

SAGE Research Methods Cases Medicine & Health Submission for Consideration

Case Title

A Mixed Method, Embedded Approach to Exploring Participation in an Exercise Referral Scheme

Author Name(s)

Coral L Hanson and Susan Dawkes

Author Affiliation & Country of Affiliation

Edinburgh Napier University, UK

Lead Author Email Address

Email: c.hanson@napier.ac.uk

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Contributor Biographies

Dr. Coral Hanson has worked as a research fellow in the School of Health and Social Care at Edinburgh Napier University since January 2017. Prior to this, she spent 20 years working in the public leisure sector environment. Her research has mainly focused on factors influencing participation in physical activity interventions for those with non-communicable diseases and resultant changes in physical activity behavior. She is currently involved in

several research projects; a mixed methods project examining how gender affects participation in physical activity interventions; the development and evaluation of a physical activity mobile health app to support participants in an exercise referral scheme and a feasibility randomized controlled trial aimed at increasing medication adherence among adults with atrial fibrillation using mobile health technology.

Professor Susan Dawkes is a registered nurse who has spent over twenty years working with cardiology patients in Scotland and Canada. Her clinical roles included nursing in acute cardiology units and latterly working as a specialist nurse in cardiac rehabilitation. Susan is currently Head of Learning and Teaching and a Professor of Nursing and Cardiovascular Health in the School of Health and Social Care at Edinburgh Napier University and an Honorary Research Consultant in the Cardiac Rehabilitation Department of NHS Lothian.

Susan is President of the British Association of Cardiovascular Prevention and Rehabilitation (BACPR) and represents BACPR on the International Council of Cardiovascular Prevention and Rehabilitation. She is the Deputy Convenor of the Association of Cardiovascular Nursing and Allied Professions (ACNAP) Education Committee for the European Society of Cardiology and on the editorial board of the British Journal of Cardiac Nursing. Her research interests align to her specialism and she is currently Principal Investigator leading a study exploring how engagement in an exercise referral scheme is influenced by the gender of people with non-communicable diseases.

Published Articles

Abstract

The case aims to highlight the potential of using a mixed methods embedded design to understand the effects of an intervention and provide greater understanding of how participant circumstances influence engagement. This case derives from larger a Burdett Trust for Nursing funded project exploring gender perspectives of engagement/non-engagement in an exercise referral scheme in Scotland, United Kingdom. This case focuses on exercise referral participants and gives insight into the value of comparing results, predominantly quantitative longitudinal telephone interviews, with qualitative face-to-face semi-structured interviews. It discusses how writing field notes can add to data collection, raise awareness of bias and aid analysis.

Learning Outcomes

By the end of this case study, the student should be able to:

- Explain why a mixed methods study using an embedded design is suitable to explore how people with a non-communicable disease engaged in an exercise referral scheme.
 - Provide an overview of the benefits and challenges of conducting mixed methods research with concurrent quantitative and qualitative data collection.
 - Reflect on how to minimise researcher bias and describe ways of minimising this.
 - Discuss the benefits and drawbacks to collecting data using longitudinal telephone surveys and face-to-face interviews.
 - Outline the benefits in making field notes when administering telephone surveys.
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Case Study

Project Overview and Context

Exercise Referral Schemes

This case study is part of a Burdett Trust for Nursing funded project exploring gender perspectives of engagement/non-engagement in an exercise referral scheme (ERS) in Scotland, United Kingdom. ERSs are one of the UK's most widespread interventions aimed at increasing physical activity (PA) and are designed to assist those with non-communicable diseases to become more active. Such schemes involve the referral of patients by healthcare professionals to a third party, predominantly leisure providers. Participants are then directed into targeted PA programmes, usually of 10-12 weeks in duration. An audit of Scottish ERS provision by Jepson, Robertson, and Doi (2010) indicated that 49 primary care schemes were in existence, providing access for 70% of GP surgeries, with a further 13 schemes aimed at secondary care. Despite this widespread provision in Scotland, there is little published evidence about whether these schemes are effective. Indeed, the need to understand what elements of such schemes work, and for whom, has been highlighted by the National Institute for Health and Care Excellence (2014).

