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Research Article

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

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Abstract

Background: Frailty is common in later life and can lead to adverse health outcomes. Services aimed at preventing decline in early stages of frailty may support older people to remain independent for longer. We developed and tested a new service, HomeHealth, in a randomised controlled trial. HomeHealth was a multidomain behaviour change service based in the voluntary sector in England targeting mobility, socialising, nutrition and psychological well-being.

Objective: To describe the population reach, fidelity, acceptability, context and mechanisms of impact of the HomeHealth service.

Design and methods: Mixed-methods process evaluation of a randomised trial.

Setting and participants: HomeHealth trial participants (older people aged 65+ years with mild frailty) and service providers.

Data sources and analysis: Population reach was evaluated through comparison to local census data. Fidelity of audio-recorded appointments was assessed by two independent raters using a structured checklist. Using data from appointments attended, types of goals set and progress towards goals, we described appointment characteristics, goals and signposting, and evaluated three mechanisms of impact: (1) effect of appointment attendance on independence, (2) effect of goal progress on independence and (3) whether selecting a particular goal type led to improvements in the corresponding intermediate outcome. We thematically analysed qualitative interviews with 49 older people, 7 HomeHealth workers and 8 stakeholders to explore acceptability and context.

Results: HomeHealth participants were similar with regards to deprivation, education and housing status to the local older population but with lower rates of minority ethnic groups. HomeHealth was delivered with good fidelity (81.7%) in voluntary sector organisations. Appointments were well attended (mean 5.33 out of the 6 intended), but attendance was not associated with better independence scores at 12 months [mean difference 1.29 (−8.20 to 10.78)]. Participants varied in progress towards goals within appointments (mean progress 1.15/2.00), but greater

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goal progress was not associated with improved independence scores at 12 months [mean difference −0.40 (−2.38 to 1.58)]. Mobility goals were most frequently selected (49%), but type of goal had no impact on independence and little impact on intermediate outcomes. Forty-one per cent were signposted or referred to other supportive services, with ongoing support where needed throughout this process. Qualitative data indicated that HomeHealth was acceptable, empowering for those who saw a need for change and fitted well within host voluntary sector organisations.

Limitations: Census data were only available for all adults aged over 65 in local areas rather than a mildly frail population, who are likely to be older, female and less diverse, and therefore population reach calculations may be less accurate. Goal progress was assessed using a simple scale rather than a validated instrument.

Conclusions: HomeHealth represents an acceptable and implementable intervention for older people with mild frailty but may work via different mechanisms than those intended.

Future work: Future work should explore how to best screen older people with mild frailty for readiness to change to maximise benefits from similar services and identify other possible mechanisms of effects.

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Introduction

Frailty is common in later life and associated with multiple adverse outcomes, such as poorer quality of life, hospitalisation and moves to long-term care.[1–3] It represents a state of increased vulnerability to stressor events, with difficulties recovering back to full functioning.[4] However, frailty can be potentially reversed or delayed, depending on the point in the trajectory. There is evidence that multidomain approaches can be effective for preventing and reducing frailty, but intervention components vary, as do effects.[5] Some of this variation may be due to general effectiveness or ineffectiveness, but for complex interventions that contain multiple interacting components, it can be difficult to determine whether an intervention was ineffective, or whether there were problems in delivering the service or its key parts. In previous trials of complex health promotion interventions for older people, issues have been identified with delivery such as difficulty focusing on behaviour change activities, setting goals and action plans,[6] engaging older people in goal setting or care pathways,[7,8] or lack of following care plan recommendations by patients or providers.[9]

Previous work suggests that exercise is an effective component of frailty interventions and that a nutritional component can add further benefits.[10] One recent meta-analysis also suggested that home-based interventions including a self-management component and home-telephone follow-up were associated with lower likelihood of institutionalisation in community-dwelling older adults.[11] However, few complex or multidomain interventions for frail older people are underpinned by a clear theoretical basis, despite evidence that a theoretical basis is associated with improvements in some outcomes.[12] In addition to understanding effectiveness, understanding how an intervention might work informs future implementation and refinement of interventions.

