



Synopsis

Enabling health and maintaining independence for older people at home: the 'HomeHealth' Randomised Controlled Trial

Kate Walters^{1*}, Rachael Frost¹, Yolanda Barrado-Martín¹, Sarah Kalwarowsky^{1,2}, Louise Marston¹, Shengning Pan¹, Christina Avgerinou¹, Claire Goodman², Andrew Clegg³, Benjamin Gardner⁴, Jane Hopkins⁵, Farah Mahmood¹, Rebecca L Gould⁶, Rekha Elaswarapou⁵, Claire Jowett⁵, Dawn A Skelton⁷, Vari M Drennan⁸, Claudia Cooper⁹, Kalpa Kharicha¹⁰, Pip Logan¹¹, Matthew Prescott³, Gillian Thornton³, Tasmin Rookes¹, Jessica Catchpole¹ and Rachael Hunter¹

¹Research Department of Primary Care and Population Health, University College London, London, UK.

²Centre for Research in Public Health and Community Care (CRIPACC), University of Hertfordshire, Hatfield, UK

³Academic Unit for Ageing and Stroke Research, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK

⁴Department of Psychology, University of Surrey, Guildford, UK

⁵Public Contributors, London and Birmingham, UK

⁶Division of Psychiatry, University College London, London, UK

⁷Department of Physiotherapy and Paramedicine, Glasgow Caledonian University, Glasgow, UK

⁸Centre for Applied Health and Social Care Research, Kingston University, London, UK

⁹Wolfson Institute of Population Health, Queen Mary University of London, London, UK

¹⁰NIHR Policy Research Unit in Health and Social Care Workforce, King's College London, London, UK

¹¹Faculty of Medicine and Health Sciences, University of Nottingham, Nottingham, UK

*Corresponding author k.walters@ucl.ac.uk

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Abstract

Background: HomeHealth is a home-based, voluntary sector service supporting older people with mild frailty to maintain independence through behaviour change. Support workers discuss the person's priorities and enable setting/achieving goals around mobility, nutrition, socialising and/or psychological well-being.

Aims: We tested clinical and cost-effectiveness of HomeHealth for maintaining independence in older people with mild frailty in a randomised controlled trial.

Methods:

Design: Single-blind, parallel randomised controlled trial open between 18 January 2021 and 4 July 2023, with mixed-methods process evaluation.

Setting: Community-dwelling older people aged 65+ years with mild frailty from 27 general practices and community settings in London, Yorkshire and Hertfordshire.

Randomisation: Participants were randomised 1 : 1 to receive HomeHealth or treatment as usual.

Outcomes: Primary outcome was independence in activities of daily living (modified Barthel Index), analysed using linear mixed models. Secondary outcomes included frailty phenotype score, extended activities of daily living, well-being, psychological distress, loneliness, cognition, falls and mortality. Health economic outcomes included quality of life, capability and service use, including hospital admissions. Cost-effectiveness acceptability curves and cost-effectiveness planes were used to represent the probability of cost-effectiveness compared to treatment as usual.

Process evaluation: We conducted semistructured interviews with participants receiving the intervention, HomeHealth workers and other stakeholders supporting service delivery. Interviews were thematically analysed. Fidelity of audio-recorded appointments was assessed by two independent raters. We evaluated potential mechanisms of impact using data from appointments attended, types of goals set and progress towards goals.

Findings: We recruited 388 participants, mean age 81.4 years (standard deviation 6.5), 64% female and 94% White British/European. HomeHealth did not improve Barthel Index scores at 12 months (0.250, 95% confidence interval -0.932 to 1.432). At 6 months, we found small significant reductions in psychological distress (-1.237, 95% confidence interval -2.127 to -0.348), and frailty phenotype score (-0.252, 95% confidence interval -0.487 to -0.017). At 12 months, we found significant improvements in well-being (1.449, 95% confidence interval 0.124 to 2.775), reduced unplanned admissions (incidence rate ratio 0.65, 95% confidence interval 0.54 to 0.92) with lower associated costs (-£586/participant, 95% confidence interval -351 to -821). There were no differences in other outcomes. HomeHealth dominates treatment as usual with a negative point estimate for incremental costs (-796, 95% confidence interval -2016 to 424), positive point estimate for incremental quality-adjusted life-years (0.009, -0.021 to 0.039) and high probability of cost-effectiveness.

Process evaluation: Sixty-four semistructured interviews were completed, including 49 participants and 15 HomeHealth workers/stakeholders. The service was acceptable and safe, with good fidelity of delivery. Participants made progress on personalised goals, most working on enhancing mobility. They found the service empowering, and received emotional/practical support. Engagement was more challenging when participants identified no need for change, had significant memory impairment or new/declining illness. Flexibility around varying symptoms and incorporating behaviour change into existing routines promoted engagement.

Conclusion: HomeHealth did not improve independent functioning for older people with mild frailty. There were small significant improvements in frailty status, psychological distress and well-being and a 35% reduction in unplanned admissions, with high probability of cost-effectiveness.

Limitations: We used a pragmatic design with intervention delivery in real-world settings during/after the COVID-19 pandemic, potentially with more variability in delivery. Our findings might not apply to other geographical settings/healthcare systems.

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Synopsis

This report details the findings of a randomised controlled trial (RCT) of the clinical effectiveness and cost-effectiveness of a home-based health promotion intervention for older people with mild frailty, with parallel process evaluation and a funded study within a project exploring the impact of multiple long-term conditions (MLTCs) on outcomes. This was funded by a commissioned call by the National Institute for Health and Care Research (NIHR) Health Technology Assessment (HTA) programme (NIHR128334).

Introduction

Frailty affects approximately 12% of people aged over 50 years worldwide.¹ It is a state of increased vulnerability to stressor events, brought about by a reduction in physiological reserves across multiple body systems as we age.² Frailty is associated with multiple adverse outcomes, including increased risk of mortality, falls, hospitalisation, moves to long-term care and reduced quality of life (QoL).^{3–7} Healthcare costs, particularly inpatient costs, are also much higher for those who are frail.^{8–10} Frailty is,

therefore, a useful way to identify those who are at higher risk of poorer outcomes, and who may benefit from appropriate support to prevent decline.

Most evidence focuses on managing those with established frailty. International clinical guidelines for frailty recommend exercise programmes, particularly including resistance training; social support; comprehensive care planning; and supplementation with protein or calories if there is weight loss or malnutrition present.¹¹ There is clear evidence for the role of resistance training and, to some extent, nutritional and multicomponent interventions for frailty for this population, but more limited and mixed evidence regarding the cost-effectiveness of interventions.^{12–15} For those in the later stages of frailty, effective interventions often require intensive multidisciplinary approaches,¹⁶ which can be costly.

Evaluating early-stage interventions with a greater focus on preventing future decline may be a promising way to reduce the greater demand for health care that arises from an ageing population. There is evidence that people in the earlier stages of frailty are more likely to transition to robust states than those who are frailer.¹⁷ This also aligns with England's NHS Long Term Plan,¹⁸ which emphasises

prevention and ageing well through proactively identifying those who could benefit from targeted support to maintain their independence. However, there is uncertainty about the best way to do this. While multicomponent exercise has been shown to play an important role in frailty prevention,^{12,13,19,20} and nutritional interventions alongside exercise also show positive effects in earlier stages of frailty (pre-frailty),^{21–23} there is uncertainty about other components. For example, the inclusion of problem-solving therapy (PST) sessions alongside exercise showed no greater effects than an education course in one RCT,²⁴ whereas exercise plus cognitive-behavioural therapy was effective in older migrants with mild to moderate disability.²⁵ It is likely that not all domains will be relevant for each person, and that a broader intervention with a more tailored multidomain approach based on priorities selected by people themselves may be more widely applicable. This aligns with policy that emphasises the importance of person-centred care.¹⁸ However, approaches such as holistic preventative home visits or senior meetings at present have little evidence,^{26,27} while very intensive multidisciplinary interventions show better cost-effectiveness in those who are frailer.²⁸

In light of this uncertainty, based on evidence reviews,^{20,29,30} qualitative research³¹ and co-design with older people, healthcare professionals and other stakeholders,²⁹ we developed a new intervention targeted at older people with mild frailty to maintain their independence, 'HomeHealth'. This is a manualised, multidomain, personalised intervention based on behaviour change and delivered one-to-one for older people with mild frailty at home across six sessions over 6 months. See [Appendix 1](#) for details of the service. The development and content have been described in our earlier study report²⁹ and according to the Template for Intervention Description and Replication (TIDieR) checklist in our protocol.³²

Our previous feasibility RCT indicated that the HomeHealth service was acceptable, feasible to deliver and showed promise on key outcomes.²⁹ We therefore evaluated this service in a larger, national RCT to:

1. test the clinical effectiveness of HomeHealth in maintaining independence
2. determine the cost-effectiveness of HomeHealth
3. quantify the cost/savings of HomeHealth to different health and social care providers
4. explore the context, mechanisms and impact of the intervention for different populations (age, gender, deprivation, ethnicity, rurality) and barriers and levers to implementation at scale in an embedded mixed-methods process evaluation.

