how the quantitative data can be used to guide sample selection *and* can be incorporated into the qualitative analyses of individual cases. Hildon and colleagues (2008) used quantitative data collected in a cohort study of older adults between 70–80 years of age (n=139) to select 32 qualitative interview participants for variability on measures of adversity, vulnerability, resilience, and quality of life. A stem-leaf

plot described the sub-sample categorically according to these measured characteristics which were the main concepts of interest in the study. The researchers integrated quantitative results into the qualitative analysis through individual case comparison. In addition to measures of adversity, vulnerability and resilience, questionnaire data (e.g., index of coping styles; limitations on activities of daily living) and content analysis of activity diaries were used to complement the interview data. Data integration is evident in the narrative description of findings and in the discussion which showed that older adults with resilient outcomes drew from social and individual resources such as maintaining positive social roles and activities (Hildon, Smith, Netuveli, & Blane, 2008). The analysis and representation of results could have been enhanced by the use of visual display (e.g., diagram) or matrices to better illustrate the mixed data combination.

In a concurrent mixed methods study examining the experience of HIV-related stigma in older adults with HIV/AIDS, Emlet (2007) constructed a diagram integrating qualitative themes within four stigma subscales from a valid and reliable measure of stigma. In this approach, the qualitative findings were used to validate and extend the quantitative findings from the stigma measure. Fitting the 11 qualitatively-derived themes within the framework of subscales from the stigma instrument was the final step in the analytic process. Quotes from participant interviews illustrated the themes which were organized and defined within the stigma subscales. Comparison of qualitative findings to existing theories or conceptual frameworks is acceptable in the final stages of analysis and interpretation in many qualitative approaches. Emlet's work yielded a "good fit," wherein the qualitative analysis served to validate and dimensionalize the main constructs in the stigma framework. Stigma in older adults with HIV/AIDS was validated as a multi-dimensional construct with rejection, disclosure concerns, stereotyping, protective silence, and negative self-images as common themes or dimensions. Stigma was positively and significantly correlated with depression ($r=0.627$, $p=0.001$) with 36% of the sample scoring above the clinical cutoff for risk of depression (Emlet).

Another option in mixed methods data combination is to integrate qualitative and quantitative data descriptively in the textual presentation of study findings. This approach is commonly used in program evaluation research in gerontology, usually with qualitative data employed to confirm quantitative findings (Pillemer et al 2008; Yeatts & Cready, 2007; Morgan & Konrad 2008). For example, Yeatts and Cready (2007) integrated qualitative data from observations of team meetings and meeting minute documents with quantitative findings about the consequences of empowered CNA teams in nursing home settings. The study was organized in a proposition testing format. Findings were reported by proposition with qualitative and quantitative findings grouped together in the text. For instance, qualitative observations of CNA autonomy and competence were evaluated as supporting the research proposition that empowered work teams in nursing homes positively affect feelings of empowerment, including autonomy and competence. CNA pretest – posttest comparisons on quantitative measures showed higher levels of empowerment, autonomy and competence in the experimental group at posttest.

Chapin, Reed and Dobbs (2004) conducted a concurrent mixed methods study of mental health needs and service use of older adults in assisted living settings. Data were collected by survey, Geriatric Depression Scale (GDS) and qualitative interviews focusing on participants' mental health beliefs and practices. The qualitative data were used to understand the finding that nearly one-third of participants scored above the clinical cutoff for depression on the GDS or had subthreshold levels of depression. Specifically, the qualitative data were analyzed by depression score category to identify and describe potential risk factors for depression among older adults in assisted living settings (Chapin et al., 2004).

In a study to compare what aspects of quality of life (QoL) elderly persons (≥ 75 years of age) and geriatric staff believe is important, Berglund and Ericsson (2003) merged quantitative demographic data and health investigation data with QoL categories gleaned from qualitative interview responses to a single open-ended question "What does quality of life mean to you?" Divided into four older age groups, the sample of elderly persons showed age differences regarding dimensions of QoL which were the main categories identified in the qualitative content analysis. Feelings of well-being ($p < 0.01$) and autonomy ($p < 0.001$) were significantly dependent on age (Berglund & Ericson).

Strategies for Mixed Data Analysis

Mixed data analysis at the 4th level (Figure 1) requires some data transformation. The term, *quantizing*, refers to transformation of coded qualitative data into a quantitative form; and *qualitizing* is converting quantitative numerical data into qualitative categories or themes. (Tashakkori & Teddlie, 1998). Decisions about "quantizing" qualitative data have to be approached cautiously, authentically, and with full understanding of the data. This may require experimenting with different visual representations or categorizations as part of the mixed methods analytic process. It should also involve knowledgeable others from the research team or external to the study. Using simple counts of qualitative codes is usually not an accurate quantitative representation because code occurrence (and recurrence) is dependent on conversational style and grouping of ideas (Creswell & Plano Clark, 2007).