Process evaluations provide a detailed understanding as to how the intervention might be delivered differently in different contexts, the impact upon inequalities, mechanisms of intervention impact, processes of implementation and the quality of what has been delivered.[13] HomeHealth was a new, personalised, home-based service that was developed in conjunction with older people, healthcare professionals and other stakeholders.[14] It aimed to maintain independence in older people with mild frailty, who scored 5 on the Rockwood Clinical Frailty Scale,[15] indicating some difficulties with instrumental activities of daily living but no need for carer support for activities such as personal care. HomeHealth workers (HHWs) assessed a person's mobility, nutrition, socialisation and psychological well-being, and supported them to identify overall goals that were important to them for the 6 months of the service (outcome goals) and smaller goals set month to month to achieve this [Specific, Measurable, Achievable, Realistic and Timely (SMART) goals]. It was a manualised intervention underpinned by behaviour change theory, in which specific behaviour change techniques[16] were expected to be delivered where relevant at appointments (e.g. goal setting, action planning, building motivation).

HomeHealth was tested in a pilot and feasibility trial, which showed that the intervention was acceptable, participants received a sufficient dose and engaged well, and it had good fidelity.[14] However, this was a small study in two areas, and HomeHealth workers were employed and supervised in a university setting rather than a real-world healthcare or local organisation setting. When scaling HomeHealth up into a larger randomised trial[17] (ISRCTN54268283), the intervention was delivered pragmatically, by HomeHealth workers based in

voluntary sector organisations (VSOs), and to 195/388 participants in 3 areas [193 received treatment as usual (TAU)]. No statistically significant effects were found upon independence (the primary outcome) compared to TAU, but small significant effects were found upon secondary outcomes of well-being, psychological distress and frailty at different time points. There was a significant 35% reduction in the likelihood of unplanned hospital admissions and in related hospital costs.[18] Given the limited clinical effects but a reduction in healthcare utilisation, it is important to understand how these findings arose.

In this paper, we aim to characterise the delivery of the HomeHealth service and explore its population reach, fidelity of delivery, mechanisms of impact, acceptability and context, using data from a mixed-methods process evaluation embedded within the HomeHealth randomised controlled trial (RCT).

Methods

We followed process evaluation guidance from the Medical Research Council[13] to explore the population reach, fidelity, mechanisms of impact, acceptability and context for HomeHealth, using data from trial outcomes, intervention delivery and qualitative interviews (*Table 1*). The research followed a pre-specified protocol (V7.0, ISRCTN54268283).

Population reach

To assess the extent to which the intervention reached our intended population, we used the following variables

TABLE 1 Constructs measured and data sources used

Construct	Definition	Operationalisation in HomeHealth	Data source(s)
Population reach	The extent to which the target audience comes into contact with the intervention[13]	• Demographic characteristics of sample compared to older people in the local area • Inequalities in the population reached	• Demographics questionnaire at baseline • Census 2021 data[19]
Fidelity of delivery	The extent to which the intervention was delivered as intended[20]	• Extent to which first, subsequent and final HomeHealth appointments were delivered as intended • Training received by HomeHealth workers	• Audio recordings of 10% participants' appointments, stratified by HomeHealth worker • HomeHealth worker training records
Mechanisms of impact	Understanding how the intervention interacts with the audience to produce change[13]	Determining whether: • Receiving a minimum therapeutic intervention dose (3+ sessions) is associated with better outcomes • Goal choice is associated with improvements in the corresponding intermediate outcome • Greater progress towards goals is associated with better outcomes	• Appointment records • Goals recorded in Health and Well-being Plans • Progress towards goals recorded by HomeHealth workers • Independence in activities of daily living [modified Barthel Index (BI)[21]], self-reported gait speed,[22] physical activity (International Physical Activity Questionnaire – Elderly[23]), weight loss (Mini Nutritional Assessment Short Form[24]), psychological distress (12-item General Health Questionnaire[25]), loneliness (University of California Los Angeles 3-item loneliness scale[26]) and cognition (Montreal Cognitive Assessment[27]) scores from trial outcomes
Acceptability	Perceptions as to what extent a given treatment or service is satisfactory and agreeable[28]	Participants', HomeHealth workers' and stakeholders' views on engagement with the service, its structure, training and supervision	Interviews with 49 participants, 7 HomeHealth workers and 8 other stakeholders
Context	External factors to the intervention which impede or strengthen effect, through shaping its implementation, mechanisms and outcomes[13]	• Participant receptiveness to intervention • HomeHealth's implementation within the VSO • The context of the COVID-19 pandemic	Interviews with 49 participants, 7 HomeHealth workers and 8 other stakeholders

