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Appraisal

Research Note: Thematic analysis in qualitative research

Qualitative research, the analysis of language and other non-numerical data, is critical to applied (including interventional) research.[1] It provides unique insight into peoples' experiences, including those related to healthcare systems, services and programs, in a manner that quantitative methods cannot.[1] Its value is increasingly being recognised by public health and funding bodies such as the US National Institute of Health.[2] However, qualitative research tends to be underrepresented in musculoskeletal and pain literature,[3] despite the highly subjective and complex nature of the topic area.

Added to this, applied health science researchers must often manage tension between practical constraints (such as time, funding, discipline-specific standards and required outputs) and the depth of qualitative analysis. This research note focuses on a type of qualitative analysis that is widely used in applied sciences – thematic analysis – and aims to help readers reflect on how this qualitative analysis method can best achieve their research goals.

When should I conduct qualitative research?

Qualitative research can be undertaken before, during or after an intervention or program of implementation, and with patients, clinicians and other stakeholders (Table 1, Figure 1). Some qualitative research may not be directly tied to the development of an intervention or implementation effort, and the study simply aims to better understand a phenomenon (termed 'Standalone' in Table 1); this type is common in social science disciplines.

Before quantitative research is undertaken qualitative research can help to understand the underlying context of the target population, their needs and their preferences for intervention goals, content and delivery formats. The goal of this research is often to inform intervention design; this can include analysis of qualitative data from co-design workshops (eg, transcripts, field notes) that depict how stakeholder input shaped the resulting intervention.

Qualitative research undertaken concurrently with quantitative research can take several forms. For example, 'think-aloud' studies, in

Table 1
Points at which qualitative research can contribute to a research program.

Study type/relationship to quantitative study	Purpose	Aim from example study
Standalone	• To understand phenomena or experiences, including those relating to usual practice • May provide background context • May inform intervention design or methods for evaluation	To seek physiotherapists' perspectives on patient adherence to exercise prescription for falls prevention and/or risk reduction in the Singapore setting[7] Research questions: What are the decision-making criteria and facilitating strategies that clinical educators use when increasing physiotherapy students' autonomy on clinical placement; and How do the criteria and strategies used by clinical educators relate to students' perceptions of their readiness to accept greater autonomy?[8]
Conducted prior to quantitative research	• To understand stakeholder (including patients and health professionals) needs and preferences regarding an intervention or implementation strategy • Often underpinned by a theoretical framework • Participants may be involved in developing solutions (co-design)	To identify the current practices of physiotherapists regarding promotion of physical activity within daily clinical practice, with a focus on referral to community-based structured physical activity opportunities for older clients and people of all ages with physical disabilities; to obtain input from physiotherapists to develop and refine strategies to help physiotherapists improve physical activity promotion and referral.[9]
Conducted concurrently with quantitative research	• To iteratively revise an intervention or implementation strategy • May be combined with quantitative data (eg, through surveys or analytics) • Often more pragmatic (depth of analysis more superficial)	To refine intervention to reduce inappropriate imaging referrals, increase psychosocial-oriented patient assessment and increase provision of patient education information (mixed methods study)[4]
Conducted after quantitative data is collected	• To evaluate and/or further refine intervention or implementation strategies; to understand the impact of the intervention • May be combined with quantitative data (eg, through surveys or analytics) • Often more pragmatic (depth of analysis more superficial) • Often underpinned by a theoretical framework	To explore the feasibility of delivering ESCAPE-pain in community venues, and the experiences of organisations and facilitators delivering it.[10] To explore the role of leadership by physiotherapists in implementing and sustaining an evidence-based complex intervention (ESCAPE-pain) for osteoarthritis.[11]