Methods for data collection and analysis

We conducted a large national two-arm, single-blind RCT in 388 people aged 65+ years with mild frailty living in the community. The full inclusion and exclusion criteria can be found in the protocol³² main trial papers.³³ The trial received favourable ethical opinion from the Social Care Research Ethics Committee on 2 July 2020 (20/IEC08/0013). Participants were recruited across three sites in London, Hertfordshire and Yorkshire between January 2021 and July 2022, with the final follow-up in July 2023. Participants were randomised 1:1 using a computer-generated random sequence stratified by site to receive the HomeHealth service or treatment as usual (TAU; no specific service, but ongoing primary and secondary care as indicated). Participants were assessed at baseline, 6 months (post intervention) and 12 months. The primary outcome was the modified Barthel Index (BI), to assess independence in activities of daily living (ADL). Secondary outcomes included Fried frailty phenotype (including physical activity International Physical Activity Questionnaire-Elderly), gait speed, grip strength, unintentional weight loss and exhaustion, independence in instrumental ADLs (Nottingham Extended Activities of Daily Living), well-being [Warwick-Edinburgh Mental Well-being Scale (WEMWBS)], cognition [Montreal Cognitive Assessment (MoCA)], psychological distress [General Health Questionnaire – 12-item version (GHQ-12)], loneliness (University of California Los Angeles Loneliness Scale – 3-item version), falls and mortality. Safety data, including adverse events (falls, emergency department attendances) and serious adverse events (SAEs), were collected at 6- and 12-month assessments, by self-report and from intervention arm support workers ad hoc and from review of general practitioner (GP) medical records at 12 months. The primary outcome (BI score at 12 months) and all other continuous outcomes were analysed by a blinded statistician using linear mixed models, including 6- and 12-month data, controlling for baseline BI score and site. Dichotomous outcomes were analysed using logistic regression.

For the health economic analysis, we collected data on QoL [EuroQol-5 Dimensions, five-level version (EQ-5D-5L)], capability [ICEpop CAPability measure for Older people (ICECAP-O)], and health and social care service use, including primary care, secondary care and community services and carer time/burden (GP medical notes, modified Client Service Receipt Inventory and an adapted iMTA Valuation of Informal Care Questionnaire). Quality-adjusted life-years (QALYs) gained and years of full capability (YFC) were calculated as the area under the curve using responses to the EQ-5D-5L and ICECAP-O

respectively. Cost-effectiveness acceptability curves and cost-effectiveness planes were reported to represent the probability that the intervention is cost-effective compared to TAU for a range of cost-effectiveness thresholds for a QALY and YFC gained.

We conducted a parallel mixed-methods process evaluation to explore the acceptability, reach, fidelity and mechanisms of impact for the service. Full details of the methods are reported in our process evaluation paper.³⁴ We compared characteristics of participants to data from the UK Census for the local areas to explore reach. We conducted semistructured interviews with a purposive sample of participants with diverse backgrounds and experiences, and those delivering and supporting delivery of the service. Participants were identified through a matrix of baseline and intervention adherence characteristics. These data were analysed using codebook thematic analysis. Goal type and goal progress were recorded at each appointment and summarised descriptively. Intervention sessions were audio-recorded and a random sample of 10% of participants' sessions were transcribed and analysed for intervention fidelity using structured checklists.

Figure 1 summarises the components of the HomeHealth trial. The trial was prospectively registered at ISRCTN54268283 on 22 April 2020. See our published trial protocol paper for further details.³² The statistical analysis plan is available at the ISRCTN registry, including a summary of the sample size calculation. Our full protocol, including a table of changes, is also available (www.isrctn.com/ISRCTN54268283).

This synopsis has been reported in line with the Consolidated Standards of Reporting Trials (CONSORT) checklist.³⁵ Where items were outside of the scope of this synopsis, we have highlighted where the information can be found.

We have published the main findings from this study across four papers (**Box 1**).

BOX 1 Papers discussed in this synopsis

Main trial paper: Clinical and cost-effectiveness of a home-based health promotion intervention for older people with mild frailty in England: a multicentre, parallel-group, randomised controlled trial³³

Process evaluation paper 1: A personalised health intervention to maintain independence in older people with mild frailty: a process evaluation within the HomeHealth RCT.³⁴

Process evaluation paper 2: Understanding how older people with mild frailty engage with behaviour change to support their independence: a qualitative study.³⁶

Health Economics paper: Funding Health Promotion Activities to Reduce Avoidable Hospital Admissions in Frail Older Adults (HomeHealth): Further Challenges to the 'Cost-Effective but Unaffordable' Paradox.³⁷

Results: key findings

Clinical effectiveness of the HomeHealth service

We recruited 388 participants between January 2021 and July 2022, of which 195 were randomised to HomeHealth. Mean age of participants was 81.4 years [standard deviation (SD) 6.5]; 249/388 (64.2%) were women and 364/388 (93.8%) were White British. HomeHealth showed no significant effect on the primary outcome, basic ADL (BI), compared to TAU, at 12 months [difference 0.250 points [95% confidence interval (CI) -0.932 to 1.432]]. Likewise, no effects were found at 6 months for the BI [difference -0.137 (95% CI -1.303 to 1.029)]. At 6 months, there was a small statistically significant reduction in psychological distress scores (GHQ-12 -1.237 points, 95% CI -2.127 to -0.348) and frailty phenotype scores (-0.252, -0.487 to -0.017, equivalent to a 5% lower score in the intervention group), in the HomeHealth arm compared to TAU, but no difference in instrumental ADL, falls, cognition, loneliness or well-being. At 12 months, there was a small significant increase in well-being (1.449 WEMWBS scale points, 95% CI 0.124 to 2.775) but no differences in any other secondary outcomes.

There were fewer SAEs in the HomeHealth group (55 in 38 participants vs. 85 in 51 participants in TAU), and no

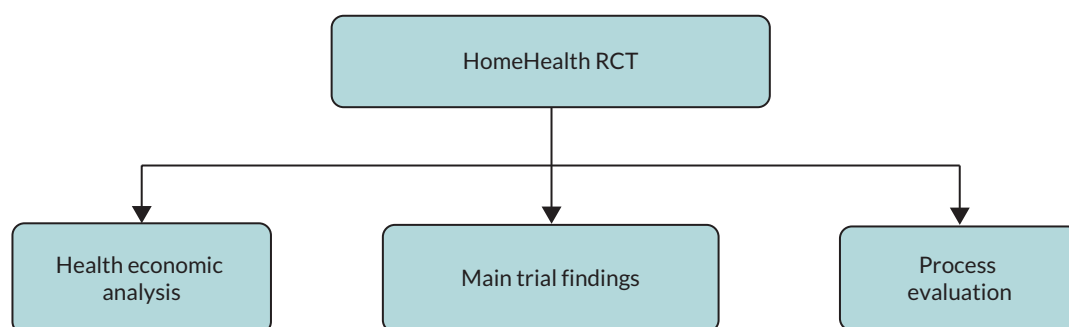


FIGURE 1 Summary of components of the HomeHealth Trial.

intervention-related SAEs. There were 6 minor reported adverse events related to the intervention (e.g. pain or fatigue with exercises) which all resolved with modifications to the goals set.