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collected at baseline as part of the demographics questionnaire: age (calculated from date of birth), gender, sexuality, ethnicity, migration status (born in UK or another country) and Index of Multiple Deprivation (IMD) decile.[29] We grouped participants by their general practitioner (GP) practice, and practice postcode was used to identify the corresponding electoral wards. Census data for each ward were compared to the mean (for IMD) or percentage per category (for categorical or ordinal variables), averaged across all participants and all ward-level data to produce final comparison. Reach data were compared descriptively and differences narratively summarised; no inferential statistical tests were used. Reach was assessed using data for the whole sample (n = 388), including those receiving TAU.

Fidelity

The extent to which the service was delivered as intended was assessed through reviewing transcribed appointments for 10% participants who had consented to this at baseline and at the start of each appointment. Appointments were recorded on encrypted audio recorders and uploaded to a secure system at the lead site. Independent fidelity rating was undertaken after the conclusion of intervention delivery and was not discussed with HomeHealth workers.

We randomly selected 10% of participants (n = 19) who had three or more recorded appointments, stratified by HomeHealth worker (n = 7) based on caseload volume, using a random sequence generated independently by the lead statistician (LM). Appointments were rated according to a checklist developed at the start of the study covering the main activities and behaviour change components expected to be delivered in HomeHealth (see *Report Supplementary Material 1*, *2* and *3* for checklists). Checklist items could be rated as completed, completed to some extent, not done or not appropriate to be done (e.g. an action plan could only be developed if a goal had been set). The first three transcripts were independently reviewed by YBM, RF, JC and TR according to a checklist, and a standardised approach to rating was agreed through discussion. YBM and SG rated all remaining appointments (n = 85), with review and input from RF where there were disagreements. Completed and completed to some extent were coded as 1, not done was coded as 0, and items not appropriate be done were excluded from calculations. Appointments were summarised by first, subsequent and final appointments, which had slightly different activities to complete.

We calculated fidelity as

$$\text{Fidelity}\,(\%) = \frac{N \text{ items completed or completed to some extent}}{N \text{ items completed, completed to some extent, and not done}}$$

We also carried out a sensitivity analysis, coding those completed to some extent as 0.5 rather than 1 to more accurately reflect fidelity, and reviewed training logs provided to HomeHealth workers to check that all training was attended and to view the time spent on each part.

Mechanisms of impact

The logic model by which HomeHealth was hypothesised to deliver change is shown in *Figure 1*. The proposed mechanisms were that a person, in conjunction with a HomeHealth worker, would identify issues in one or more relevant health and well-being domains, develop goals to address these and use behaviour change techniques and established intervention functions to strengthen the likelihood of goal achievement. Subsequent behaviour changes were expected to improve intermediate outcomes such as increased mobility or improved social network, which would in turn optimise independence and functioning and reduce the use of health and social care.

We carried out three analyses to test the mechanisms for our primary outcome (modified BI[21]):

- receiving a minimum therapeutic intervention dose (3+ sessions) would be associated with better independence, measured by BI, at 12 months
- choosing a goal on a particular HomeHealth domain would be associated with improvements in the corresponding intermediate outcome measure (e.g. mobility goal and physical activity) at 12 months
- making greater progress towards goals would be associated with better independence (BI) at 12 months.

Analyses were pre-planned as part of the overall trial statistical analysis plan.

Attendance

Participant attendance at sessions was calculated from HomeHealth worker spreadsheets which recorded all participant contact. We descriptively summarised mean [standard deviation (SD)] number of appointments per participant, mean (SD) duration of first, subsequent and final appointments, and number (%) attending at least three appointments.

