

Physical activity Implementation Study In Community-dwelling AdulLts (PHISICAL): study protocol

Hannah Carpenter,¹ Sarah Audsley,¹ Carol Coupland,¹ John Gladman,² Denise Kendrick,¹ Natasher Lafond,¹ Philippa Logan,² Dawn A Skelton,³ Clare Timblin,¹ Stephen Timmons,⁴ Derek Ward,⁵ Elizabeth Orton¹

¹Division of Primary Care, School of Medicine, University of Nottingham, Nottingham, UK
²Division of Rehabilitation and Ageing, School of Medicine, University of Nottingham, Nottingham, UK

³School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, Glasgow, UK

⁴Centre for Health Innovation, Leadership and Learning, Business School, University of Nottingham, Nottingham, UK

⁵College of Health and Social Care, University of Derby, Derby, UK

Correspondence to

Dr Elizabeth Orton, Division of Primary Care, School of Medicine, University of Nottingham, Nottingham NG7 2RD, UK; elizabeth.orton@nottingham.ac.uk

Received 6 October 2017

Revised 1 December 2017

Accepted 15 December 2017

ABSTRACT

Background Falls in older people are a leading causes of unintentional injury. Due to an ageing population, injuries are likely to increase unless more is done to reduce older people's falls risk. In clinical trials, the Falls Management Exercise (FaME) programme has reduced the rate of falls and falls-related injuries in community-dwelling older adults. However, the commissioning of FaME is inconsistent across England, potentially due to a lack of evidence that FaME can be delivered effectively in a 'real world' setting. The PHysical activity Implementation Study In Community-dwelling AdulLts (PHISICAL) study is designed to study the implementation of FaME in a range of different settings in England.

Methods The PHISICAL study will use a mixed-methods, triangulation, multilevel design to explore the implementation of FaME. Framework analysis of semistructured interviews with up to 90 stakeholders (exercise programme users, service providers, referrers and commissioners) and observational data from locally led communities of practice will identify the factors that influence FaME's implementation. Quantitative, anonymised, routine service data from up to 650 exercise programme users, including measures of falls and physical activity, will allow assessment of whether the benefits of FaME reported in clinical trials translate to the 'real world' setting.

Conclusion The findings from this study will be used to develop a toolkit of resources and guidance to inform the commissioning and delivery of future FaME programmes. This study has the potential to inform public health prevention strategies, and in doing so may reduce the number of falls in the older population while delivering cost savings to health and social care services.

INTRODUCTION

Falls in older people are one of the leading causes of unintentional injury and represent a major public health problem worldwide.¹ Approximately one in three community-dwelling adults aged 65 years and over fall each year,^{2,3} increasing to one in two for those aged 80 years and over.⁴

In England, falls admissions account for 4 million hospital bed days each year,⁵ and hip fractures alone are estimated to cost the UK £2 billion.⁶ The personal cost of falling includes loss of confidence, increased social isolation and severe injuries that together are a significant factor in people having to

move from their own homes into high-cost long-term residential care.⁷ With the number of people aged 65 years and over predicted to increase from 10 million people in the UK in 2010 to 19 million by 2050,⁸ the burden of falls on individuals, families and the health and social care system will rise.⁹

Falling risk is increased by age-related muscle weakness that impairs balance and the ability to undertake activities of daily living such as standing from a chair or walking.¹⁰ Physical activity can play an important role in reducing this deterioration,¹¹ helping people retain their independence for longer¹² and reducing their risk of falls including injurious falls.^{1,13} For older people at low risk of falling, activities such as tai chi, dancing, Nordic walking and yoga may be suitable,¹⁴ but for people at a high risk of falling, a more structured approach targeting strength and balance is recommended.^{7,14,15}