Based on these results, HomeHealth did not improve independence in older people with mild frailty, our primary outcome. It showed small significant effects on some of the secondary outcomes at 6 months (distress, frailty phenotype score) and 12 months (well-being). See our main trial paper for further details.³³

Cost-effectiveness of the HomeHealth service

The mean total cost per participant of the HomeHealth intervention using trial data was £457 per participant, including intervention time, travel time, intervention resources, training, supervision and overheads for providers, though this also included costs of time for trial-related tasks. Using a caseload model based on each full-time HomeHealth support worker having a caseload of 120 people per year (typical caseload data provided by our voluntary sector partners) and employed as NHS Band 5 workers, the delivery cost, including training and supervision, would be £295 per participant.

There was a significant reduction in emergency hospital admissions (incidence rate ratio 0.65, 95% CI 0.45 to 0.92) in participants receiving HomeHealth service versus TAU, leading to a reduction in costs of unplanned admissions of -£586 per person (95% CI -£821 to -£351). Total healthcare costs were also lower, but this was not significant (-£796, 95% CI -£2016 to £424). There was a significant reduction in unpaid carer hours at 6 months of -16 fewer hours per week per person (95% CI -18 to -14 hours) in those receiving the HomeHealth service or the equivalent of -£360 cost (95% CI -369 to -351) per person if carer time was paid at the same rate as a home-care worker. There were no significant differences in other costs (primary and community care, state-funded social care). There was no significant difference in QALYs in those receiving the HomeHealth service compared to TAU (difference 0.014, 95% CI -0.014 to 0.041). As the intervention had a lower mean cost per person, but slightly more QALYs, there is a high probability that the intervention is cost-effective at all decision thresholds, with a 92% probability of cost-effectiveness at a decision threshold of £20,000 per QALY gained. See our main trial paper and health economics paper for further details.^{33,37}

Process evaluation of the HomeHealth service

When comparing HomeHealth participants' sociodemographic characteristics to the Census 2021 local area data

in which they lived, we had slightly higher proportions of women, from White ethnic backgrounds, and 80 + years old than the proportion in their areas, but represented closely housing tenure, education level and deprivation level. See our process evaluation paper for details.³⁴ The service attendance was good, with 93.3% of intervention participants receiving the minimum dose of three or more appointments out of the six offered. Fidelity (delivery as intended, rated from audio-recordings) was overall good (81.7%).

Overall, 177 outcome goals were set by the 195 participants in the intervention arm. Of these, most participants chose a mobility goal ($n = 129/177$, 72.9%) as one of their overall outcome goals to achieve during the 6 months of the service, followed by psychological ($n = 29/177$, 16.4%), other (e.g. housing related, $n = 26/177$, 14.7%), nutrition ($n = 13/177$, 7.3%), and social ($n = 12/177$, 6.8%), with few choosing cognition ($n = 3/177$, 1.7%). After identifying an outcome goal, participants were supported by HomeHealth workers to set Specific, Measurable, Achievable, Relevant, and Time-Bound (SMART) goals. Participants set an average of 3.8 SMART goals each (range 1–12), and made moderate progress towards these (1.15/2 on a 0–2 rating scale).

Interviews with participants ($n = 49$), HomeHealth workers ($n = 7$) and other service delivery stakeholders (e.g. voluntary sector managers) ($n = 8$) showed the service was acceptable in its current form. Participants reported willingness to attend sessions, but there was more variable engagement with selecting and achieving goals as part of the service. Some who were highly engaged participants felt they made good progress across several goals, while others with poorer engagement either felt they were already doing what they could to promote their health or that little could be done about their problems. Participants who were enthusiastic about health promotion and preventing decline as a concept reported engaging well with goal-setting and action planning. Those less engaged with this approach reported valuing emotional and practical support provided by the support worker. Mobility goals were seen by both participants and support workers as the easiest to set initially and review progress towards, with other goals mainly identified after building rapport. New health behaviours (e.g. exercises) could be maintained after the intervention, where participants saw a clear benefit. Our process evaluation found the HomeHealth service identified needs, encouraged self-management and provided education, empowerment, ongoing support and continuity. Many participants felt enabled to link with local support organisations and services (e.g. psychological therapies, memory services, occupational therapy) and

participants reported feeling empowered to seek out and attend relevant health and support services, and express their views when attending. HomeHealth was felt to cover a gap in services by providing person-centred and continued support, and was implemented easily in voluntary sector organisations (VSOs). HomeHealth support workers felt further training around optimising goal-setting in people living with memory impairment and issues such as grief and bereavement would be valuable. See our process evaluation papers for further details of themes, including supporting quotes.^{34,36}

Discussion

Principal findings and achievements

We successfully conducted a high-quality pragmatic trial, recruiting over target across three diverse sites in England and retaining 86% of our participants, older people with mild frailty for 12 months, all during and after the COVID-19 pandemic. We showed no significant effects of the HomeHealth health promotion intervention on independence in ADL, our primary outcome. There were small significant effects on frailty phenotype score and distress at 6 months (immediately post intervention) and well-being at 12 months, with no significant difference in other clinical outcomes. There was a 35% reduction in unplanned hospital admissions with reduced associated secondary care costs in those receiving the intervention. There was no difference in state-funded care costs, which few participants received, but a significant reduction in informal care costs from family/friends of on average 16 fewer hours a week per person in those receiving the intervention.

Our process evaluation findings showed the HomeHealth trial participants were largely representative of the areas they were recruited from, with potentially lower proportions of people from minority ethnic populations. The service was acceptable, with good attendance of intervention sessions and fidelity of delivery of the intervention, albeit with some restrictions due to the COVID-19 pandemic. Our intervention was successfully delivered by our voluntary sector partners who felt the service was a good fit to their services and would be implementable at scale. Most but not all participants engaged with goal-setting, with most making progress to meeting their goals. However, the extent of engagement in goal-setting and action planning was variable. Some participants were highly engaged and made good progress with goals, whereas for others the process was more challenging due to developing new illnesses or increased illness burden over the intervention period, and some participants felt goal-setting was less

relevant for them as they were already engaging in health promoting activities or they felt there was little they could change.

Contribution to existing knowledge

Our trial showed that a low-intensity multidomain, individually tailored home-based behaviour change intervention was not successful in maintaining independence in ADL. This finding is similar to previous work which has shown mixed effects on basic ADLs, no effect on QoL, but some effects on instrumental ADLs in trials of complex interventions, including holistic assessment and care planning, largely delivered by community nurses.¹⁵ Previous studies of health promotion interventions have suggested that group-based exercise interventions for older people may be more effective than ones delivered individually in people's homes.¹² In our trial we were unable to support participants to attend local group-based exercise as intended due to the COVID-19 context, which might have contributed to this negative finding. However, in a study in a similar population (older people scoring with mild-moderate frailty in Taiwan), a more intensive approach of group exercise and PST showed little additional effects over an education and exercise session at home.²⁴ While many of our intervention arm participants chose mobility as an outcome goal, nearly a third focused on other goals (psychological, social, nutrition, etc.), and activities to address mobility were tailored to individuals and therefore varied. It may be that the mobility component of the intervention was not as intensive as needed.

As our intervention was tailored to person-centred goals chosen by participants, the content of the intervention varied across participants, which makes it challenging to identify suitable outcome measures that match the nature of the intervention. Our sample was close to the ceiling on our primary outcome measure (BI) at baseline and both arms did not deteriorate greatly in this measure over 12 months; this measure might lack sensitivity to change as an outcome measure in this population. We found small but significant changes in other measures, including psychological distress, frailty phenotype score and well-being, but not QoL. Other trials in similar populations have also shown significant reductions in frailty progression but no changes in functional ability measured by the BI.³⁸ In other studies of multidomain interventions in community-based older populations, no effects have been seen on QoL measures.¹⁵ We found a small but significant improvement in well-being (WEMWBS) at 12 months with the intervention, an important global outcome measure in older people that is commonly used within service evaluations in the UK

but has not often been reported as an outcome measure in similar trials.