To determine whether a therapeutic dose was associated with better outcomes, we dichotomised the data set into those receiving three or more sessions and those receiving fewer. All TAU participants were coded as attending no sessions. We carried out mixed models with the BI at 6 and 12 months as the outcome, adjusted for baseline BI score, attendance, site and an interaction between

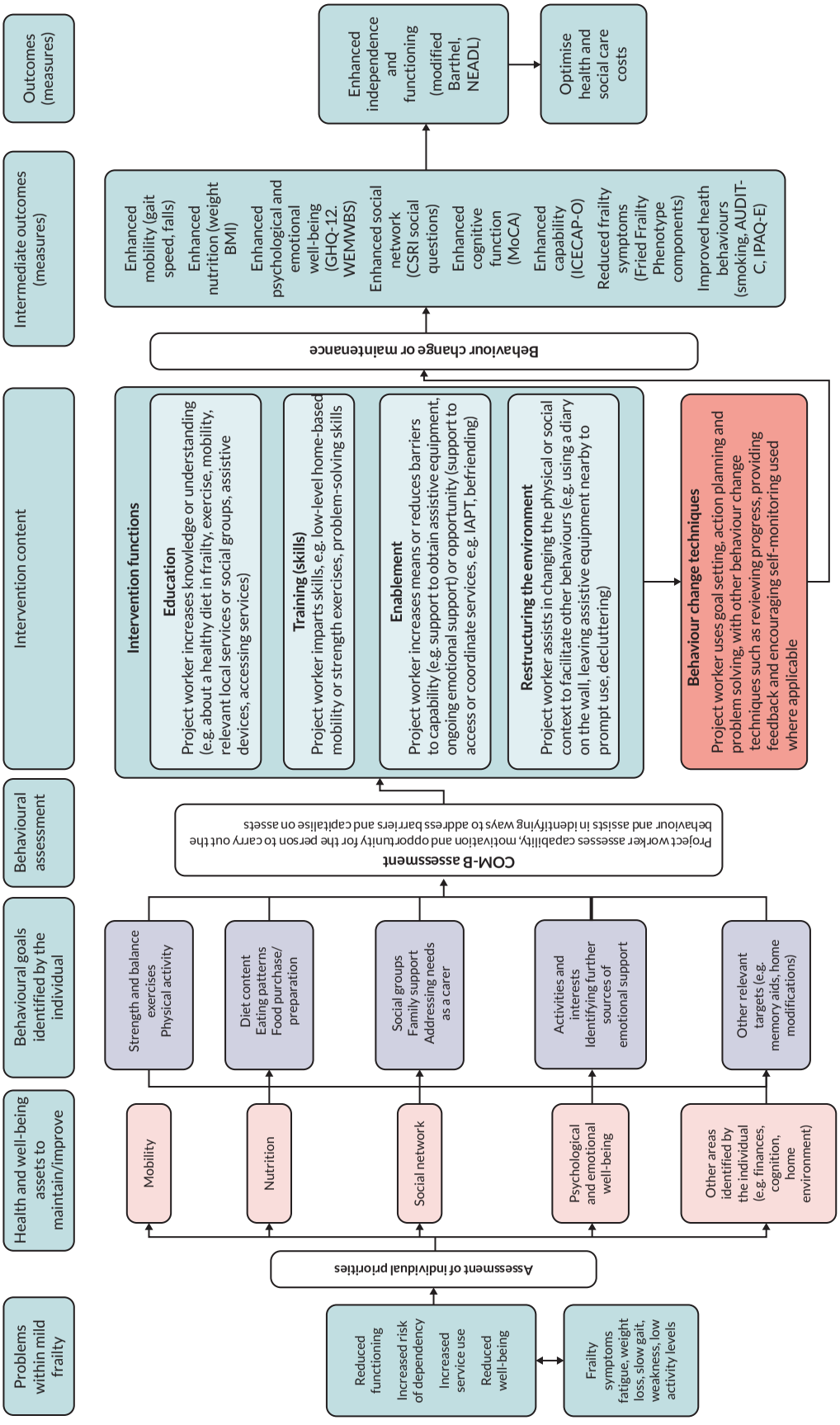

FIGURE 1 Logic model of HomeHealth RCT. AUDIT-C, Alcohol Use Disorders Identification Test - Consumption; BMI, body mass index; CSRI, Client Service Receipt Inventory; GHQ-12, 12-item General Health Questionnaire; IAPT, Improving Access to Psychological Therapies; ICECAP-O, ICEpop CAPability measure for Older people; IPAQ-E, International Physical Activity Questionnaire – Elderly; MoCA, Montreal Cognitive Assessment; NEADL, Nottingham Extended Activities of Daily Living scale; WEMWBS, Warwick-Edinburgh Mental Well-being Scale. Reproduced from Walters *et al.*[14] This is an Open Access article distributed under the terms of the Creative Commons Attribution Licence, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The figure above includes minor additions and formatting changes to the original text.

time and randomised group, with a random effect for participant. We also carried out a complier-average causal effect (CACE) analysis to understand if per-session effects existed.