The Falls Management Exercise (FaME)¹⁶ is a community-based exercise programme that aims to improve strength and balance and was originally recommended for older people at a high risk of falling^{13–17} but more recently has been shown to reduce falls in community-dwelling older adults at lower falls risk.¹³ It has also been shown to reduce injurious falls by 40%¹⁶ and increase moderate intensity physical activity levels, with the potential to improve other aspects of health.^{13,18} The programme is delivered by qualified Postural Stability Instructors (PSIs) in community venues such as village halls and leisure centres and consists of weekly 1-hour group exercise classes (approximately 10 participants per class) for 24 weeks. Participants are also advised to complete two 30 min home exercise sessions and two 30 min walks per week.^{13,18} The programme's exercise components include progressive strengthening and balance exercises targeted to the trunk, arms and legs, functional floor skills, cardiovascular conditioning, flexibility training and adapted tai chi. Ankle cuff weights, elastic resistance training bands and mats are also used throughout the programme. The group exercise sessions include retraining of the ability to get up from the floor and floor exercises to improve strength, balance and coping strategies to reduce the risk of complications from a long lie.¹⁹

However, despite clinical trial data supporting FaME's effectiveness in reducing falls



CrossMark

To cite: Carpenter H, Audsley S, Coupland C, et al. Inj Prev Published Online First: [please include Day Month Year]. doi:10.1136/injuryprev-2017-042627

Study protocol

rates,^{13 16} including among those with Parkinson's disease,^{20 21} such programmes are not consistently available to older people, or lack fidelity to the FaME programme, in the UK. For example, a national audit across England showed that 54% of falls services used the FaME programme, but the duration and dose was inadequate, and referrals from rehabilitation services to continuing community-based FaME programmes were lacking.²² In particular, fidelity to strength progression, home exercise adherence and duration of programme were inconsistent. This may be due to a lack of evidence that such programmes can be delivered effectively in the complex setting of a commissioned community service. It is therefore important to explore implementation of the FaME programme in a 'real world' setting to help understand factors that influence its successful delivery.

The Physical activity Implementation Study In Community-dwelling AduLts (PHISICAL) study is designed to examine the implementation of FaME commissioned and provided in organisationally (ie, different local government structures), geographically, ethnically and sociodemographically distinct English localities—Derby City and Leicestershire and Rutland Counties. The PHISICAL study will use qualitative and quantitative methods to explore this implementation, with the aim of generating generalisable findings related to the factors that influence the programme's effectiveness in a community setting. The objectives of the study are multilevel as follows:

- ▶ to identify factors that influence the successful implementation of FaME within the community using the Consolidated Framework for Implementation Research (CFIR).²³ This framework includes examination of the local context, leadership and support for implementation and facilitation of the programme. We will also combine this with quantitative data collected routinely by the services on factors such as completion rates and functional outcomes, to identify characteristics of poor and well-performing providers;
- ▶ to assess the fidelity of the delivery of FaME across multiple providers and settings using the Carroll conceptual framework for implementation fidelity.²⁴ This framework will allow us to combine qualitative information from interviews and from observations of class delivery using a check list, with quantitative data from routinely collected information such as class registers and questionnaires. This will include analysis of the coverage, frequency, duration and content of local programmes and factors that moderate these such as quality of delivery, facilitation strategies and participant responsiveness;
- ▶ to assess whether the clinical benefits of FaME found in previous trials, including reduced falls rates and increased physical activity^{13 16 17} are realised when FaME is delivered as routine service provision in a community setting.

METHODS

Study design

This is a multisite, mixed methods implementation study using a triangulation multilevel design as described by Tashakkori and Teddlie.²⁵ In this design, both qualitative and quantitative data will be collected concurrently in order to answer the three research objectives. The data will be given equal weighting when merged so that we can understand the characteristics of poor-performing and well-performing providers. This approach will allow us to gather the maximum amount of evidence to develop our understanding of FaME programme implementation. Given that it is a study of how the programme is implemented locally, focusing on barriers and facilitators to implementation, there is

no control group nor randomisation. The study will use qualitative interviews, observations of locally led Community of Practice (CoP) events, observations of FaME classes and analysis of before and after anonymised quantitative data collected routinely by service providers.