The majority of our participants had some degree of cognitive impairment, with most scoring within the mild cognitive impairment (MCI) range on the MoCA. We also included participants with dementia, as long as they had capacity to consent and a carer to support their involvement. This is likely to have had some impact on capacity to engage with sustained behaviour change, and additional work undertaken by a PhD student (Tasmin Rookes) has suggested that those with higher degrees of cognitive impairment made less progress on their goals than those with normal cognition.³⁹ Tailoring has been identified as an important component for those with MCI or dementia to promote physical activity,⁴⁰ and where not addressed, this might have had an impact on our intervention effectiveness. Including training on modifying activities for those with MCI and dementia is important for those delivering behaviour change services with older frailer populations.

In our process evaluation, it was noted that while, on average, participants made progress on their goals, this was variable, with some highly engaged and motivated individuals making good progress, whereas others felt they were doing health promoting activities already and did not self-identify a need to increase these, or they felt they were unable to make further changes in lifestyle. This is consistent with other work reporting goal-setting can be challenging for some older people.^{41,42} In future work or implementation of this or similar services we would recommend a more extended initial assessment of potential participants to ensure they understood what a behaviour change service might involve and they were engaged with these concepts before offering the service. Another group identified in our process evaluation where behaviour change was more challenging were those who had a high symptom burden from MLTCs, with fluctuating symptoms and/or who experienced further new illnesses over the course of the intervention period. Previous work has suggested that goal-setting can be challenging in people with MLTCs.^{43,44}

One important finding from our trial was a 35% reduction in unplanned admissions, with an associated significant reduction in secondary care costs in those receiving the HomeHealth service. Largely driven by this reduction, our intervention had a high probability of cost-effectiveness. Furthermore, there was a significant and meaningful (~16 hours per participant per week on average) reduction in the hours for unpaid carers, and it thus also has the potential to reduce the opportunity costs and burden for

friends and family carers. It is interesting that we observed this reduction in care hours of support provided by informal carers during our intervention period in those receiving HomeHealth, but there was a lack of a corresponding significant change in perceived functional ability in our ADL measures. This may reflect differences between perceived abilities as measured in the instruments and actual needs, or potentially increased confidence in informal carers in providing less care support. Few other studies have explored the impact of such interventions on unpaid carer time. Our process evaluation reported the HomeHealth service helped identify needs, encouraged self-management, provided education, empowerment, links with local support services and continuity and supported participants to make progress on their goals. These components may have led to improved self-management, self-efficacy and use of community services, which in turn reduced unplanned admissions. Previous studies of multicomponent interventions in similar populations have shown mixed effects on reducing unplanned admissions and related costs.^{28,45–48}

In our trial, the improvement in frailty phenotype score at 6 months was driven by fewer people falling into the lowest physical activity group in those receiving the intervention. It may be that while overall activity levels were not significantly higher in the intervention arm, improvements in those who were the least active at baseline led to fewer admissions in a more vulnerable group. We also observed small improvements in psychological distress at 6 months on average with the intervention, but it may be that larger improvements in a sub-group with higher baseline distress led to fewer admissions in this group.

HomeHealth is thus a promising intervention to reduce unplanned admissions in a vulnerable population of older people with mild frailty, a population with an increased risk of such admissions.⁶ Overall, the service was acceptable in its current form, with good engagement and most would recommend the service to others. The service was delivered by trained support workers without specialist qualifications, who typically had previous VSO experience as care navigators, link workers or in social prescribing. HomeHealth integrated well within the services VSOs offer, with positive feedback from service providers and potential for wider implementation in this setting. This contrasts with many previous complex interventions tested in frailer older people, which have been largely delivered by highly skilled healthcare professionals such as nurses, physiotherapists and occupational therapists, who are in short supply in many health systems and costly to employ.^{12,15}

Strengths and limitations

We conducted a high-quality single-blind pragmatic RCT, recruiting to target with high retention rates above target, and were therefore fully powered to show a meaningful (above the minimal clinically important difference) difference in our primary outcome. Alongside this, we ran a large, successful process evaluation. We recruited a diverse population, including those from under-represented groups. Our participants were broadly representative of the local areas they were recruited from, but with potentially lower proportions of people from ethnic minority populations, which might be explained by the older age of participants (mean age 81 years). Our community outreach work was limited by COVID-19 impacts (see [Equality, diversity and inclusion](#)). We were unable to find any other trials with similar populations that had compared participants to local area data to compare our findings on local reach. Our trial was single-blind, and it was not possible to blind participants to intervention status. Our key outcomes were interviewer-administered by blinded outcome assessors, and rating of this demonstrated that blinding was largely successful. Our trial statistician was also blinded. Our data on healthcare use were extracted from GP medical records by blinded researchers, supplemented by self-reported data from participants on community services not routinely recorded by GPs. Our comparator group received 'treatment as usual' and information about resources relevant for older people with mild frailty at the end of the study period. The observed effects might therefore be due to the extra attention from support workers, rather than other aspects of the intervention, though our process evaluation suggests that there was a range of perceived benefits to the intervention through use of behaviour change techniques, for example, enablement, self-management and self-efficacy.

One of the key strengths of our pragmatic trial was that our intervention delivery was set up as close to the real world as possible, delivered by voluntary sector partners and trained support workers who needed no specialist qualifications, which increases the potential for implementation. However, this is also a potential limitation when determining intervention effectiveness, as there may have been some reduction in fidelity of delivery and dilution of effect, with less control of service delivery by the core trial team. We noted that while overall fidelity was rated as good (82%) from audio-recordings of intervention sessions, there was variability of this across sites and individual support workers, and some aspects were less consistent, for example, some goals were not SMART, and there may have been less progression in exercise intensity than desired, which was not rated in our fidelity assessments. In future studies, we would consider more active

monitoring of fidelity by the core study team during the intervention delivery, to identify areas where extra training or support might have been needed for some service staff. The content of multidomain interventions for older people with frailty are heterogeneous,^{12,15} which makes it challenging to compare across studies or synthesise these to derive conclusions across the body of evidence.

Impact of COVID-19 context

Our trial was conducted during the COVID-19 pandemic and its aftermath, which is likely to have had an impact on our trial and its interpretation. Our recruitment was initially paused in 2020, and was paused again later at one site in early 2021 due to COVID-19 restrictions. We had to modify the trial research assessments to be captured remotely if required due to COVID-19 restrictions. This included collecting data on grip strength and gait speed using questionnaires⁴⁹ in addition to our objective measures, and using the telephone MoCA for cognitive assessment (a shorter validated version for telephone use). We also offered remote delivery of the intervention, supported by the loan of free-internet-enabled tablets if needed; however, most participants opted to delay participation until they could be seen in person, with very few people receiving the intervention entirely remotely, and the majority of appointments (89.5%) being conducted face-to-face. For most participants, at least some (if not all) face-to-face appointments would have required the use of face masks as personal protection equipment restrictions for COVID-19, which might have impacted on rapport building and caused difficulties for those with hearing impairment. To mitigate this our hearing impaired patient and public involvement engagement member provided training to researchers and service delivery support workers on communication with people with sensory impairments and we provided transparent masks to improve communication. Participants themselves may have been impacted by the COVID-19 pandemic, with potential increase in loneliness, loss of confidence and deconditioning, with lower activity levels for some participants. The impact of COVID-19 has been found in some studies to be less than anticipated and positive impacts have also been identified, for example, feeling more connected to the local neighbourhood.⁵⁰ During our intervention period most local community group-based face-to-face activities, including local exercise classes, were suspended or closed. This meant one part of our intervention (enabling attendance at group-based local activities/classes) could not be delivered. Lastly, COVID-19 was a challenging time for our VSO partners, with all delivering their services working remotely and without a physical office in initial stages of the trial, and some turnover of staff. It was therefore more difficult for our support workers to integrate as part of the

larger team within their host organisations. Nonetheless, we had excellent engagement with our VSOs, who were invested in service delivery, enthusiastic and flexible when needed.