Local Context for the Study

Fife is one of Scotland's 32 unitary council areas and has a co-terminus NHS Health Board (NHS Fife). Situated in southeast Scotland, it has a land area of 1,312km². Larger urban areas and an industrial economy dominate the south and west, the east is predominantly agricultural and the east coast has a tourism economy. The 2016 population of Fife was 370,330. By 2039, a population increase of 5.4% is predicted; with a 27.5% increase in adults of pensionable age and a 91.0% increase of those aged 75+ years (National Records Scotland, 2016). The cost of health and social care for older adults will be a key strategic driver for the

council and NHS Fife in coming years; therefore, there is a need to invest in interventions that will maintain good health for longer.

The Fife ERS accepts referrals from primary and secondary care. The scheme receives approximately 1,000 referrals per year, is time unlimited and accepts people with a range of conditions (cardiovascular disease, diabetes, stroke, multiple sclerosis, chronic obstructive pulmonary disease, rheumatic disease) as well as those who are undertaking pre-bariatric surgery weight management programmes and those who are considered at risk of falls. Referrers indicate participants' functional ability to take part in one of four levels of class:

- Level 1: limited standing balance, those requiring mobility aids or chair-based PA.
- Level 2: mobile (with or without a mobility aid) with some restriction in movement or activities of daily living.
- Level 3: independently mobile.
- Level 4: independently mobile and already physically active.

Activities include using the gym, circuit classes, and aqua-based activities. Each session costs £3.50. Scheme administrators allocate participants a venue based on postcode and invite them to attend sessions by letter. The scheme does not receive any National Health Service (NHS) funding.

Insider/outsider positioning in research

Gair (2012) discusses the notion of insider/outsider status, the degree to which a researcher is located in or outside the group studied. This status is based on common lived experience or status as a member of that group. Breen (2007), however, counters this in saying that the insider/outsider dichotomy is too simplistic and that to some extent all

researchers are insiders since they are humans studying humans. Indeed, Rowling (1999) reasoned that a researcher was neither out nor in, but ideally alongside and with. Having worked for almost 20 years delivering and managing ERSs but now a researcher, I identified with a blurring of boundaries between the insider/outsider positions. My status informed study design, as I understood the complexities of service provision. I could confidently discuss the ERS in depth with healthcare professionals, which helped participant recruitment. Conversely, I had to reflect whether my preconceptions created bias in study design and data collection. My co-author, Susan, who was also involved in data collection, is an experienced cardiac rehabilitation nurse. With an excellent understanding of PA interventions for those with cardiovascular conditions, she has instructed PA sessions for patients attending cardiac rehabilitation but has more of an outsider stance in relation to ERS. Following robust discussion with the whole research team, we agreed that this combination would help reduce the potential for bias.

This case discusses the participant element of a wider project developed after conversations between leisure trust staff and academics at Edinburgh Napier University. Internal ERS evaluation conducted by the leisure trust had identified that men were less likely to be referred, less likely to engage in the first instance and less likely to adhere if they did engage. The wider project also involved qualitative studies of ERS staff and referring healthcare professionals. For the participant study, a mixed methods approach allowed for (1) the collection of quantitative data assessing uptake, attendance, adherence and PA behaviour change by gender and (2) an exploration of ERS participant engagement/non-engagement experiences. This case focuses on longitudinal (baseline, 12 and 52 week) telephone interviews collecting quantitative data and face-to-face qualitative interviews with a purposive sample sub-group of study participants.

Section Summary

- Exercise referral schemes (ERS) are widespread in Scotland and aim to increase PA levels for people with non-communicable diseases
- The ERS studied had previously identified that men were less likely to be referred, to engage and to adhere to the scheme.
- The researchers involved in study were experienced deliverers of similar PA interventions but did not work for the organization delivering the ERS studied, which blurred the boundaries between an insider and outsider stance.

Research Design

Mixed Methods

As experienced researchers, we had both previously conducted mixed methods research and felt that this was the most suitable approach for this study. The philosophical underpinning of mixed methods research is unclear and for many decades, quantitative and qualitative researchers have disputed each other's research paradigms. Purists believe that these are separate entities; for example, Castro, Kellison, Boyd, and Kopak (2010) maintained that qualitative and quantitative research have different ontological and epistemological standpoints, which cannot be mixed. A more pragmatic approach has developed in the last 30 years however. Feilzer (2010) highlighted that mixed methods research has emerged as the third research paradigm, not replacing the other approaches but capturing the strengths and minimizing the weaknesses of a single method. Additionally, Teddlie and Tashakkori (2013) suggest that it is justifiable to use mixed methods if it is more appropriate for the research questions.