Data collection methods

Qualitative interviews

Up to 90 participants will be recruited for qualitative interviews. This will consist of interviews with:

- ▶ exercise programme users enrolled on a FaME course (up to 30) towards the end of the programme delivery period. Interview topics will include how the exercise programme users experienced participating in FaME and their plans for physical activity outside of the programme. We will use purposeful sampling to achieve a range of interviews from all of the provider sites in Derby, Leicestershire and Rutland and to achieve a range of ages and if possible a balance of male/female gender;
- ▶ service providers (up to 30), including PSIs and their managers, interviewed at two time points: early in the implementation phase and again towards the end of the programme delivery period. Interview topics will include how they experienced providing FaME, barriers and facilitators to delivery, how they would change the programme if they were to continue delivering it and what they feel would encourage exercise programme users to maintain physical activity at the end of the programme. We will use a snowball recruitment method to identify service providers, initially asking the commissioners who to approach. We will aim to recruit as many PSIs and their managers as possible (up to 30) in the full range of provider sites;
- ▶ referrers to FaME (up to 15) interviewed towards the end of the programme delivery period. Interview topics will include how they experienced the referral process and beliefs regarding benefits for exercise programme users. We will use a snowball recruitment method to identify referrers by asking the FaME providers who to approach. We will aim to recruit a range of referrer types (eg, general practitioners and occupational therapists) from a range of provider sites;
- ▶ commissioners of FaME (up to 15) interviewed at two time points: early in the implementation phase and again towards the end of the programme delivery period. Interview topics will include whether they felt FaME was effective and whether they would commission the programme again. As there are a small number of commissioners, we will use snowball sampling methods and aim to recruit all key commissioners in Leicestershire, Rutland and Derby with a responsibility for falls prevention.

Recruitment will continue until the planned sample size is achieved. If the number of potential participants within each category is less than that stated above, recruitment will continue until all potential participants have been approached.

Interviews with exercise programme users will take place at the participants' homes or at a convenient community location. Interviews with service providers, referrers and commissioners will take place at a convenient community location or over the telephone. Written informed consent will be obtained prior to the interviews taking place. Interviews will be audio-recorded and last up to 60 min.

See figure 1 for a flow diagram of exercise programme user recruitment, and figure 2 for a flow diagram of service provider, referrer and commissioner recruitment.