Patient and public involvement

The 'public voice' was threaded throughout all aspects of the HomeHealth study to benefit from their rich and unique insights and 'lived experience' as frailer older people and carers. As 'critical friends', their influence affected the overall design, management, oversight, intervention delivery, process evaluation and dissemination of the final outcomes.

Methods

Five main public contributors were involved throughout the study – Jane Hopkins, Rekha Elaswarapou, Maggie Kirby-Barr, Claire Jowett and Rashmi Kumar as part of the study team. Jane Hopkins was our patient and public involvement lead, a grant co-applicant and regular member of the Trial Management Group (TMG). Three further independent public contributors sat on the independent Trial Steering Committee (TSC) tasked with oversight of the study's progress and provision of feedback, comment, and recommendations. The profile of our public contributors (service users and carers) was designed to mirror our target participants in respect to age (over 65 years), long-term health conditions, increasing frailty along with existing links into community-based groups. Three (Jane Hopkins, Rekha Elaswarapou, MKB) were previously involved in the feasibility and intervention development study so were confident about helping shape the grant application, revising the trial process in the light of COVID-19, recruitment and guidance on the accessibility and content of participant information, manuals, and training materials.

The expert advice from Jane Hopkins and MKB who live with sight and hearing loss, proved instrumental in the significant improvement in the telephone delivery (tone, modulation, and speed) of the researcher's baseline assessments offered by role-play telephone sessions and also guidance around problematic mask-use for participants reliant on lip reading and facial cues. In the light of the impact of the COVID-19 pandemic, public contributors emphasised the importance of minimising digital exclusion, introducing study-funded tablets/training, offering the option to defer participation until face-to-face delivery could occur and raising the potential inequalities of using text messages as a recruitment method, which was not pursued as a result of their advice.

In terms of trial recruitment and retention, public contributors informed strategies to reach under-represented groups, emphasising the importance of this, through proactive outreach to local community groups and ensuring that the availability of interpreting services was adequately communicated. We worked with public contributors to develop two participant newsletters and a 12-month assessment reminder card. To build capacity to tackle the data evaluation, shape the dissemination strategy and replace MKB, two further new members (Claire Jowett and Rashmi Kumar) joined the team. Jane Hopkins, Rekha Elaswarapou, Claire Jowett and Rashmi Kumar all contributed to the process evaluation, including revising the participant materials and topic guides, attending data analysis meetings for the qualitative study, and providing feedback on initial and finalised themes. They informed our dissemination strategy and contributed to a range of study outputs (see [Study results](#)). All public contributors attended the Implementation Group twice a year alongside VSO representatives and HomeHealth workers to address any challenges in service delivery and plan future implementation.

Study results

Public contributors provided important input into trial processes, our equality, diversity and inclusion (EDI) strategy (see below) and process evaluation analyses. Trial recruitment and retention were both above target despite the COVID-19 pandemic, which was likely to have been strengthened by the input from our public contributors on our recruitment materials, study processes and newsletters, for example, on language/content of written materials. Communication with participants with sensory impairments was strengthened through guidance provided by Jane Hopkins and MKB.

All public contributors contributed to planning dissemination, through videos, conferences and our stakeholder symposium. All written material, including conference posters, participant leaflets, newsletters, plain language summaries and policy briefings, were scrutinised by public contributors and revised to ensure that the content and language used was curated for different audiences. Furthermore, members coauthored six peer-reviewed papers for publication. We sent all study participants and participating general practices a summary leaflet of the findings.

Discussion, conclusions and reflections

The HomeHealth RCT had substantial public contributor input into the setup, processes, analysis, interpretation and dissemination. Input likely strengthened the acceptability of trial processes and intervention delivery, particularly during the COVID-19 restrictions, our communications

to participants and the analysis and interpretation of our qualitative data. They also helped develop our dissemination and implementation strategy.

In order to support our contributors throughout, Jane Hopkins and the trial manager, Rachael Frost, implemented optional additional support group meetings for all public contributors to voice concerns, raise unmet access or training needs and act as a learning space. News of relevant online training, webinars and resources was circulated and a glossary of key terms and personnel produced. The group met four times during our set-up and recruitment phase in 2020–1, then stopped due to competing demands on contributor's time, ill health and lack of expressed need. Jane Hopkins undertook an accessibility audit with each contributor to check if extra personalised support was required and ensured printed copies of documents were made available to those unable to work on-screen due to neurodiversity or visual impairment, loans of software packages and funding agreed for accessible transport to meetings. During quieter periods in the trial (e.g. follow-up) where less input was required, there were fewer TMG meetings, and contributors fed back they would have liked further updates during this period. Our public contributors actively participated throughout the trial and provided valuable insights that improved the delivery and outputs of our trial.

Equality, diversity and inclusion

We embedded EDI principles throughout our study. Our trial was designed with diverse recruitment and representativeness in mind across a range of sites, and included a budget for translation of materials, interpreters and community engagement and provision of internet-enabled tablets with training for participants for digital inclusion. Experienced staff at trial sites (local GP practices) recommended that we did not translate written materials at the outset, as they felt most of those unable to read English would also not be able to read a written form of another language. We offered translation of materials if needed, interpretation services, and multilingual staff members. We received no requests for translation of study materials, had limited uptake of formal interpreters or use of our multilingual staff members, and no uptake of our offer of free internet enabled tablets – participants unable to use/with no access to their own digital devices opted to wait until COVID-19 restrictions lifted to have face-to-face meetings instead. Use of interpreters and multilingual staff members allowed for more people speaking limited English to be screened; however, most were ineligible and

resulted in only a small number of additional participants with limited English.

Frailty is common in all older people; however, studies suggest this can vary by ethnicity, deprivation level and migrant status. In data from London general practices, Bangladeshi, Pakistani and Indian older people were the most likely to be frail, while those of Black ethnicity were least likely to be frail.⁵¹ Similarly, in terms of frailty transitions, based on UK general practice data, those who are Asian are more likely to transition from mild to moderate frailty on the electronic frailty index than those who are White, with no difference for Black people.⁵² Our process evaluation evaluating the reach of our study compared to local area Census 2021 data showed that while most ethnic groups were slightly under-represented compared to those living in the local area, there was a larger gap for Asian participants. However, these demographic differences may reflect the older age of our sample (mean 81.4 years with mild frailty) compared to the available local area Census data (65+ years, general population). It is known that there are fewer people in England and Wales from minority ethnic groups in older age groups (80+ years).⁵³ For example, in Census data for all England and Wales, 5.3% of people aged 80–84 years were from minority ethnic groups, compared to 6.1% of our participants,⁵³ though this does not account for local variability. Although we carried out community outreach intending to reach more ethnically diverse and migrant communities, as most local community groups were closed due to COVID-19, our main access for face-to-face community engagement to support recruitment was through sheltered housing facilities or by using electronic mailing lists for community groups where face-to-face activities were closed, and this led to socially diverse but less ethnically diverse participants.

Our study is one of few that have assessed how far the intervention reached into the local expected community (population reach). Previous similar studies have reported reach in terms of numbers recruited versus those approached, or were limited to a description of the demographic characteristics of those recruited.^{54,55} One physical activity trial in people aged 45–75 years which assessed population reach found similar lower rates of recruitment in men and Asian people, but also lower recruitment of people from deprived areas.⁵⁶ Those who are more deprived are also more likely to transition from mild to moderate frailty, while sex and rurality do not impact on transitions.⁵² Although we slightly under-recruited men, this may be due to the older age of our sample. We reached people from a range of deprivation levels, and our

study sample's Index of Multiple Deprivation score was similar to that of people in the local area.

As in the early stages of the service the COVID-19 pandemic and its associated restrictions were still ongoing, we were only able to offer the service remotely in the first few months. Data from an Age UK report suggest in those aged over 75, 42% do not use the internet, despite an increase in use during the pandemic.⁵⁷ As such, we ensured that participants were approached by printed letter, and where only remote methods could be offered due to COVID-19 restrictions, we offered telephone and video conferencing, and the HomeHealth worker could provide phone support with technical issues such as connecting to the video call.