Where mixed methods are used, Creswell and Plano Clark (2011) suggest that researchers should consider the timing of the quantitative and qualitative ‘strands’, and how they will be mixed. Indeed, Bryman (2016) discusses combining qualitative and quantitative research at different stages in studies, e.g., research question formulation, sampling, data collection and data analysis. The weighting or emphasis of the strands should be explicit and considered before commencing any research to ensure the correct design.

Embedded Design

According to Creswell and Plano Clark (2011), an embedded mixed methods design is where one data set provides a supportive secondary role in a study based primarily on the other data type. This study had two main research questions:

1. Did adherence to the ERS resulted in short-term (12-week) and long-term (52-week) changes in self-reported PA behaviour, social support for PA, self-efficacy related to PA, and overall health and wellbeing?
2. How did participants’ perspectives of gender, circumstances, self-efficacy, health beliefs and personal experience affect uptake of, and adherence to, the ERS?

The study encompassed a main, primary quantitative phase of data collection and a subsequent qualitative phase, implemented partway through quantitative data collection. A challenge of using an embedded design is that the researcher must specify the purpose of collecting the qualitative data as part of a larger quantitative study. We felt that the secondary dataset would supplement the quantitative results, justifying our choice of study design. The aim of the qualitative investigation was to examine how participant personal factors influenced uptake and adherence. A further challenge of an embedded design is how to integrate the datasets, especially since in this case we were trying to answer two different

research questions. We planned to combine all results into one paper for publication, but with separate reporting of quantitative and qualitative results.

Planning the Quantitative Data Collection

Power calculations for the quantitative element stated that we should recruit 207 participants. Power calculations determine the number of participants required in a quantitative study to give a high chance of detection of a clinically or scientifically relevant 'effect or difference', if it exists. We were interested to understand short and longer-term effects of the ERS. Criticisms of ERS literature are a lack of one-year follow-up data and a failure to understand sufficient factors affecting engagement. We therefore planned three data collection points (prior to starting, after 12 weeks in line with much existing research and after 52 weeks). We chose telephone interviews because of the higher chance of response compared to postal questionnaires. We prepared a questionnaire for each time point containing validated instruments to measure PA, self-efficacy for PA, social support for PA, and quality of life. We created Microsoft Excel spreadsheets to facilitate the cleansing of data and calculation of scores.

The baseline questionnaire also contained questions about demographics and personal information (age, gender, postcode, ethnicity, employment status, education level, reason for referral, other medical conditions, attendance goals, willingness to pay, intended mode of travel to venue, and intention to attend). Subsequent questionnaires contained questions about attendance, location, time and type of session attended, facilitators and barriers to attendance, and other PA. We designed all questions with closed answers and referred to a randomised controlled trial protocol by Murphy et al. (2010) when choosing validated questionnaires. We pre-coded answers to allow for ease of data input into a statistics programme.

We calculated the time required for interviews, based on 30 minutes per interview, 10 minutes for data entry and 30 minutes for repeat telephone calls to make contact. This totalled 70 minutes for a maximum of 621 interviews. We felt that this would be challenging, but achievable, given that it was a three-year project with a full time research fellow.

Planning the Qualitative Data Collection

Since the overall project was about male participation/non-participation, we were particularly interested in understanding what happened to men after referral. We planned to recruit a purposive sample sub-group of 20 participants from the larger study to take part in face-to-face interviews after they had had the opportunity to participate in the ERS. We aimed to have a higher proportion of male interviewees but felt that it was important to have some female perspectives, to help explain why the scheme worked better for women. We wanted to select a mix of non-engagers, those who had dropped out and those who were continuing to attend the ERS to explore a range of participant experiences.

We constructed an interview guide containing a list of key areas and example questions for the interview. We based these on evidence from published literature, for example a meta-synthesis of qualitative studies of gender and access to cardiac rehabilitation by Angus et al. (2015), and our own qualitative ERS work (Hanson et al., 2019). These suggested that although gender differences were apparent, there were intersecting influences such as age and social circumstances. Our questions needed to explore these possibilities. The study steering group, which included an ERS participant, considered the interview guide and made suggestions for changes. Susan, who was conducting these interviews, was an experienced qualitative interviewer.