Because the qualitative research process is iterative or emergent, all data collection observations or interactions with research participants are not standardized. During the course of a study, a qualitative researcher commonly adds interview questions or observational items to the data collection routine in order to follow new lines in the analysis. When this type of iterative qualitative approach is used as part of a mixed methods project, the researcher faces difficulty during analysis in accounting for areas in the data collection where there may have been no opportunity or unequal opportunities to observe a phenomenon or event. This is particularly troublesome when attempting to "quantize" qualitative codes, categories, or themes. In pursuit of a quantifiable analysis, categorizing the code or phenomenon as present, absent or unknown becomes an option. The unknown category can then be applied to missed opportunities. For example, in an open-ended conversational style interview about their perception of the process of weaning patients from prolonged mechanical ventilation, family members of critically ill patients described setbacks that their loved ones had experienced (Happ, Tate, Swigart, Sereika, Arnold & Hoffman 2006). There was not, however, a specific interview question asking about setbacks or regression in weaning progress. Some families who did not mention setbacks may not have experienced or perceived setbacks; others may not have thought to mention it, but may have endorsed the notion if it had been presented to them by the interviewer. Questions or probes about setbacks were added to family interviews and when quantizing the qualitative data for a mixed data combination, the following numerical codes are assigned: 0 = not present when probed or given the opportunity, 1 = present, 9 = unknown.

Decisions about "qualitizing" quantitative data require the research to accept some loss of measurement precision and information. Quantitative data can be qualitized as categories, patterns, or trajectories for combination with qualitative themes or categories. Visual displays, such as stem-leaf plots, scatter plots, matrices, and histograms, are particularly useful as an analytic tool in combining qualitative and quantitative data (Happ et al., 2006; Miles & Huberman, 1994; Sandelowski, 2003). It is in the visual display that the data "touch" and analytic statements can be constructed about their relationship and meaning. The visual display might then be used in a representation of the data when reporting study findings (Sandelowski, 1998).

Although mixed methods data combination adds considerable difficulty and complexity to a project, mixed data integration can be fruitful in extending explanation of study results, dimensionalization of conceptual frameworks, and exploration of new relationships. Writing and planning for mixed data integration, requires creativity and consideration of multiple options for data transformation. Skilled statistical consultation and support is invaluable at all stages of the process from planning through interpretation and presentation of results.

Summary

Four levels of mixed methods data combination and integration were proposed and described in this paper ranging from separate qualitative and quantitative data collection and analysis (Level 1) to selective merging of qualitative and quantitative datasets by data transformation and additional qualitative or quantitative analyses (Level 4). Gerontological research provides substantial opportunities for and exemplars of the use of mixed methods research approaches. Gerontological researchers have been at the forefront of mixing qualitative and quantitative research approaches. In fact, this paper only presented a sampling of the uses of mixed methods in gerontological research. Most of the studies reviewed fell into Levels 2 or 3 with respect to mixed methods data combination. Specifically, most studies either used the results of one method to inform the subsequent method (Level 2) or compared separate qualitative and quantitative results in the discussion (Level 3). The next generation of mixed methods research in gerontology is challenged to combine approaches in ways that lead to responsible data integration (Level 4). The judicious use of data transformation and visual display are pathways to fuller mixed methods data integration and, potentially, more powerful and comprehensive analysis in gerontological research.

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References

- Berglund A-L, Ericsson K. Different meanings of quality of life: a comparison between what elderly persons and geriatric staff believe is of importance. *International Journal of Nursing Practice* 2003;9:112–119. [PubMed: 12694480]
- Bishop CE, Weinberg DB, Leutz W, Dossa A, Pfefferle SG, Zincavage RM. Nursing assistants' job commitment: Effects of nursing home organizational factors and impact on resident well-being. *The Gerontologist* 2008;48(Special Issue 1):36–45. [PubMed: 18694985]
- Bryman A. Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research* 2007;1:8–22.
- Caracelli VJ, Greene JC. Data analysis strategies for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis* 1993;15:195–207.
- Cohen-Mansfield J, Creedon MA, Malone T, Parpura-Gill A, Dakheel-Ali M, Heasley C. Dressing of cognitively impaired nursing home residents: Description and analysis. *The Gerontologist* 2006;46:89–96. [PubMed: 16452288]
- Cox EO, Green KE, Seo H, Inaba M, Quillen AA. Coping with late-life challenges: Development and validation of the care-receiver efficacy scale. *The Gerontologist* 2006;46:640–649. [PubMed: 17050755]
- Chapin RK, Reed CJ, Dobbs D. Mental health needs and service use of older adults in assisted living settings: A mixed methods study. *Journal of Mental Health & Aging* 2004;10:351–365.
- Craft Morgan J, Konrad TR. A mixed-methods evaluation of a workforce development intervention for nursing assistants in nursing homes: The case of WIN A STEP UP. *The Gerontologist* 2008;48(Special Issue 1):71–79.