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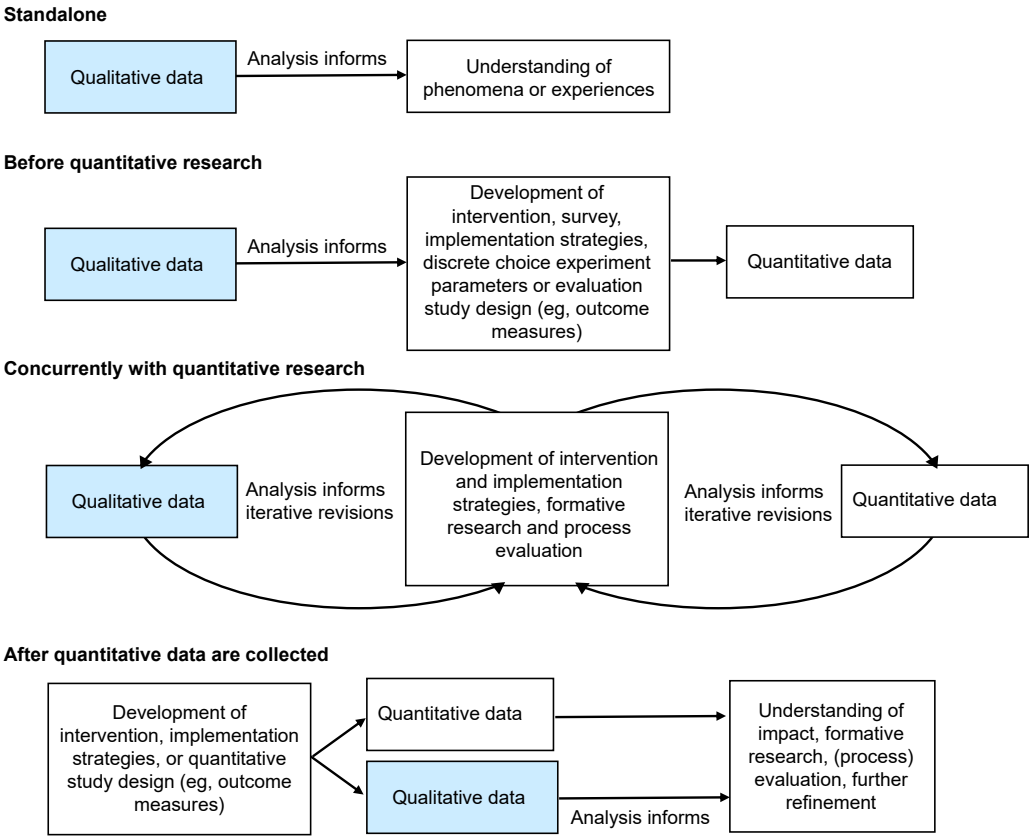

Figure 1. Points at which qualitative research can contribute to a research program.

which participants speak their thoughts out loud while engaging with an intervention, are widely used for evaluating and refining digital technologies, including innovative apps for pain management. Focus groups, interviews and field notes can also assist with iterative development of pilot programs (see Lin et al,[4] Table 1, as an example).

After quantitative research is undertaken (eg, after an intervention is implemented) qualitative research is fundamental to process evaluation efforts.[5] This often takes the form of a qualitative study nested within a trial. These findings elucidate the experience of the intervention and can shed further light on its success (or not), providing opportunities for further improvement and strategies to adapt it for different settings. Research questions could explore, for example, acceptability, adoption, feasibility and patient-reported outcomes such as satisfaction and quality of life.[6]

Which analytical approach should I take?

Thematic analysis comprises several analytical approaches, that each have different aims, philosophical underpinnings and methods. The philosophical underpinnings encompass ontology (beliefs about the nature of the world and what we can know about it), and epistemology (ways of knowing about the world, including the researcher's relationship to knowledge); both will shape the resulting analysis, and we encourage readers to take up the suggested readings in Table 2 on this topic.[12] Braun and Clarke have categorised thematic analysis into three broad approaches: coding reliability, reflexive thematic analysis and codebook analysis.[13] The benefits and trade-offs for each approach are now discussed.

Coding reliability thematic analysis (or content analysis)[13] is an approach to qualitative research that may feel most familiar to quantitative researchers. It is characterised by topic or domain summaries (or content codes) that capture the frequency of ideas, concepts and meanings expressed by participants, often at a more surface (explicit) level.[14] This approach inherently assumes that objective facts are 'in' the data, uncovered by the researcher. For this reason, researcher subjectivity is considered a bias that must be minimised, and interrater reliability statistics (agreement between coders) are often reported to demonstrate rigour. The benefit of this approach is that the data can be collected easily, for example, through open-ended survey questions, and analysis is relatively quick. However, this approach may not provide sufficient depth; coding reliability analysis will answer 'What is the most common barrier to adhering to an exercise program?' but won't necessarily help you understand why.

Table 2
Suggested further reading.