Our intention was to recruit participants to this part of the study via the quantitative interviews. During the first telephone interview, we asked participants if they would be willing to take part in a face-to-face interview later in the study. We stressed that we would only be interviewing a few people in this manner and even though they gave consent to be interviewed not everyone would be chosen.

Quantitative Data Analysis

We planned statistical analysis of quantitative data using SPSSv23®. This focused on two key areas; (1) demographic predictors of engagement and adherence, and (2) changes in PA behaviour, social support for PA, self-efficacy related to PA, and quality of life.

Descriptive statistical analysis would summarize participant characteristics recorded at baseline (e.g., gender, age, deprivation quintile, reason for referral, number of co-morbidities). Each participant would be classified as a non-engager, dropout (attended <50% of weekly sessions), low adherer (attended 50-69% of weekly sessions) or high adherer (attended \geq 70% of weekly sessions). We would combine all those who attended at least one session to calculate uptake. We would use univariate and multivariate analyzes to assess whether demographics (gender, age and deprivation quintile) and other referral factors (reason for referral and number of co-morbidities) predicted uptake, dropout and adherence.

Repeated measures analyzes would be used to assess whether there were significant changes compared to baseline after 12 and 52 weeks for self-reported PA behaviour, self-efficacy for PA, social support PA, and quality of life. The tests used would be determined once we had assessed whether the distribution of data were normal.

Qualitative Data Analysis

We audio-recorded the interviews and transcribed them using intelligent verbatim, a style of transcription that leaves out fillers, such as ‘um’ or ‘you know’ and repeated words, and amends slang words so that, for example, ‘gonna’ will become ‘going to’. Our intention was to analyze data using the framework approach to thematic analysis suggested by Ritchie, Lewis, and O'Connor (2003). The authors developed this approach in the context of evaluating effective delivery of social policies and programmes. It is a matrix-based method for analyzing, managing and making sense of qualitative data. The process involves indexing initial concepts, using a charting process to synthesize data and constructing typologies.

We planned to undertake initial data analysis -alongside ongoing interviews. Using NVIVO12® to organize data, we would separately create open nodes to record preliminary concepts for three transcripts. At a data workshop involving all researchers in the study team (n=6), we would establish agreed codes to form an initial analytical framework. After analyzing three more transcripts, we would refine the framework to use for all cases. We would then create a matrix to allow for the exploration of connections within and between participants and categories. We would develop themes that identified participant perspectives of what influenced uptake and adherence to this ERS and experience typologies if appropriate.

Section Summary

- Mixed methods research is described as the third research paradigm, which is suggested to capture the strengths and minimize the weaknesses of a single research method.

- It is essential to consider the research question(s) and determine if both qualitative and quantitative data are required.
- If a mixed methods approach is required, the study design will be determined by the timing and priority of the quantitative and qualitative data strands and consideration should be given to how data will be mixed.

Research Practicalities

Recruitment considerations

We planned for recruitment to take place over an 18-month period, between August 2017 and January 2019. Given the research question, we wanted to try to recruit some participants who would not attend the scheme after referral. From previous research and work experience, we knew that those referred would be predominantly older and have multiple co-morbidities. We were aware that not all those referred would engage with the ERS and that those who chose not to start would be difficult to engage in research. An additional challenge was that the scheme in this study did not speak to participants to arrange an initial visit. Instead, the scheme administrator sent a letter to those referred inviting them to attend their local venue on a defined day. For non-attenders, there was no further contact. We considered that trying to recruit via the ERS would lead to a sample biased towards those more likely to attend.

The ideal time to recruit therefore seemed to be at the point of referral from the NHS. Due to data protection issues, we were unable to recruit patients directly. This was because we could not access personal details until we received signed consent to contact potential study participants. We recruited healthcare professionals to inform patients about the study at the point of referral. We recognised the challenge with this as time constraints for

consultations may have meant some potential participants did not receive information about the study. Ensuring patients received the information was in the sphere of influence of the study team but not under our control. Anyone who expressed an interest received an invitation letter and an information sheet. They signed a consent form agreeing for their contact details (name, address and telephone number) to be passed on to the study team via the ERS administration. We attempted to contact participants by telephone a maximum of five times. We checked for continued consent to take part in the study at the beginning of each telephone call. Choosing not to take part in the study did not affect participation in the ERS.