Goals

HomeHealth incorporated two levels of goals:

1. Outcome goals: the overall aim that the person would like to achieve during the 6 months of the service, for example, remaining independent, improving mobility.
2. SMART goals: goals set between appointments which were Specific, Measurable, Achievable, Realistic and Timely.

Outcome goal progress was originally intended to be assessed using the Goal Attainment Scale (GAS), which develops a scale of progress towards goals over time with the anchor descriptions personalised to each individual and their choice of goal.[30] However, participants struggled to envision the anchors (+2 to −2) and to predict function in 6 months' time, and the time taken to complete this was excessive. As this was not part of the intervention, HomeHealth workers were instructed to cease using it if it distracted from engaging with the service. Consequently, only 10% participants had GAS scoring and so this was not used in analysis. Outcome goals were coded by one researcher into five major categories: mobility, nutrition, cognitive, psychological and social, or a combination of these (e.g. mobility and social). If outcome goals changed over time, these were coded as a combination goal. Outcome goals were descriptively summarised.

To assess whether choice of outcome goal was associated with BI scores or other intermediate outcomes at 12 months, we carried out similar mixed models with BI as the outcome as those described for attendance including goal type (yes/no) as fixed effects in separate regression models. Combination goals were included in multiple analyses as a 'yes' for both relevant domains. The outcome measures for each type were:

- mobility: gait speed[22] and International Physical Activity Questionnaire – Elderly (IPAQ-E) score[23]
- nutrition: weight loss category from Mini Nutritional Assessment Short Form (MNA-SF)[24]
- psychological: 12-item General Health Questionnaire (GHQ-12)[25] to assess psychological distress
- social: University of California Los Angeles 3-item loneliness scale (UCLA-3)[26]
- cognitive: Montreal Cognitive Assessment (MoCA)[27] – full and telephone version.

Progress towards SMART goals was rated at the following appointments by HomeHealth workers as 0 (no progress), 1 (goal partially completed) or 2 (goal completed). Mean progress towards goals was calculated for each participant. If a goal was carried on over multiple appointments, we used the final rating of progress towards goals as this was seen as the most reflective of progress. Where goals were modified (e.g. greater intensity of exercise), we included these as the same goal. Where a SMART goal was reported but not rated at any point (e.g. withdrew, no follow-up on that goal), this was set to missing. Where participants had no goal score at any point (e.g. had not set any goals), this was assumed to be 0 progress. We descriptively summarised goal progress from all participants as a continuous figure. In order to characterise progress, we grouped scores into tertiles (0–0.65 = poor progress, 0.66–1.32 = moderate progress and 1.33–2.00 = good progress). We summarised goal progress by site and by HomeHealth worker to check for therapist effects.

In order to assess the effect of goal progress upon BI scores, we carried out linear mixed models, adjusted for baseline BI score and site. The TAU group was coded as 0 progress.

To understand the role of signposting and referrals in outcomes, we also summarised services participants were signposted or referred to, from HomeHealth worker logs.

Acceptability and context

As service delivery occurred between January 2021 and February 2023, we kept a log of the timeline and impact of COVID-19-related restrictions. We collected data on acceptability and the influence of contextual factors through semistructured interviews with 49 older people with mild frailty, all HomeHealth workers (n = 7) and 8 other stakeholders involved in implementation and supervision of HomeHealth workers. Older people were eligible if they had been allocated to receive HomeHealth (n = 195) and were sampled for maximum diversity according to intervention characteristics (site, HomeHealth worker, goal types set, delivery mode and service engagement) and participant characteristics (demographics, functioning, cognition, adverse events). They were approached by postal invitation, with telephone follow-up for non-responders. Interviews were conducted post-intervention (20 between intervention and 12-month follow-up, 29 after 12-month follow-up). Interviews were face to face at participants' homes (n = 43), by telephone (n = 4) or videoconferencing (n = 2 older participants, all videoconferencing for staff interviews). Older participant interviews were carried out