Finally, we recognised that while the concept of frailty offers a clinically useful way of stratifying a heterogeneous older population according to support needs and risk of poor outcomes, it can be a stigmatising term.⁵⁸ Our recruitment materials and screening processes specifically avoided the term 'frailty' and focused on encouraging older people to self-identify with symptoms of mild frailty. Likewise, frailty levels were not explicitly discussed during the intervention, but the focus was on an individual's assets, capability and difficulties. We feel the focus on symptoms and impact rather than use of a frailty label may have contributed to the high recruitment rates to the study.

Our five public contributors (two were from a minority ethnic group, two had difficulty using digital technology) were instrumental in informing and helping us deliver our EDI strategy, including plans for community engagement, plain language in our recruitment materials and considerations of language, communication strategies to use with participants and digital exclusion (see [Patient and public involvement](#)).

Impact and learning

Our findings showed that a personalised, tailored health promotion intervention delivered at home one-to-one for older people with mild frailty did not significantly increase independent functioning. It did, however, demonstrate a meaningful observed reduction by more than a third in unplanned hospital admissions and associated costs, which is a policy imperative, and a meaningful reduction in need for care/support from unpaid carers. There were also small improvements in psychological distress and frailty status at 6 months and well-being at 12 months. It was a rigorously developed, evidence and theory-based

and co-designed service. There was high acceptability and engagement, good safety (no intervention-related SAEs), it integrated well with VSO provider services and had modest delivery costs. Our VSO providers and support staff were very positive about the service and its value and potential for future implementation.

Our process evaluation identified areas to optimise delivery, including an initial assessment to enable engagement with the concepts of behaviour change and identify those who are ready and able to make changes in health-related behaviours prior to receiving the service, and maximising opportunities to optimise content (e.g. enabling exercise classes attendance, tailoring for cognitive impairment).

During the course of the trial, we showed that holistic health promotion interventions, including those involving exercise and nutrition, can be successfully delivered by non-specialist staff employed by VSO providers, and maintain good fidelity despite delivery in different areas. We showed that there is a demand for health promotion interventions from older people with mild frailty, and a willingness to attend sessions to support their independence. Currently, in the UK, VSO providers are commissioned to deliver a range of services for older people, which varies by locality, but often includes some form of social prescribing, link worker or care navigation service. We demonstrated in our trial that such staff can be trained and supervised in more extended health promotion roles, including teaching older people selected strength and balance exercises and basic dietary education. There is potential therefore for a service such as HomeHealth to be commissioned and delivered by VSOs more widely.

Our trial demonstrated a high probability (> 90%) of cost-effectiveness for the HomeHealth service across a range of decision thresholds and a meaningful reduction in unplanned hospital admissions. It has potential to be cash-saving, reducing secondary care costs and deliver a high return on investment across the wider health system. However, those commissioning the service do not directly benefit from this cash-saving, and with high competing demands, they would need to be provided with an incentive to invest funds in commissioning such a service, even one at a modest cost like HomeHealth (costing only £295 per participant, using a typical caseload model). This is a conundrum in the commissioning of health promotion services for frailty prevention more widely, and is discussed further in our health economics paper.³⁷ Our findings showed that the vast majority of care for this population with mild frailty was provided by unpaid informal carers, which is likely to be due in part to high thresholds for receiving state-funded care, meaning those with lower levels of

need (i.e. less-established frailty) are unlikely to be eligible. We demonstrated a meaningful reduction in this informal care (on average –16 hours per participant per week). This reduced informal carer burden in the short-intermediate term may translate into a lower demand for state-funded care in the longer term. Further research with longer-term follow-up could determine if these shorter-term benefits in reduced hospital admissions and informal care needs translate into longer-term benefits, such as reduced need for state-funded care and care home admissions.

Lessons for future research

We identified several lessons for future research projects:

1. A diverse sample can be achieved through general practice recruitment of older people, although face-to-face community outreach with under-represented populations may strengthen this. Remote community outreach (e.g. reaching out through e-mail lists/newsletters, etc.) did not improve diversity.
2. Offering study-funded internet enabled tablets with training was not effective in enabling digitally excluded older people to engage in a remote intervention. In our study, all participants who had no digital access chose to use the telephone or most often deferred to see someone face-to-face, which was the most popular modality.
3. Some older people with mild frailty find the concept of behaviour change, including goal-setting and action planning, difficult to understand and engage with, or feel no need to change their current health behaviours. For the former group, taking time to build a rapport and explain concepts using jargon-free language and identify goals over more than one appointment was helpful. Health promotion services or future interventions focused upon behaviour change should include sufficient time to explain concepts, and consider targeting those with a clear need and/or desire for change.

Related work

A PhD project by Tasmin Rookes was funded by the NIHR School for Primary Care Research ('Engagement with behaviour change interventions and maintenance of health promoting behaviour change in older adults with MCI'). As approximately half of our sample had MCI, this project has drawn upon data collected as part of the HomeHealth RCT to examine the impact of MCI on engagement with health promotion and behaviour change, and how services should be adapted to improve delivery of health promotion services for this population in the future.

Dissemination and implementation

We have undertaken or plan the following activities (see [Study results](#) for details):

1. Presentation of the findings to academic and other audiences in a range of conferences (geriatrics, gerontology, primary care, public health, health psychology).
2. We have published four papers from the main trial and process evaluation (see outputs).
3. Presentation of findings and discussion of the implications for commissioning HomeHealth at an in-person symposium with 51 key stakeholders, including VSO providers and commissioners from localities involved in our trial and beyond, and representatives from NHS-England in November 2023. This has informed the interpretation of our findings for policy and practice.
4. Presentation and discussion of implications of findings with Hertfordshire Frailty Board (part of Integrated Care System), March 2024, which informed the interpretation of health economic findings for Integrated Care Systems.
5. Plain language summaries distributed to participants and participating GP practices, November and December 2023.
6. Video summaries of findings and policy briefings prepared for distribution to key stakeholders and public (via networks, e.g. Age UK newsletters, and media) on publication of the main findings (available from the corresponding author).

Future work

We plan:

1. To seek funding for longer-term follow-up of participants using routinely collected health and social care data, to evaluate impact on health services use and state-funded care in the longer term.
2. An implementation study which evaluates the delivery and models the return on investment of integration of HomeHealth within social prescribing services in areas with under-represented populations or in other geographical settings.

Implications for decision-makers

Our large pragmatic trial across three regions of England evaluated a personalised multidomain health promotion intervention in older people with mild frailty and demonstrated a significant reduction by more than a third in

unplanned hospital admissions in those receiving the service. It has a high probability of cost-effectiveness and is likely to be cash-saving across the wider health system at scale. There was no significant difference in maintaining independence in ADL. Small improvements were demonstrated in frailty status and distress at 6 months and well-being at 12 months, and there was also a meaningful reduction (–16 hours per person per week on average) in the provision of informal (unpaid) care by friends and family. Personalised care for at risk individuals and promoting mental health and well-being are all NHS priorities. Almost all of our participants had MLTCs (on average 5.3 MLTCs per person) and personalised care for older people with MLTCs is an NHS priority. The intervention was provided at modest cost by VSOs. The service aligns well with other services VSOs provide (e.g. social prescribing) and with NHS workforce planning.

Our process evaluation showed that older people with mild frailty were able, with support, to engage with a behaviour change intervention, attend sessions and make progress on goals. Participants reported that the HomeHealth service identified needs, encouraged self-management, provided education and developed skills (e.g. strength and balance exercises), empowerment, enabled engagement with support services to address unmet needs, provided practical and emotional support and continuity. These are potential mechanisms for the observed reduction in unplanned admissions and reduced need for carer support. VSO providers were able to deliver the service consistently across the three regions, and felt it integrated well with other services they provided with good potential for wider implementation. The staff employed to deliver the service had no specialist qualifications and commonly had experience of working with older people in a VSO setting already, for example, as care navigators, link workers or social prescribers. They received brief training to deliver the service, using a ‘train the trainer’ model (a team leader was trained who then trained support staff) which worked well. Feedback from VSO stakeholders and our service delivery staff suggests that the HomeHealth service would work well as an extension to existing social prescribing/link worker services delivered by VSOs, who already commonly enable people to engage with local services primarily focused on social connections and mental well-being, but who do not have a behaviour change focus or training and do not currently typically support older people to undertake strength and balance exercises or modify their diet.