Ethical considerations

As we wanted to recruit study participants at the point of referral, via healthcare professionals, we needed ethical approval from the NHS Research Ethics Committee and our University school ethics committee. For NHS approval, we completed an ethics application via the Integrated Research Application System, then applied for research and development approval from NHS Fife, and gained approval from the Caldicott Guardian. Although NHS healthcare professionals referred patients, a charitable leisure trust delivered the ERS. This meant that we needed to create a data sharing agreement to allow the transfer of information from the leisure trust to researchers.

Section Summary

- Recruiting participants at the point of referral to the intervention aimed to limit bias towards those most likely to engage.
- Since the study involved healthcare professionals informing patients about the research, it required NHS ethical approval.
- When conducting longitudinal interviews, consent to participate should be checked at each interview.

Method in Action

Recruitment

Recruitment took place over an 11-month period, between March 2018 and February 2019, rather than the initially planned 18-month period. This was because of issues that we experienced during the NHS ethics and research and development approval process. These related to confusion about whether the ERS was an NHS service (it was not), which influenced research permissions and clearances. This meant that our challenging timescales became critical.

Once we had approvals in place, we needed to recruit healthcare professionals to tell patients about the study. To do this, we emailed all those who had referred more than five patients to the ERS in the previous year, telling them about the study. Where possible, we arranged to attend team meetings to explain the study in detail and give out participant materials. To encourage continued recruitment, we sent out graphical monthly updates about the study via email. In the 11-month period, we received 209 forms from healthcare professionals. We only recruited 136 (65%) of these to take part in the study, meaning that it was underpowered. This was frustrating, as we did not feel that this would have been an issue if we had been able to recruit for the planned 18-month period. We thought it probable that those who declined to participate in the study also chose not to attend the ERS. We had no way to check whether this was the case, as we securely destroyed their details after they declined.

Quantitative Telephone Interviews

It took longer than anticipated to contact potential participants, and when I was successful, sometimes they were unclear about why I was telephoning. I needed to explain the study to each participant and check for consent at each interview. During our planning, we did not consider the time that needed to contact people (n=73) who decided not to take part in the study. This added to already challenging timelines. The participants were mostly older (65+ years) and many wanted to chat as well as answer the questionnaires. My ERS background influenced these conversations, as my natural inclination was to encourage participants to think about what might encourage increased PA (further discussed under practical lessons learned). Rather than being 30 minutes, interviews often took approximately an hour. Participants wanted to share stories about their previous participation in PA, feelings about referral to the ERS, and expectations/concerns about attending. We had not planned to audio-record these interviews, but it became apparent that we could add understanding to the study by making field notes about the interviews. These had the benefit of providing context when telephoning for repeated interviews and, in our opinion, helped to improve retention (which was 88% at 12 weeks and 59% at 52 weeks). The field notes also created a secondary qualitative dataset to analyze in parallel to the qualitative interviews.

We did manage to recruit some non-engagers in the study (approximately 20% of the sample). This justified our approach, as my previous work indicated ERS uptake to be approximately 80% (Hanson et al., 2013). It was more challenging to encourage these participants to take part in further interviews, but the detailed field notes helped to prepare for these conversations. If a participant did not attend the ERS, I informed them that the study was actually about people like them, as we wanted to understand why people did not go. I made a particular effort to recruit these people for face-to-face interviews.

Qualitative Interviews

Most participants indicated that they would be willing to take part in a face-to-face interview during their first telephone interview. During second telephone interviews, it proved challenging to get those who had not attended any sessions to agree to take part in a face-to-face interview. Susan conducted 19 interviews (15 men and 4 women) at the leisure facilities offering the ERS, but some of those who did not engage were reluctant to attend there. Despite this, we did manage to recruit two non-engagers to take part in the qualitative part of the study. Those who had dropped out seemed content to share their experience and the insight into the reasons for non-continuation. The largest proportion of participants interviewed were those who continued with the ERS. Given that we were able to engage 88% of those who completed initial interviews in second telephone interviews, we may have gained more uptake for non-engagers and dropouts by asking to record qualitative telephone interviews.