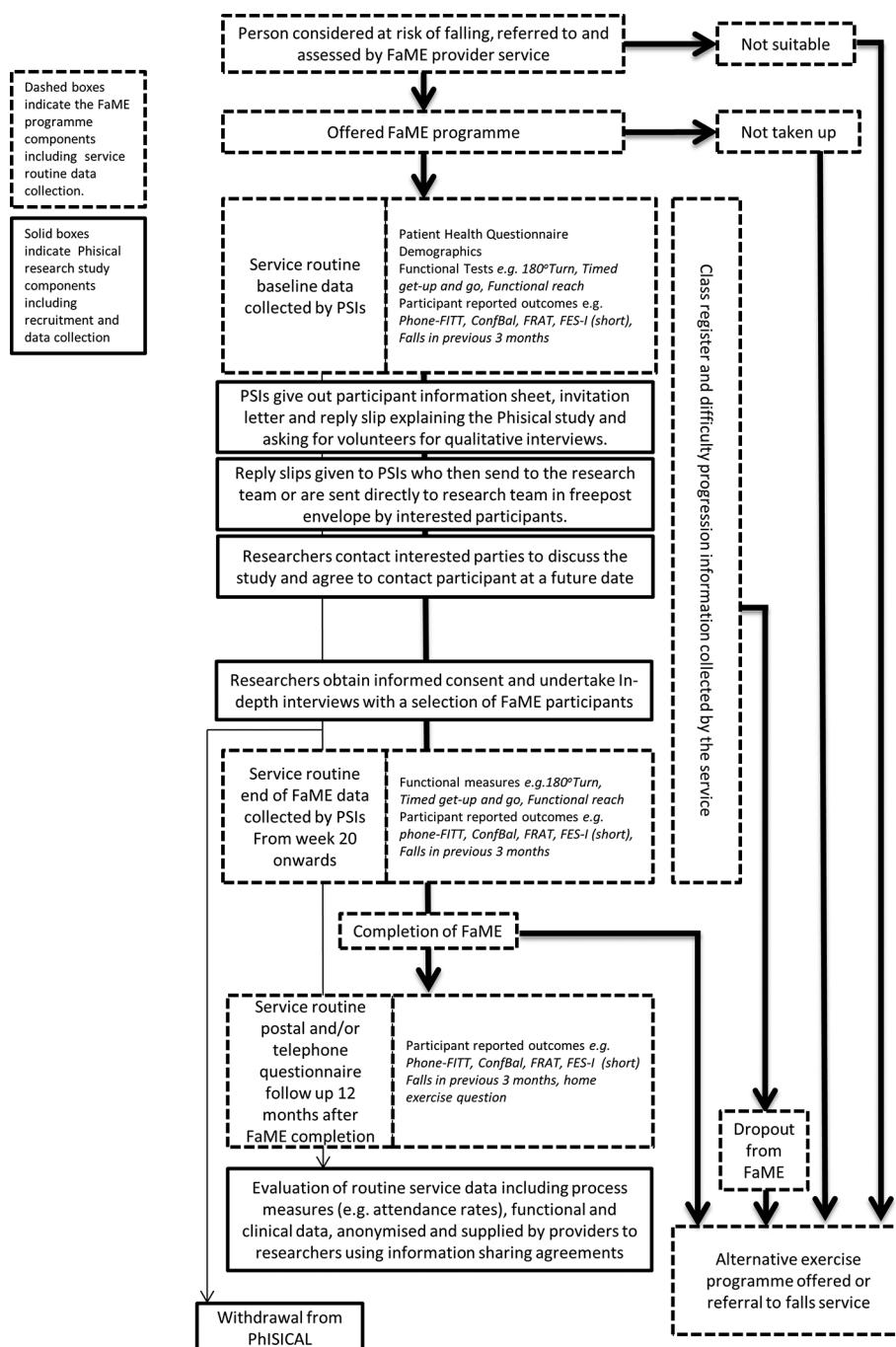


Figure 1 Flow chart for FaME participant recruitment into the PHISICAL study. FaME, Falls Management Exercise; PHISICAL, PHysical activity Implementation Study In Community-dwelling AdulLts; PSIs, Postural Stability Instructors.

Observation of CoP events

CoPs are ‘groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’.²⁶ They have been promoted as a way of enhancing knowledge and improving practice in the healthcare setting,²⁷ although the evidence supporting this is unclear.²⁸ The PHISICAL study will explore the degree to which CoPs assist in the successful implementation of FaME and the mechanisms involved, with the aim of creating a guide for future healthcare CoPs.

It is anticipated that up to six CoP events will take place during programme delivery in Derby City and Leicestershire

and Rutland Counties, and we will study each of these (up to a maximum of 6). Commissioners will invite stakeholders in each locality, including FaME exercise programme users, relevant professionals (eg, PSIs and physiotherapists) and third sector organisations (eg, Age UK). Invitations to attend will include a participant information sheet, stating that the event will be observed and recorded by the research team and will include a consent form for information. Attendees will be asked to provide written informed consent on arrival. The whole CoP event will be recorded as one data collection method, and the method of recording (videotaping or note taking) will be based on the group’s preference.