We feel that the potential for benefit in terms of cash-savings for the NHS system as a whole with reduced unplanned admissions, alongside reduced requirement

for informal carer time, and with the modest cost for HomeHealth and a setting where it can be delivered without causing strain on existing NHS staff, mean that HomeHealth should be considered for wider implementation and commissioning.

Research recommendations

1. Longer-term follow-up of interventions should be considered, as it might take longer for benefits to be realised in a mildly frail population, which should be explored in further research.
2. Evaluate which behaviour change techniques are effective and can be used routinely in practice as part of personalised care planning processes for older people becoming frail, including tailoring to overcome barriers due to symptom burden from MLTCs and cognitive impairment, which may be mild and unacknowledged.
3. Evaluate personalised interventions for older people with mild frailty that include more intensive home exercise programme with progression for those unable/unwilling to attend group-based exercise.

Conclusions

Our personalised, tailored multidomain intervention for older adults with mild frailty showed potential to reduce unplanned admissions and associated secondary care costs and informal carer burden, but demonstrated no effect on maintaining independence in ADL over 12 months’ follow-up. Small benefits were found on psychological distress and frailty status at 6 months, and well-being at 12 months. The HomeHealth service had a high probability of cost-effectiveness and shows potential as a service aiming to reduce unplanned hospital admissions in an at-risk population who are becoming frail.

Additional information

CRedit contribution statement

Kate Walters (<https://orcid.org/0000-0003-2173-2430>): Conceptualisation, Funding acquisition, Investigation (lead), Writing – original draft, Methodology, Formal analysis, Writing – reviewing and editing.

Rachael Frost (<https://orcid.org/0000-0003-3523-0052>): Conceptualisation, Funding acquisition, Writing – original draft, Methodology, Project administration, Data curation, Formal analysis, Visualisation, Supervision, Writing – reviewing and editing.

Yolanda Barrado-Martín (<https://orcid.org/0000-0002-9912-6345>): Methodology, Data curation, Formal analysis, Software, Visualisation, Writing – reviewing and editing.

Sarah Kalwarowsky (<https://orcid.org/0009-0009-3817-0244>): Methodology, Project administration, Data curation, Writing – reviewing and editing.

Louise Marston (<https://orcid.org/0000-0002-9973-1131>): Conceptualisation, Funding acquisition, Methodology, Formal analysis, Validation, Writing – reviewing and editing.

Shengning Pan (<https://orcid.org/0000-0001-8895-9993>): Methodology, Formal analysis, Validation, Writing – reviewing and editing.

Christina Avgerinou (<https://orcid.org/0000-0002-1445-1676>): Conceptualisation, Funding acquisition, Methodology, Project administration, Formal analysis, Writing – reviewing and editing.

Claire Goodman (<https://orcid.org/0000-0002-8938-4893>): Conceptualisation, Funding acquisition, Methodology, Project administration, Writing – reviewing and editing.

Andrew Clegg (<https://orcid.org/0000-0001-5972-1097>): Conceptualisation, Funding acquisition, Methodology, Project administration, Writing – reviewing and editing.

Benjamin Gardner (<https://orcid.org/0000-0003-1223-5934>): Conceptualisation, Funding acquisition, Methodology, Formal analysis, Supervision, Writing – reviewing and editing.

Jane Hopkins: Conceptualisation, Funding acquisition, Methodology, Formal analysis, Writing – reviewing and editing.

Farah Mahmood (<https://orcid.org/0009-0001-9161-0140>): Methodology, Data curation, Software, Supervision, Writing – reviewing and editing.

Rebecca L Gould (<https://orcid.org/0000-0001-9283-1626>): Methodology, Formal analysis, Supervision, Writing – reviewing and editing.

Rekha Elaswarapou: Methodology, Formal analysis, Writing – reviewing and editing.

Claire Jowett (<https://orcid.org/0000-0002-1392-0979>): Methodology, Formal analysis, Writing – reviewing and editing.

Dawn A Skelton (<https://orcid.org/0000-0001-6223-9840>): Conceptualisation, Funding acquisition, Methodology, Writing – reviewing and editing.

Vari M Drennan (<https://orcid.org/0000-0002-8915-5185>): Conceptualisation, Funding acquisition, Methodology, Formal analysis, Writing – reviewing and editing.

Claudia Cooper (<https://orcid.org/0000-0002-2777-7616>): Conceptualisation, Funding acquisition, Methodology, Writing – reviewing and editing.

Kalpa Kharicha (<https://orcid.org/0000-0002-2975-2084>): Methodology, Formal analysis, Writing – reviewing and editing.

Pip Logan (<https://orcid.org/0000-0002-6657-2381>): Conceptualisation, Funding acquisition, Methodology, Writing – reviewing and editing.

Matthew Prescott (<https://orcid.org/0000-0001-7397-9422>): Methodology, Data curation, Writing – reviewing and editing.

Gillian Thornton: Methodology, Data curation, Writing – reviewing and editing.

Tasmin Rookes (<https://orcid.org/0000-0001-6330-7059>): Methodology, Data curation, Formal analysis, Software, Writing – reviewing and editing.

Jessica Catchpole (<https://orcid.org/0000-0001-7901-1797>): Methodology, Data curation, Formal analysis, Software, Writing – reviewing and editing.

Rachael Hunter (<https://orcid.org/0000-0002-7447-8934>): Conceptualisation, Funding acquisition, Formal analysis, Validation, Writing – reviewing and editing.

Rashmi Kumar: Formal analysis.

Paul Chadwick: Formal analysis.

Jill Manthorpe: Conceptualisation, Funding acquisition.

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Patient data statement

This work uses data provided by patients and collected by the NHS as part of their care and support, with their consent. Using patient data is vital to improve health and care for everyone. There is huge potential to make better use of information from people's patient records, to understand more about disease, develop new treatments, monitor safety, and plan NHS services. Patient data should be kept safe and secure, to protect everyone's privacy, and it is important that there are safeguards to make sure that they are stored and used responsibly. Everyone should be able to find out about how patient data are used. #datasaveslives You can find out more about the background to this citation here: <https://understandingpatientdata.org.uk/data-citation>

Data-sharing statement

Requests to share suitably anonymised data for scientific purposes should be made in writing and sent to primint@ucl.ac.uk for consideration. Data will only be shared upon completion of a data-sharing agreement. The primary qualitative data will not be shared, as it is not possible to de-identify these data sufficiently and retain the integrity of the data.

Ethics statement

The study has been approved by the Health Research Authority Social Care Research Ethics Committee on 1 April 2020 (ref 20/IEC08/0013). This study was approved by Social Care REC, and all participants provided written or audio-recorded verbal consent to participate in the study, and separately to participate in process evaluation interviews.

Information governance statement

University College London is committed to handling all personal information in line with the UK Data Protection Act (2018) and the General Data Protection Regulation (EU GDPR) 2016/679. Under the Data Protection legislation, University College London is the Data Controller, and you can find out more about how we handle personal data, including how to exercise your individual rights, and the contact details for our Data Protection Officer here: www.ucl.ac.uk/legal-services/privacy/ucl-general-privacy-notice-participants-and-researchers-health-and-care-research-studies

Disclosure of interests

Full disclosure of interests: Completed ICMJE forms for all authors, including all related interests, are available in the toolkit

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Primary conflicts of interest: Rachael Frost is Chair of the CASCADE project (NIHR RfPB-funded) Study Steering Committee.

Louise Marston is Independent statistician on NIHR-funded PROSPER TSC.

Christina Avgerinou has received an NIHR Development and Skills Enhancement award and NIHR grant from the School of Primary Care Research to conduct another research project.