- Creswell, JW.; Plano Clark, VL. Designing and conducting mixed methods research. Thousand Oaks, CA: SAGE Publications; 2007.
- Driscoll, Appiah-Yeboah, Salib, Rupert. Merging qualitative and quantitative data in mixed methods research: How to and why not. *Ecological and Environmental Anthropology* 2007;3:19–28.
- Emler CA. Experiences of stigma in older adults living with HIV/AIDS: A mixed methods analysis. *AIDS Patient Care and STDs* 2007;21:740–752. [PubMed: 17949273]
- Happ MB, DeVito Dabbs A, Tate J, Hricik A, Erlen J. Exemplars of mixed methods data combination and analysis. *Nursing Research* 2006;55:S43–S49. [PubMed: 16601634]
- Happ MB, Swigart V, Tate JA, Arnold RM, Sereika SM, Hoffman LA. Family presence and surveillance during weaning from prolonged mechanical ventilation. *Heart & Lung* 2007;36:47–57. [PubMed: 17234477]
- Happ MB, Tate J, Swigart V, Sereika S, Arnold R, Hoffman L. Ventilator weaning: Process of care and communication. *American Journal of Respiratory and Critical Care Medicine* 2006;173(7) [abstract].
- Hildon Z, Smith G, Netueli G, Blane D. Understanding adversity and resilience at older ages. *Sociology of Health & Illness* 2008;30:726–740. [PubMed: 18444953]
- Howes C. Love, money, or flexibility: What motivates people to work in consumer-directed home care? *The Gerontologist* 2008;48(Special Issue I):46–59. [PubMed: 18694986]
- Hwalek M, Straub V, Kosniewski K. Older workers: An opportunity to expand long-term care/direct care labor force. *The Gerontologist* 2008;48(Special Issue I):90–103. [PubMed: 18694990]
- Ingersoll-Dayton B, Saengtienchai C, Kespichayawattana J, Aunguroch Y. Measuring psychological well being: Insights from Thai elders. *The Gerontologist* 2004;44:596–604. [PubMed: 15498835]
- Kayser-Jones JS, Wiener CL, Barbaccia JC. Factors contributing to the hospitalization of nursing home residents. *The Gerontologist* 1989;29:502–510. [PubMed: 2521110]
- Liang W, Kasman D, Wang JH, Yuan EH, Mandelblatt JS. Communication between older women and physicians: Preliminary implications for satisfaction and intention to have mammography. *Patient Education and Counseling* 2006;64:387–392. [PubMed: 16872797]
- Lingard L, Albert M, Levinson W. Grounded theory, mixed methods, and action research. *British Medical Journal* 2008;337:459–461.
- Miles, MB.; Huberman, AM. Qualitative data analysis: An expanded sourcebook. 2nd Ed.. Thousand Oaks, CA: SAGE Publications; 1994.
- Morgan DL. Practical strategies for combining qualitative and quantitative methods: applications to health research. *Qualitative Health Research* 1998;8:362–276. [PubMed: 10558337]
- Morgan DL. Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research* 2007;1:48–76.
- Morse, JM. Principles of mixed methods and multimethod research design. In: Tashakkori, A.; Teddlie, C., editors. *Handbook of Mixed Methods in Social and Behavioral Research*. Thousand Oaks, CA: SAGE Publications; 2003. p. 189-207.
- Onwuegbuzie, AJ.; Teddlie, C. Framework for analyzing data in mixed methods research. In: Tashakkori, A.; Teddlie, C., editors. *Handbook of Mixed Methods in Social and Behavioral Research*. Thousand Oaks, CA: SAGE Publications; 2003. p. 351-384.
- Pillemer K, Meador R, Henderson C, Robison J, Hegeman C, Graham E, Schultz L. A facility specialist model for improving retention of nursing home staff: results from a randomized, controlled study. *The Gerontologist* 2008;48(Special Issue I):80–89. [PubMed: 18694989]
- Sandelowski M. Writing a good read: Strategies for re-presenting qualitative data. *Research in Nursing & Health* 1998;21:375–382. [PubMed: 9679813]
- Sandelowski, M. Tables or tableaux? The challenges of writing and reading mixed methods studies. In: Tashakkori, A.; Teddlie, C., editors. *Handbook of Mixed Methods in Social and Behavioral Research*. Thousand Oaks, CA: SAGE Publications; 2003. p. 321-350.
- Tashakkori, A.; Teddlie, C. Mixed methodology: combining qualitative and quantitative approaches. Thousand Oaks, CA: SAGE Publications; 1998. (Applied Social Research Methods, No. 46)
- Tashakkori, A.; Teddlie, C. *Handbook of Mixed Methods in Social and Behavioral Research*. Thousand Oaks, CA: SAGE Publications; 2003.

- Wiglesworth A, Mosqueda L, Burnight K, Younglove T, Jeske D. Findings from an elder abuse forensic center. *The Gerontologist* 2006;46:277–283. [PubMed: 16581893]
- Yeatts DE, Cready CM. Consequences of empowered CNA teams in nursing home settings: A longitudinal assessment. *The Gerontologist* 2007;20:323–339. [PubMed: 17565096]

Figure 1.
Basic Levels of Mixed Methods Data Combination