by either JC, TR, YBM, RF or SG (researchers not previously known to the participants) and lasted on an average for 68 minutes. YBM carried out interviews for HomeHealth workers (average 118 minutes) and stakeholders (average 60 minutes), with topic guides based around Normalisation Process Theory constructs[31] (see *Report Supplementary Material 4* for all topic guides). Interviews were audio-recorded and transcribed verbatim, and analysed using codebook thematic analysis[32] in Lumivero 12 (QSR International, Warrington, UK; Lumivero 2017). YBM and TR developed a preliminary coding framework after coding three interviews independently, which was discussed and finalised with five team members (YBM, RF, TR, JC and KW). Interviews were coded by a single person (JC, TR, SG, YBM or RF) according to the framework, with slight modifications as needed after discussion. Themes were inductively derived from the data by YBM and RF and refined through feedback from the wider qualitative team (JC, TR, SG, JH, BG, RG, CJ, RK, RE, CA, PC, KK, VD and KW). Those relating to intervention acceptability and context are summarised in this paper; further themes on behaviour change and maintenance of behaviour will be reported elsewhere.

Results

Reach

As expected, the mildly frail population recruited in HomeHealth was older than census data for those aged 65+ years from the local area. There was a higher proportion of women (64% women in HomeHealth vs. 56% in the census), a lower proportion of those from ethnic minorities (94% white vs. 88% white in census) and greater numbers of people born in the UK (84% vs. 77%) (see *Appendix 1*, *Table 3* for a detailed comparison to census data), which may be a result of the older age demographic. Deprivation levels, educational levels and home ownership statistics were broadly similar to the census data. We were not able to obtain sexuality data at ward level from the 2021 census; however, our sample was 97.42% heterosexual, 1.29% lesbian, gay or bisexual, 1.03% preferred not to say and 0.26% other. If compared to the national figures for those aged over 65 (0.7% identifying as either lesbian, gay or bisexual),[33] HomeHealth adequately reached non-heterosexual populations.

Fidelity

Overall fidelity to the HomeHealth intervention was 81.7%. It was relatively consistent across appointment type, with 88.5% for first appointments, 79.4% for subsequent appointments and 82.0% for final appointments. Fidelity scores varied substantially by HHW, ranging from 68.2% to 89.8% (see *Appendix 1*, *Table 4*). Our sensitivity analysis showed that using the stricter definition of fidelity (completed to some extent coded as 0.5 rather than 1), fidelity reduced to 60.4%, with individual HomeHealth worker scores ranging from 45.2% to 72.4%. Generally, it was higher in those who saw more participants, although it was not consistently associated with goal progress ratings.

All HomeHealth workers completed all parts of the training, although there was some variation in the time taken to complete the self-study parts of the training course, for example, reviewing the intervention manual ranged from 1.5 to 4 hours. Topic experts could also be contacted for further support and information for complex cases; however, this mainly occurred for exercise queries, such as adapting exercise due to pain or progression of exercises.

Mechanisms of impact

Attendance and adherence

Out of the 195 people randomised to the intervention, 10 withdrew, 5 before the first appointment and 5 at other points in the intervention. One was not contactable after the first appointment and two participants died during the intervention period. Out of 1171 appointments scheduled, 1039 (89%) were attended, 122 (10.8%) were cancelled/rescheduled and in 10 cases (1%) participants did not attend. Most reasons for non-attendance or cancellation were related to health issues and medical appointments (54/132, 41%) or lack of time/forgetfulness (31/132, 24%), with some cancellations by HomeHealth workers (22/132, 17%, due to issues such as illness, self-isolation or bereavement) and small numbers for other reasons (e.g. weather, telephone issues). Only four appointments (3%) were cancelled as participants no longer wished to take part.

Overall, a mean of 5.33 appointments were attended across all participants (range 3–9, *Appendix 1*, *Table 4*), close to the expected number of six appointments, with little variation across sites (range 5.00–5.71). The majority of participants (94%, 182/193 excluding those who died) completed the minimum dose of three or more appointments. Only five participants received more than six appointments, indicating that six appointments were sufficient for most participants. The mean duration of appointments was 102 minutes for the first appointment (range 10–180 minutes) and 62 minutes (range 57–69 minutes) for appointments 2–6. Attending three or more sessions had no influence on BI scores between randomised group at 6 or 12 months [mean difference (MD) at 6 months 0.905 (−8.58 to 10.39), 12 months 1.29 (−8.20 to 10.78)]. The CACE analysis found no per-session effects (0.11, 95% confidence interval −1.25 to 1.46).