Claire Goodman and Claudia Cooper receive funding as NIHR senior Investigators.

Andrew Clegg is part-funded by the NIHR Applied Research Collaboration Yorkshire and Humber, NIHR Leeds Biomedical Research Centre, and Health Data Research UK, an initiative funded by UK Research and Innovation Councils, NIHR and the UK devolved administrations and leading medical research charities. He is also on a TSC and DMEC for NIHR trials.

Dawn A Skelton is Director and holds shares in Later Life Training Ltd, a not for profit training organisation that delivers exercise delivery training to health and fitness professionals, which supported the exercise training programme for HomeHealth support workers. She is additionally a coinvestigator on NIHR H2020-MSCA ITN, Member of Scientific Advisory Board for the Older People and Frailty Policy Research Unit (OPFPRU) funded by the NIHR, Member of NIHR Advanced Fellowship Selection Committee.

Vari M Drennan is a member of the NIHR Programme Grants for Applied Research panel.

All other authors declare no conflict of interest.

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This synopsis was published based on current knowledge at the time and date of publication. NIHR is committed to being inclusive and will continually monitor best practice and guidance in relation to terminology and language to ensure that we remain relevant to our stakeholders.

Publications

Peer-reviewed publications

Frost R, Avgerinou C, Goodman C, Clegg A, Hopkins J, Gould RL, et al. Clinical and cost-effectiveness of a personalised health promotion intervention enabling independence in older people with mild frailty ('HomeHealth') compared to treatment as usual: study protocol for a randomised controlled trial. *BMC Geriatr* 2022;**22**:485. <https://doi.org/10.1186/s12877-022-03160-x>

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Conferences

Rachael Frost. *Adapting a Trial of a Behaviour Change Service Targeted at Older People with Mild Frailty to be Delivered Remotely during COVID-19: Lessons Learnt*. British Society of Gerontology, 7 July 2022.

Verity Thomas. *Enabling Health and Maintaining Independence for Older People at Home: the 'HomeHealth' Trial*. Poster presented at British Society of Gerontology, 7 July 2022.

Yolanda Barrado Martin. *Process Evaluation of an Individualised Intervention to Promote Independence among Older People Living with Mild Frailty*. Poster (with short oral) presented at British Society of Gerontology, 6 July 2023.

Jessica Catchpole. *How Do Older People with Multiple Long-Term Conditions Engage with Behaviour Change Interventions? A Qualitative Study*. Society for Academic Primary Care, 12 July 2023.

Tasmin Rookes. *How Does MCI in Older Adults' Impact Engagement with Behaviour Change Interventions and Maintenance of Changes?* British Society of Gerontology, 6 July 2023.

Sarah Kalwarowsky. *The 'HomeHealth' Trial: Enabling Health and Maintaining Independence of Older People at Home*. Poster (with short oral) presented at ARC North Thames conference, 11 September 2023.

Christina Avgerinou. *Community Based Management of Older People. Where Do We Stand?* European Geriatric Medicine Society (EuGM), 20 September 2023.

Sarah Kalwarowsky. *Enabling Health and Maintaining Independence for Older People at Home: The 'HomeHealth' Randomised Controlled Trial*. Poster presented at Lancet Public Health Science, 24 November 2023.

Yolanda Barrado Martin. *Goal Setting as Part of a Holistic Intervention to Promote Independence in Older People with Mild Frailty: A Process Evaluation Alongside a Randomised Controlled Trial*. Lancet Public Health Science, 24 November 2023.

Tasmin Rookes. *How Does MCI in Older Adults Impact the Type of Goals Set and Progress towards These Goals, in a Behaviour Change Intervention? – A Mixed-Methods Review of Goals Set in an RCT*. Poster presented at Lancet Public Health Science, 23 November 2023.

Kate Walters. *Enabling Health and Maintaining Independence for Older People at Home: The 'HomeHealth' Randomised Controlled Trial*. British Geriatrics Society, 24 November 2023.

Yolanda Barrado Martin. *Process Evaluation of an Individualised Intervention to Promote Independence among Older People Living with Mild Frailty*. Poster presented at British Geriatrics Society, 24 November 2023.

Christina Avgerinou. *Results of a Randomised Controlled Trial Testing the Effectiveness and Cost-Effectiveness of a Home-based Health Promotion Service for Older People with Mild Frailty in England*. Poster presented at European Geriatric Medicine Society (EuGM), September 2024.

Tasmin Rookes. *A Home-based Behaviour Change Service for Older Adults, with Mild Frailty and Cognitive Impairment: RCT*. European Health Psychology Society, September 2024.

Other

The Future of Early Frailty Prevention: Lessons from a National Clinical Trial. Stakeholder symposium, The Wellcome Foundation, London, 13 November 2023 (51 attendees from policy, public and practice).

Enabling Health and Maintaining Independence for Older People at Home: The 'HomeHealth' Randomised Controlled Trial. East and North Hertfordshire Frailty Board, 22 March 2024.

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List of abbreviations

ADL	activities of daily living
BI	modified Barthel Index
DMEC	Data Monitoring and Ethics Committee
EDI	equality, diversity and inclusion
EQ-5D-5L	EuroQol-5 Dimensions, five-level version
GHQ-12	General Health Questionnaire (psychological distress measure) – 12-item version
GP	general practitioner
ICECAP-O	ICEpop CAPability measure for Older people
MCI	mild cognitive impairment
MLTC	multiple long-term condition
MoCA	Montreal Cognitive Assessment
PST	problem-solving therapy
QALY	quality-adjusted life-year
QoL	quality of life
RCT	randomised controlled trial
SAE	serious adverse event
SMART	Specific, Measurable, Achievable, Relevant, and Time-Bound
TAU	treatment as usual
TIDieR	Template for Intervention Description and Replication
TMG	Trial Management Group
TSC	Trial Steering Committee
VSO	voluntary sector organisation
WEMWBS	Warwick-Edinburgh Mental Well-being Scale
YFC	years of full capability

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Appendix 1 Intervention content: description of the HomeHealth service

The HomeHealth service

HomeHealth is a home-based health promotion service for older people with mild frailty, co-designed with people with lived experience, health and social care practitioners and other key experts. It was developed based on evidence of what works, interviews with people with mild frailty and health and social care practitioners and relevant theory. The service is based on an asset-based approach, supporting people to continue to do activities they enjoy, underpinned by behaviour change.

HomeHealth is delivered face to face in the older person's home, although it can be delivered remotely through telephone or video conferencing if needed or preferred. The person has six sessions with a HomeHealth support worker over 6 months. The first session is designed to be longer (60–120 minutes) to build rapport and getting to know the person, and subsequent sessions are designed to be shorter (approximately 30 minutes). HomeHealth was delivered by HomeHealth workers employed in VSO. They did not need to have a specific professional background but needed to have experience in working with older people and/or in similar services, and undergo a 5-day HomeHealth training course and regular supervision.

The older person is supported to identify what is working well for them and what they would like to maintain, and to set an overall goal from the service. Goals can be set on any topic; however, the HomeHealth worker discusses with them the key domains of HomeHealth: mobility, socialising, nutrition and psychological well-being (including mood and memory). Once an overall outcome goal is set, the HomeHealth worker works with the older person to break this down into achievable steps towards the goal between sessions and set SMART goals. This can include steps such as strength and balance exercises based on the Otago home-exercise programme, nutritional advice, dietary changes or signposting to groups or classes. HomeHealth workers use behaviour change techniques to maximise the achievability of goals.

At subsequent appointments, progress towards goals is reviewed, and goals may be revised, completed or new goals introduced. Some telephone, e-mail or postal contact may occur between sessions (e.g. to follow up a referral). At the final appointment, progress is summarised and sent to their GP, any further signposting is undertaken as needed, and a plan for maintenance of ongoing behaviours (e.g. exercises) is agreed.

A detailed description of the development and content of the service can be found in Walters *et al.* 2017,²⁹ and a description of the HomeHealth service according to the TIDieR checklist can be found in Frost *et al.* 2022.³²