Study protocol

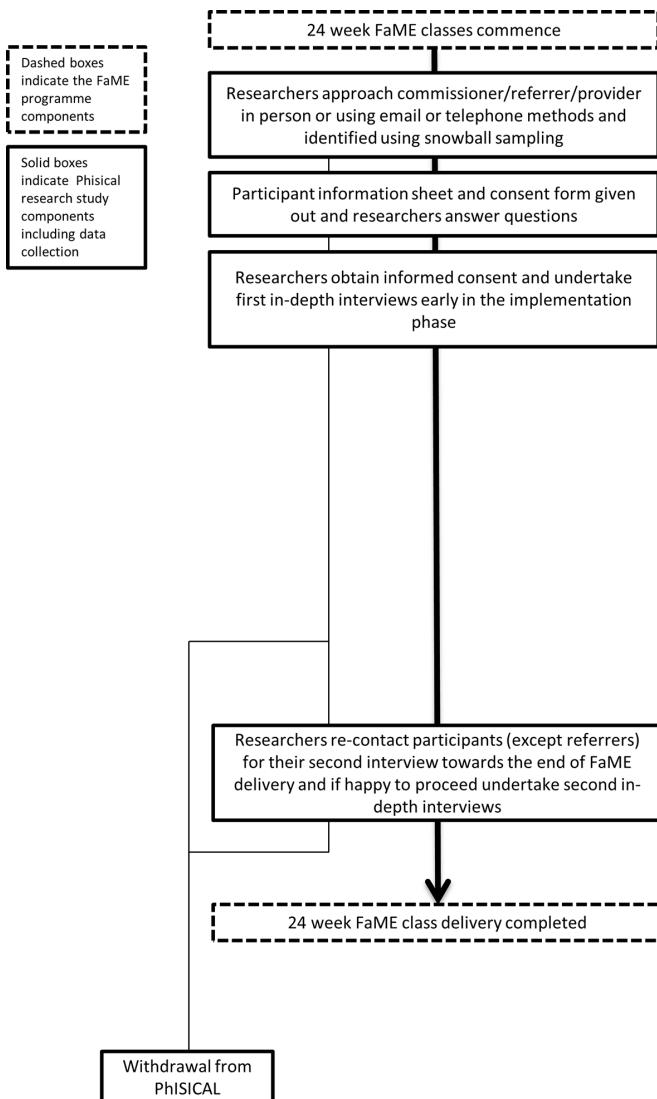


Figure 2 Flow chart for referrer, commissioner and provider participant recruitment into the PHISICAL study. FaME, Falls Management Exercise; PHISICAL, Physical activity Implementation Study In Community-dwelling AduLts.

Observations of FaME classes

All PSIs who deliver the FaME classes will be asked if they would agree to being observed for up to two classes per instructor. The first observation will take place early in the implementation phase, and the second will occur towards the end of the programme delivery period. It is anticipated that there will be up to 30 observations in total. Written informed consent will be obtained from the PSIs prior to the observations. PSIs will notify their class attendees verbally regarding the observations both the week before and on the day of the observation, with assurance that the observations are of the instructor and class delivery rather than their participation. Observations will last the duration of the class and will be monitored using a programme fidelity checklist as a content guide to assess FaME delivery consistency and quality as provided by the PSIs.

Routinely collected quantitative data

Quantitative data will be routinely collected by the service providers from all people participating in the FaME classes; it is anticipated that this will be a maximum of 650 people. Data

collected will include attendance, functional ability, number of falls, balance confidence and physical activity. The data will be shared with the research team on an anonymised basis under information sharing agreements.

The following functional assessments will be used:

- Functional Reach²⁹ as a measure of balance and falls risk
- The Turn 180³⁰ as a measure of dynamic postural stability and falls risk
- Timed get-up and go (TUG)³¹ as a measure of balance, mobility and falls risk.

The following self-reported clinical outcome measures will be used:

- Falls Risk Assessment Tool (FRAT)³² as a measure of falls risk
- ConfBal scale³³ as a measure of confidence in carrying out a range of basic activities without falling
- Short Falls Efficacy Scale-International (FES-I)³⁴ as a measure of concern about falling when carrying out a range of basic activities
- Phone-frequency, intensity, time and type (FITT)³⁵ as a measure of physical activity.

In addition, service providers will also collect and share the following anonymised routine data with the research team: demographic and socioeconomic information, diagnosed comorbidities, prescription medications, falls within the last 3 months (number, injuries sustained and medical care received), attendance rates and exercise difficulty progression (including balance challenge, strength progression and endurance intensity).

See [table 1](#) for an overview of the data collected at each time point.