Data analysis

As we pre-calculated all validated instrument scores, we only entered the final scores that we would use to measure change into SPSSv23®. We had also pre-coded answers to demographic and personal factor questions, making variable labelling a simple task. We followed our planned statistical analysis, although we were aware that because the study was underpowered, there was a higher chance of non-significant findings. Unexpectedly, the field notes from the telephone interview provided a great deal of qualitative insight. We decided to analyze these data thematically using NVIVO12® and then compare findings with the qualitative element of the study. This created a large amount of unplanned extra work.

An external agency transcribed the qualitative audio-files for us. We ensured that the agency met GDPR requirements and that a data-sharing agreement was in place. As the recruitment period was so long, the interviews were interspersed over a year (August 2018 – August 2019) meaning that there was sufficient time to analyze data between participants. This allowed for the exploration of developing themes in later interviews and influenced selection of later participants to check the credibility of data interpretation. This approach to analysis and sampling draws from qualitative methods such as Grounded Theory, as discussed in Corbin and Strauss (2015).

In keeping with embedded design methodology, we analyzed each dataset separately, but then explored similarities and differences in qualitative and quantitative findings. For example, small increases in PA in the first 12-weeks were in keeping with qualitative participants reporting low intensity sessions, a focus on the social aspects of the scheme and once a week attendance.

Section Summary

- Delays in gaining ethical, and research and development approval shortened the study recruitment period, meaning that the study was underpowered.
- Planned quantitative interviews provided unexpected qualitative insight and the use of comprehensive field notes aided data collection.
- It proved difficult to encourage non-engagers to attend face-to-face interviews, even though this was the group of most interest to the study team.
- Qualitative and quantitative data were analyzed separately, but then qualitative findings presented alongside the quantitative results.

Practical Lessons Learned

Pre-existing knowledge and research bias

The majority of my research and work experience revolved around ERS. Since I was responsible for the quantitative interviews, I was not worried that my experience would create a research bias. However, these interviews created a qualitative dataset. While I tried to remain neutral, my previous employment meant that I had a natural inclination to relate to the scheme and at times found myself explaining to participants why certain things had happened (or not happened) between telephone interviews.

Several participants told me that they had made changes to their PA behaviour, not because of the scheme but because of their conversations with me. Patton (2002) discusses the need for reflexivity when considering the potential for bias within qualitative research. This emphasizes the importance of self-awareness and ownership of perspective. Given my blurring of insider/outsider status, I found the use of field notes, which doubled as a reflexive diary, very important in maintaining perspective and recognising where I have may have influenced participants. Could what participants were telling me be explained by the Hawthorne effect (Roethlisberger and Dickson, 1939), where individuals modify or improve their behaviour due to the attention they receive from researchers rather than the intervention itself? Was it possible that I created a bias in PA levels, if not uptake and adherence? This was a difficult question, and in the field notes, I recorded where participants had suggested this. This made it possible to run quantitative analyzes with and without these participants.

Taking field notes

I made extensive field notes during and after each telephone interview. Where possible, I wrote verbatim during the interviews. Typing these up took considerably longer than the time allocated for data entry. The closed responses planned for questions such as ‘what discouraged you from attending?’ and ‘what other PA are you doing?’ were too narrow to represent the complexity of participants’ circumstances. The following excerpt illustrates this for one 52-week interview. In the quantitative data, barriers to attendance was recorded as ‘sessions are too easy’ and other PA as ‘home-based exercise’

Had stopped attending the leisure centre some time ago. Started exercising at home with elastic bands and movement around the house to accumulate roughly 3,000 steps per day. Is still waiting for a double hip replacement operation, but this is due to the need for her having to achieve a total weight loss of 4 stone prior to surgery (has lost 2 stone to date). Is still attending the weight management program and is now on the maintenance section of the program, which will finish in December. She is confident she can continue the weight loss as per their instructions. Once she has had surgery she would not go back to the leisure centre activities because the exercises were too gentle and more of a social. She will aim to go outside walking and return to golf, which is the activity she has done previously.

Prior to this study, I considered field notes a reflexivity tool to help me to gain perspective and aid interpretation of data. As I conducted over 300 telephone interviews, we could not record and transcribe these data within the timescales of the project. The field notes provided valuable qualitative data. Although face-to-face interviews provided more depth, the numbers involved were far fewer.