Topic	Description
Comparison of qualitative and quantitative research[24]	Describes differences between quantitative and qualitative research in the context of public health, with additional further reading
Qualitative analysis[25]	General conceptual overview of qualitative research, ontology and epistemology, with more detail about quality reflexive thematic analysis
Framework analysis[12]	General conceptual overview of qualitative research, ontology and epistemology, with more detail about framework analysis methods, a type of codebook analysis
Content analysis[26]	Comparison of content and thematic analysis
Person-centred intervention development[27]	Overview of how qualitative research can be used to develop interventions
Implementation science[6,15]	Further detail outlining how qualitative research can contribute to implementation outcomes
Using theoretical frameworks in qualitative research[21]	Systematic review investigating how use of the theoretical domains framework impacts on research findings
Sample size[19]	Discussion of 'information power' as an alternative to 'saturation'

Reflexive thematic analysis presents analyses as 'themes', described as patterns of shared meaning.[13] Themes may incorporate explicit ideas, concepts and meanings (eg, frustration when physiotherapists give vague or conflicting advice), as well as those that are implicit (eg, that physiotherapists who acknowledge uncertainty have inadequate skills or expertise). Quality reflexive thematic analysis recognises the inherent role of the researcher in constructing themes as they engage with the data.[13] As such, rigour is demonstrated through continual reflection, questioning and awareness of the researchers' roles in generating themes, rather than seeking consensus. Coding can be inductive ('data driven') or deductive (data are interpreted through existing research or theory), or a mixture of both. Although this approach is slower and more involved, it takes full advantage of the richness of qualitative data.

Codebook thematic analysis lies between codebook reliability and reflexive thematic analysis and is recommended for applied health research.[13] In this approach, themes are generated and charted into a framework; however, this framework does not determine reliability or accuracy, as it would for content analysis. Rather, the framework exists to help further develop themes, and is particularly useful for integrating efforts from multiple researchers.[14] Whilst the output of the analysis is 'themes', these can range from topic/domain summaries through to more fully developed themes. Similar to reflexive thematic analysis, codebook thematic analysis affords flexibility in the extent that inductive and deductive coding are used. Given implementation science's emphasis on theoretical frameworks, these studies often take a mostly deductive approach (themes align with components of these frameworks), whilst remaining open to other themes, which are developed through an inductive approach.[15] This approach is discussed in greater detail in the final section.

Further decisions in thematic analysis

The most appropriate approach to thematic analysis will depend on the research goals, desired outputs and practical constraints. The field of sport and exercise science has previously been criticised for conducting superficial and poor-quality qualitative analyses.[16] The following questions may help researchers to justify their approach and make deliberate decisions that balance pragmatic factors and quality and depth of analysis.[17]

What level of depth is needed?

This will depend on the extent that the research question focuses on internal, experiential and highly subjective narratives, and potentially the sensitivity of the topic area. For example, perspectives on the relationship between pain and exercise will almost certainly be better explored within the context of a person's life, goals and values. As such, this type of research question may be better suited to codebook or reflexive thematic analysis. Conversely, any of the three approaches described above may be appropriate for narrower research questions (eg, evaluating use of heat packs for managing back pain or identifying barriers and enablers).

What method of data collection is most appropriate?

Data collection methods should ideally suit the level of depth expected for analysis. For a more superficial analysis, open-ended survey questions may provide adequate and insightful data (eg, What are the barriers to using heat packs for back pain in emergency departments?). Focus groups are less resource-intensive than interviews, but are more logistically complex, including scheduling (especially clinicians), travel and catering; they are most useful for observing group discussion and reactions on a topic.

Sample size for codebook and reflexive thematic analysis should balance data breadth and depth against complexity of the analytic task. Although a priori sample sizes are not appropriate for qualitative research, an estimated sample size is often required for ethics or funding applications. Vasileiou et al[18] summarise various expert rules of thumb, which range from 15 to 20 individual interviews through to estimates of 50 to 60 participants, and emphasise that whilst a lower and upper range may be identified a priori, the final sample size is a product of ongoing reflection as the research progresses. Sample size will also depend on aspects such as the narrowness of the study aim, specificity of the sample, how established the existing research/theory is, the quality of the interview dialogue, and whether analysis focuses on singular experiences (eg, case studies) versus patterns across participants.[19] Larger samples may be appropriate for stratified analysis (eg, comparing findings for younger versus older participants).

Should I (or how should I) use a theoretical framework in my work?

This will depend on the norms within your discipline and other criteria by which the research is judged.[20] As discussed above, using a theoretical framework to deductively code qualitative data for an implementation project can ensure that findings align with concepts used in implementation science and may identify gaps or opportunities through the mapping process. But this must be weighed against the risk of missing or ignoring themes that don't align with the theory and developing superficial themes that feel 'done' simply because they have been mapped to the framework.[21] Three alternatives that allow for largely inductive coding but can still be informed by theoretical frameworks are:

a. Develop an interview schedule that incorporates important elements from the theoretical framework but still has flexibility to uncover additional unexpected concepts (see, for example, McDonald et al[22]).
b. Apply the theoretical framework only after themes are largely finalised (for the purposes of publication). This entails switching to a more deductive approach at the end of the analysis. In a journal manuscript, tables in the discussion section can help to make these links to theoretical framework and the practical implications of the research more explicit.
c. Ramanadhan et al[20] suggest that a two-step process may be appropriate when fast output is needed (eg, deductive coding into a framework followed by a second, more in-depth analysis that has a less rigid coding framework).