Data analysis

Qualitative analysis

A framework analysis³⁶ approach will be used for all interviews and the data from the CoP events. The first five interviews will be coded to the CFIR and Carroll frameworks, which will then be amended to reflect new topics and concepts that are evident in the data. Once all interview data have been coded to the

Table 1 Overview of routinely collected quantitative data, collected by service providers at different time points

Outcome measure	Time point			
	Baseline	Throughout 24 week programme	End of FaME (24 weeks)	12 months post-FaME
Functional Reach	x		x	
Turn 180	x		x	
Timed get-up and go	x		x	
Falls risk assessment tool	x		x	x
ConfBal scale	x		x	x
Short FES-I	x		x	x
Phone-FITT	x		x	x
Demographic	x			
Socioeconomic	x			
Comorbidities	x			
Medications	x			
Falls in last 3 months	x		x	x
Attendance			x	
Exercise difficulty progression*			x	

*Including balance challenge, strength progression and endurance intensity.
FaME, Falls Management Exercise; FES-I, Falls Efficacy Scale-International; FITT, frequency, intensity, time and type.

amended frameworks, each framework will be reviewed, and those aspects most pertinent to the research objectives will be identified. This same approach will be used for analysis of the CoP events.

Transcribed interview data and CoP recorded data will be managed using the latest version of NVivo qualitative data analysis software (QSR International). All qualitative data will be coded by one researcher and then a sample will be validated by a second.

For the FaME class observations, a programme fidelity checklist, based on that used in the ProAct65+ trial¹³ will be used as a content guide, and findings will be summarised under identified themes. We will merge quantitative data with the qualitative data in the analysis to try to identify factors that lead to poor-performing and well-performing providers.

Quantitative analysis

Attendance rates (including dropout and completion rates), exercise difficulty progression, participant demographics and socio-economic data, comorbidities, medications, falls incidence rate over 3 months, functional assessments, compliance with home strength and balance exercises and clinical outcome measures will be described using frequencies, percentages, means and SDs, medians and IQRs as appropriate. We will assess what proportion of participants comply with the programmes inclusion and exclusion criteria as set out in the service specification provided by commissioners. Outcomes will be compared between baseline, the end of the 24-week FaME programme and 12 months post-FaME to allow comparison with the clinical benefits of FaME found in previous trials. The Functional Reach, Turn 180, TUG, FRAT, ConfBal scale and Short FES-I will be compared using paired t-tests (or non-parametric equivalent as appropriate) comparing values within participants at the end of the 24-week FaME programme with their baseline values and comparing values 12 months post-FaME with baseline values. The proportions of participants reaching the recommended government target of at least 30 min of moderate or vigorous activity at least five times per week¹² will be compared using McNemar's test comparing values at the end of the 24-week FaME programme and at 12 months post-FaME with baseline values. The rate of falls over 3 months will be compared using conditional Poisson or negative binomial regression as appropriate comparing values at the end of the 24-week FaME programme and at 12 months post-FaME with baseline values. In addition, multilevel models will be used to analyse changes compared with baseline accounting for clustering, as participants are attending different FaME classes. The multilevel models will be linear models for continuous outcome variables, logistic models for binary outcome variables and negative binomial models for falls incidence rates. Numbers and percentages of participants with missing data will be reported for all time points. We will use multiple imputation to replace missing values at baseline or follow-up and will compare results from analyses of multiply imputed data with the results of the complete case analyses.

We will assess whether there are differential effects by age (less than 75 years/ \geq 75 years), ethnicity, study site and sex for the outcome measures by adding interaction terms to the multilevel models, although this will be hypothesis generating as it is unlikely that we will have enough study power to detect these interactions.

All quantitative analyses will be conducted using the latest version of Stata.

Sample size

Exercise programme users (up to 30), service providers (up to 30), referrers (up to 15) and commissioners (up to 15) will be recruited for qualitative interviews based on the achievement of thematic saturation.³⁷

Quantitative data will be routinely collected by the service providers from up to 650 people as part of programme delivery. Based on a previous FaME clinical trial,¹³ this number of people means the PHISICAL study will have at least 80% power (5% significance) to detect:

- ▶ an increase of 5% from 40% before the FaME programme to 45% after in the proportion of participants doing at least 150 min of moderate or vigorous physical activity per week, assuming the proportion of discordant pairs is 0.15;
- ▶ a reduction in the mean ConfBal score of 0.5, assuming SD of 4.0;
- ▶ a difference of 0.1 in the FRAT score, assuming SD of 0.9;
- ▶ an incidence rate ratio of 0.75 (25% reduction in rate of falls) based on a negative binomial distribution.

These are based on the null hypotheses of no difference in the outcome comparing values before and after the 24-week FaME programme.