Timelines and Study Dropout

We planned data collection for an 18-month period. This was foreshortened by the time taken to get appropriate permissions in place. On reflection, we should have discussed the complexity of service provision with NHS colleagues in more detail prior to applying for NHS research and development approval. This may have avoided the six-month delay.

We expected that if we successfully recruited non-engagers in the ERS, or dropouts, it might be difficult to engage them in further interviews. I tried to mitigate this by explaining to participants during the first interview that we were equally interested in those who did not attend. I reinforced this for anyone who had not engaged or dropped out at 12-weeks. This was effective, as we successfully engaged 88% of study participants in second telephone interviews. I found that I was most successful when I kept closely to planned dates for further interviews. I sent postal questionnaires to those who I could not contact at baseline and 12-weeks, but did not receive any responses. This was felt to be a poor use of my time, so I did not do it at 52-weeks.

At 52-weeks, many participants reported a deterioration in health that had prevented continued attendance at the ERS. This was perhaps not surprising given the age of many of those taking part, but it meant that some no longer wanted to participate in the study, despite assurances that we were interested in hearing why they had stopped attending. One person had died. I found this challenging as I had developed a relationship with study participants. If you are carrying out in-depth longitudinal health-based studies, there is a need to ensure that appropriate support mechanisms are in place to deal with any psychological issues that may arise for researchers.

Section Summary

- Reflexivity is an important concept that allows for consideration of how the researcher and the research process have shaped the data.
- The use of field notes can aid data collection and act as a reflective diary to help consideration of research practice and bias.
- One-year longitudinal data collection is challenging with older participants due to the potential for health deterioration and researchers should ensure that they have adequate support if this proves stressful.

Conclusion

This case highlights the use of an embedded mixed methods research design. We considered this the best method to answer predominantly quantitative research question about the short and longer-term effects of an ERS, but used qualitative methodology to provide context around participant perspectives of how gender, circumstances and health beliefs influenced engagement. The use of longitudinal telephone interviews to conduct quantitative investigation resulted in the creation of a valuable but unplanned qualitative dataset to complement the planned qualitative element. This highlights a need for reflexivity in data collection and being responsive to opportunities to provide greater insight. An embedded qualitative design allows for the addition of context to quantitative results, creating greater understanding of interventions studied.

Longitudinal interviews are advantageous in understanding intervention effect over time, but challenging in terms of retention in an older participant group with multi-morbidities. Stressing the importance of understanding non-engagement and dropout from the intervention during the first interview may increase retention to the study.

Section summary

- A mixed method embedded design has the potential to provide the benefits of qualitative context and understanding to a predominantly quantitative study.
- Longitudinal interviews are useful if understanding of intervention effect over time is required, but can be challenging in an older population.

Classroom Discussion Questions

1. What are the benefits of using an embedded mixed methods design in evaluations seeking to understand the effect of an intervention?
2. What are the pros and cons of using longitudinal interviews as a quantitative method in a study like this one?
3. Why is considering when to recruit participants for a study examining a longitudinal intervention important in terms of research bias?
4. What is the importance of field notes in qualitative research?

Multiple Choice Quiz Questions

1. A key advantage of telephone interviews for longitudinal questionnaire completion is
 - A. Telephoning potential participants is a quick and easy way to recruit people for a study.
 - B. You do not need to recruit as many participants.

- C. You are more likely to recruit and retain participants than if you use postal questionnaires.

Correct answer: C

2. An embedded research design is
- A. A mixed methods design where one data set provides a supportive secondary role in a study based primarily on the other data type.
 - B. A qualitative method design where the researcher works for the organization providing the intervention studied.
 - C. A quantitative method design where intervention staff routinely collect data, which researchers then analyze.

Correct answer: A

3. Doing a power calculation at the beginning of a mixed methods study is important because:
- A. You can use it to decide how many participants to include in the qualitative part of a mixed methods study.
 - B. It calculates the number of participants required in a quantitative study to give a high chance of detection of a clinically or scientifically relevant 'effect or difference' that results from the intervention, if it exists.
 - C. All research studies require a power calculation.