How do I know if my themes are superficial and how can I develop them further?

There is no clear 'endpoint' in qualitative analysis and there is no 'one quality standard criterion'.[13] However, the following may flag opportunities to increase the depth of analysis when using codebook or reflective thematic analyses:

a. Themes read as topics or domain summaries, or simply mirror the interview questions.[23] Braun and Clarke describe these as descriptive summaries of all information on a topic, but which do not reflect shared patterns of meaning or differences.[17] These themes often comprise a single word.
b. The scope of themes overlaps.
c. Themes feel disjointed and do not tell a coherent narrative.

Developing themes further is fundamentally about reflecting on connections between the data, themes and researcher. A researcher might refine themes, for example, by reflecting on the assumptions they or participants have made about the data (eg, asking; 'Why might the participant have said that?', 'Why didn't they say the opposite?', 'Which sections of the data stand out to me, and why?'). Involving other researchers (including consumers and other stakeholders) in theme development provides a different perspective on the data and can facilitate reflection.[17] Drawing diagrams or 'maps' can also be useful to explore relationships *between* themes.[23] This can

reduce conceptual overlap between themes and refine their descriptions and scope.

Conclusion

This research note discusses the value of qualitative research to applied health sciences. To make the most of qualitative studies, researchers must carefully consider which analytic approach will best achieve their research goals. We encourage researchers to make deliberate and reasoned decisions to balance the depth of analysis, whilst still providing timely and practical outputs. Further reading is provided in Table 2.

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References

1. Southam-Gerow MA, et al. *J Clin Child Adolesc Psychol*. 2014;43:845–850.
2. National Cancer Institute. https://cancercontrol.cancer.gov/sites/default/files/2020-09/nci-dccps-implementationscience-whitepaper.pdf. Accessed 13 August, 2021.
3. Tutelman PR, et al. *Can J Pain*. 2020;4:1–5.
4. Lin IB, et al. *BMC Family Practice*. 2016;17:44.
5. Moore GF, et al. *BMJ*. 2015;350:h1258.
6. Proctor E, et al. *Adm Policy Ment Health*. 2011;38:65–76.
7. Teng B, et al. *Disabil Rehabil*. 2021:1–9.
8. Clouder L, et al. *Physiother Theory Pract*. 2021:1–11.
9. West K, et al. *Int J Environ Res Public Health*. 2021;18:2963.
10. Hurley M, et al. *Musculoskelet Care*. 2021;n/a.
11. Walker A, et al. *Disabil Rehabil*. 2020:1–8.
12. Ritchie J, et al. *Qualitative research practice: A guide for social science students and researchers*. SAGE; 2013.
13. Braun V, et al. *Qual Res Psychol*. 2020:1–25.
14. Braun V, et al. *Couns Psychother Res*. 2020;21:37–47.
15. Hamilton AB, et al. *Psychiatry Res*. 2019;280:112516.
16. Braun V, et al. *Qual Res Sport Exerc Health*. 2019;11:589–597.
17. Braun V, et al. Thematic Analysis. In: Liamputtong P, ed. *Handbook of Research Methods in Health Social Sciences*. Singapore: Springer Singapore; 2019:843–860.
18. Vasileiou K, et al. *BMC Med Res Methodol*. 2018;18:148.
19. Malterud K, et al. *Qual Health Res*. 2015;26:1753–1760.
20. Ramanadhan S, et al. *Implement Sci Comm*. 2021;2:70.
21. McGowan LJ, et al. *Br J Health Psychol*. 2020;25:677–694.
22. McDonald S, et al. *Int J Behav Nutr Phys Act*. 2015;12:25.
23. Braun V, et al. *Qual Res Psychol*. 2006;3:77–101.
24. Carter SM, et al. *NSW Pub Health Bull*. 2009;20:105–111.
25. Braun V, et al. *Successful Qualitative Research: A Practical Guide for Beginners*. SAGE; 2013.
26. Vaismoradi M, et al. *Nurs Health Sci*. 2013;15:398–405.
27. Yardley L, et al. *J Med Internet Res*. 2015;17:e30.