DISCUSSION

The implementation of complex interventions such as FaME remains poorly understood. This study will use qualitative and quantitative methods to explore its implementation when commissioned routinely as a community service. This will address the gap in the literature regarding how FaME can be implemented most effectively and whether the clinical benefits found in previous trials, including reduced falls and increased physical activity,^{13 16 18} translate to the 'real world' setting. This could in turn provide data that will be useful in the development of return on investment tools and will inform current UK commissioning recommendations on falls prevention interventions.⁹

The findings from this study will be used to develop a toolkit of resources and guidance to inform the commissioning and delivery of FaME. The research team will ask service providers and commissioners to provide the documents used during the implementation of FaME and will update these based on the findings of the study. The toolkit will include items such as a business case, service specification, service-level agreements, promotional materials (eg, leaflets used to recruit exercise programme users), quantitative routine data collection booklets and other forms/letters that were developed locally. Additionally, the toolkit will contain an evidence summary of the factors that influence the successful implementation of FaME in the community.

It is anticipated that the toolkit of resources and guidelines, developed from the findings of this study, will inform the commissioning of future FaME programmes in the UK and wider rollout across the health economy. This study therefore has the potential to inform public health prevention strategies, and in doing so reduce the number of falls and increase the quality of life of the older population while delivering essential cost savings to health and social care services.

Acknowledgements The study team would like to acknowledge the planned commitment from the Patient Public Representatives and Steering Group members to the oversight and interpretation of the research findings.

Contributors The study was conceived by EO, DK, JG, PL and DAS. HC and EO drafted this manuscript in consultation with all coauthors. All coauthors critically reviewed and approved the final version of this manuscript and response to reviewers' comments.

Study protocol

Funding The research was funded by the NIHR Collaboration for Leadership in Applied Health Research and Care East Midlands (CLAHRC EM) and Leicestershire County Council.

Disclaimer The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

Competing interests DAS is a director of Later Life Training, a not for profit training provider, delivering training to PSIs in delivery of the FaME programme. DAS will not have access to any raw quantitative data to look at efficacy and will not attend any CoP events or be able to influence the results or analysis of the study. DAS will, however, have access to raw data on quality assurance of the PSIs in order to provide feedback on fidelity and quality of teaching. All other authors have no competing interest to declare.

Patient consent Obtained.

Ethics approval This study was approved by the London-Chelsea Research Ethics Committee, reference number 16/LO/0396.

Provenance and peer review Not commissioned; externally peer reviewed.

© Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2018. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