Correct answer: B

Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

Further Reading

Creswell, J. W., & Plano Clark, V. L. (2011). Key decisions in choosing a mixed methods design. In *Designing and conducting mixed methods research* (2nd ed., pp. 63–68). Thousand Oaks, CA: SAGE.

Lewis, J., & O'Connor, W. (2003). Carrying out qualitative analysis. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 220–262). London, England: SAGE.

Web Resources

References

Angus, J. E., King-Shier, K. M., Spaling, M. A., Duncan, A. S., Jaglal, S. B., Stone, J. A. & Clark, A. M. 2015. A secondary meta-synthesis of qualitative studies of gender and access to cardiac rehabilitation.(Report). *Journal of Advanced Nursing*, 71, 1758.

Breen, L. (2007). The researcher 'in the middle': Negotiating the insider/outsider dichotomy. *The Australian Community Psychologist*, 19(1), 163-174.

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford: University Press.

Castro, F. G., Kellison, J. G., Boyd, S. J., & Kopak, A. (2010). A methodology for conducting integrative mixed methods research and data analyses. *Journal of Mixed Methods Research*, 4(4), 342-360.

- Corbin, J. M. & Strauss, A. L. 2015. *Basics of qualitative research : techniques and procedures for developing grounded theory*, Los Angeles : SAGE.
- Creswell, J. W., & Plano Clark, V. L. (2011). Key decisions in choosing a mixed methods design. In *Designing and conducting mixed methods research* (2nd ed., pp. 63–68). Thousand Oaks, CA: SAGE.
- Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research, 4*(1), 6-16.
- Gair, S. (2012). Feeling their stories: contemplating empathy, insider/outsider positionings, and enriching qualitative research. *Qualitative Health Research, 22*(1), 134-143.
- Hanson, C. L., Allin, L. J., Ellis, J. G. & Dodd-Reynolds, C. J. 2013. An evaluation of the efficacy of the exercise on referral scheme in Northumberland, UK: association with physical activity and predictors of engagement. A naturalistic observation study. *BMJ Open, 3*.
- Hanson, C. L., Oliver, E. J., Dodd-Reynolds, C. J. & Allin, L. J. 2019. How do participant experiences and characteristics influence engagement in exercise referral? A qualitative longitudinal study of a scheme in Northumberland, UK. *BMJ Open, 9*, e024370.
- Jepson, R., Robertson, R., & Doi, L. (2010). *Audit of exercise referral scheme activity in Scotland March 2010*. Retrieved from:
<http://www.healthscotland.com/uploads/documents/12990-REO36auditExerciseReferralSchemesInScotland.pdf>:
- Murphy, S., Raisanen, L., Moore, G., Edwards, R., Linck, P., Williams, N., Ud Din, N., Hale, J., Roberts, C., Mcnaish, E. & Moore, L. 2010. A pragmatic randomised controlled

trial of the Welsh National Exercise Referral Scheme: protocol for trial and integrated economic and process evaluation. *BMC Public Health*, 10, 352.

National Institute for Health and Care Excellence. (2014). *Exercise referral schemes to promote physical activity*. Retrieved from <https://www.nice.org.uk/guidance/ph54>

National Records Scotland. (2016). *Population projections for Scottish areas (2014-based). Principal and variant population projections by age and sex for council, NHS health board, Strategic development plan and national park areas*. Retrieved from Scotland: <https://www.nrscotland.gov.uk/files//statistics/population-projections/2014-based-euro-var/pop-proj-scot-areas-14-corrected.pdf>

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: SAGE.

Ritchie, J., Lewis, J., & O'Connor, W. (2003). Carrying out qualitative analysis. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 220-262). London, England: SAGE.

Roethlisberger, F. J., & Dickson, W. (1939). *Management and the worker : an account of a research program conducted by the Western Electric Company, Hawthorne Works, Chicago*. Cambridge, Mass ; London: Harvard U.P.

Rowling, L. (1999). Being in, being out, being with: Affect and the role of the qualitative researcher in loss and grief research. *Mortality*, 4(2), 167-181.

Teddle, C., & Tashakkori, A. (2013). Mixed methods research contemporary issues in an emerging field. In N. K. Denzin & Y. S. Lincoln (Eds.), *Strategies of Qualitative Inquiry* (4th ed., pp. 135-167). Thousand Oaks, CA: SAGE.