REFERENCES

- 1 World Health Organization. In: Salas-Rojas C, ed. *WHO global report on falls prevention in older age*. France: Department of Ageing and Life Course, 2007.
- 2 Blake AJ, Morgan K, Bendall MJ, et al. Falls by elderly people at home: prevalence and associated factors. *Age Ageing* 1988;17:365–72.
- 3 Campbell AJ, Reinken J, Allan BC, et al. Falls in old age: a study of frequency and related clinical factors. *Age Ageing* 1981;10:264–70.
- 4 O'Loughlin JL, Robitaille Y, Boivin JF, et al. Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly. *Am J Epidemiol* 1993;137:342–54.
- 5 Royal College of Physicians. *National audit of falls and bone health in older people*, 2011.
- 6 Svedbom A, Hernlund E, Ivergård M, et al. Osteoporosis in the European Union: a compendium of country-specific reports. *Arch Osteoporos* 2013;8:137.
- 7 National Institute for Health and Care Excellence. *CG161 Falls in older people: assessing risk and prevention*, 2004.
- 8 Cracknell R. In: HoCL R, ed. *The ageing population*. London, 2010.
- 9 Public Health England. *Falls and fracture consensus statement: supporting commissioning for prevention*, 2017.
- 10 Myers AH, Young Y, Langlois JA. Prevention of falls in the elderly. *Bone* 1996;18:S87–S101.
- 11 Milanović Z, Pantelić S, Trajković N, et al. Age-related decrease in physical activity and functional fitness among elderly men and women. *Clin Interv Aging* 2013;8:549–56.
- 12 Department of Health. Team PAIn: ed. *Start Active, Stay Active: A report on physical activity from the four home countries' Chief Medical Officers*, 2011.
- 13 Iliffe S, Kendrick D, Morris R, et al. Multicentre cluster randomised trial comparing a community group exercise programme and home-based exercise with usual care for people aged 65 years and over in primary care. *Health Technol Assess* 2014;18:1–106.
- 14 Charters A, Age UK. In: Gillingwater CH, Lau K, eds. *Falls prevention exercises - following the evidence*, 2013.
- 15 Department of Health. Prevention package for older people resources. 2009 http://webarchive.nationalarchives.gov.uk/+/http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/DH_103146 (accessed 22 Sep 2017).
- 16 Skelton D, Dinan S, Campbell M, et al. Tailored group exercise (Falls Management Exercise -- FaME) reduces falls in community-dwelling older frequent fallers (an RCT). *Age Ageing* 2005;34:636–9.
- 17 Centers for Disease Control and Prevention. *Compendium of effective fall interventions: what works for community-dwelling older adults*, 2015.
- 18 Gawler S, Skelton DA, Dinan-Young S, et al. Reducing falls among older people in general practice: The ProAct65+ exercise intervention trial. *Arch Gerontol Geriatr* 2016;67:46–54.
- 19 Skelton D, Dinan SM. Exercise for falls management: rationale for an exercise programme to reduce postural instability. *Physiotherapy: Theory and Practice* 1999.
- 20 Goodwin VA, Richards SH, Henley W, et al. An exercise intervention to prevent falls in people with Parkinson's disease: a pragmatic randomised controlled trial. *J Neurol Neurosurg Psychiatry* 2011;82:1232–8.
- 21 Fletcher E, Goodwin VA, Richards SH, et al. An exercise intervention to prevent falls in Parkinson's: an economic evaluation. *BMC Health Serv Res* 2012;12:426.
- 22 Royal College of Physicians. *Older people's experience of therapeutic exercise as part of a falls prevention service*, 2016.
- 23 Damschroder LJ, Aron DC, Keith RE, et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci* 2009;4:50.
- 24 Carroll C, Patterson M, Wood S, et al. A conceptual framework for implementation fidelity. *Implement Sci* 2007;2:40.
- 25 Tashakkori A, Teddlie C. Mixed methodology. Combining qualitative and quantitative approaches. *Applied Social Research Methods* 1998;46.
- 26 Wenger E, McDermott RA, Snyder W. *Cultivating communities of practice*. Boston, MA: Harvard Business School Press, 2001.
- 27 Wenger E. *Communities of practice in health and social care*: Wiley-Blackwell, 2008.
- 28 Li LC, Grimshaw JM, Nielsen C, et al. Use of communities of practice in business and health care sectors: a systematic review. *Implement Sci* 2009;4:27.
- 29 Duncan PW, Weiner DK, Chandler J, et al. Functional reach: a new clinical measure of balance. *J Gerontol* 1990;45:M192–M197.
- 30 Simpson JL, Worsfold C, Reilly E, et al. A standard procedure for using TURN180: testing dynamic postural stability among elderly people. *Physiotherapy* 2002;88:342–53.
- 31 Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc* 1991;39:142–8.
- 32 Nandy S, Parsons S, Cryer C, et al. Development and preliminary examination of the predictive validity of the Falls Risk Assessment Tool (FRAT) for use in primary care. *J Public Health* 2004;26:138–43.
- 33 Simpson J, Worsfold C, Hawke J. Balance confidence in elderly people the CONFbal scale. *Age Ageing* 1998;27:57.
- 34 Kempen GL, Yardley L, van Haastregt JC, et al. The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling. *Age Ageing* 2008;37:45–50.
- 35 Gill DP, Jones GR, Zou GY, et al. The Phone-FITT: a brief physical activity interview for older adults. *J Aging Phys Act* 2008;16:292–315.
- 36 Ritchie J, Spencer L. *Qualitative data analysis for applied policy research. The qualitative researcher's companion*. London: Routledge, 1993:173–94.
- 37 Guest G, Bunce A, Johnson L. How many interviews are enough? *Field methods* 2006;18:59–82.