The vast majority of appointments were carried out face to face (*n* = 931/1040, 89.5%), with 61 (5.9%) by telephone and 48 (4.6%) by videoconferencing. Some technical issues (*n* = 17) were reported with videoconferencing, including connectivity issues, sound issues and software difficulties. We offered the loan of free internet-enabled tablets to enable remote participation in the intervention, given the COVID-19-related restrictions in place at the start of intervention delivery, but no participants took up this offer.

Specific, Measurable, Achievable, Realistic and Timely (SMART) goal progress

From the 172 participants who provided SMART goal data (88%), participants set an average of 3.8 SMART goals (range 1–12). Twenty-three participants had missing SMART goal data, due to withdrawing, not setting SMART goals or missing progress rating data. The average progress towards goals was 1.15/2.00, with 79 (46%) making good progress (1.33–2.00), 60 (35%) making moderate progress (0.66–1.32) and 33 (19%) making poor progress (≤ 0.65). Progress varied by HomeHealth worker (see *Appendix 1*, *Table 4*). HomeHealth worker-rated progress towards goals was not a predictor of BI scores, and adjusting for progress did not change BI scores at 6 or 12 months [MD 6 months −0.78 (−2.75 to 1.20), MD 12 months −0.40 (−2.38 to 1.58)].

Outcome goal types

Table 2 shows the 177 outcome goals set by participants. The most common goal set was around mobility alone, followed by mobility plus another goal (*n* = 51, 29%), mainly psychological or other.

In our exploratory analysis, choice of outcome goal was not associated with BI scores, and there were few associations with domain-specific outcomes (see *Appendix 1*, *Table 5* for all results). Choosing a mobility goal (chosen by 129 participants) did not predict gait speed or IPAQ-E scores. Controlling for psychological goal (selected by 35 participants) did not show a difference in GHQ-12 scores between randomised group at 6 or 12 months. Choice of a social goal (chosen by 19 participants) was not associated with UCLA-3 loneliness outcomes, but when choice of a social goal was adjusted for loneliness, scores were significantly lower in the intervention group at 6 months [−0.29 scale points (−0.57 to −0.02)] but not 12 months

TABLE 2 Outcome goals set by participants

Outcome goal type	Examples	*N*	%
Mobility	'To be able to walk more and feel less tired' (01056) 'I want to keep being able to go to the shop and travel' (03003)	86	49
Psychological	'I want something to do that occupies me and makes me happy' (02104)	14	8
Nutrition	'Better my diet' (03042)	5	3
Social	'Improve social life' (02063)	4	2
Cognitive	'Maintaining my memory – techniques around current difficulties' (01013)	1	0.6
Other	'I want to declutter and redecorate the living room in my flat' (03106)	14	8
Combination	'I want to feel more confident when walking, both physically and psychologically so that I can use the buses again to go out and about' (02007) 'To walk safely without aids. To look at my diet and nutrition' (02086)	53	30
	Mobility + psychological	13	7
	Mobility + other	12	7
	Mobility + nutrition	8	5
	Mobility + social	8	5
	Mobility + two other domains	7	4
	Mobility + cognitive	2	1
	Psychological + another domain	2	1
	Mobility + three other domains	1	0.6
Total		177	

[−0.23 (−0.52 to 0.05)]. Choice of a nutrition goal (selected by 15 participants) did not affect the likelihood of meeting the weight loss criteria on the MNA-SF. There were insufficient numbers selecting a cognitive outcome goal (chosen by four participants) to evaluate the impact upon MoCA, (Telephone) Montreal Cognitive Assessment (t-MoCA) or BI scores.

Signposting and referrals

Signposting and referral data indicated information about organisations was provided 166 times to 79 participants (41% of those who received the service). Out of 60 referrals, 46 were accepted, 6 were declined and 2 were re-referred (no data for 6). *Figure 2* shows the most common services signposted and referred to. The vast majority of referrals and signposting were for local services and organisations rather than community groups, which may reflect COVID-19 closures, for example, despite it being a key part of the intervention for those with mobility goals, only eight were signposted to local exercise classes and six to a home exercise service.

Qualitative findings: acceptability and context

Qualitative data generated six themes regarding acceptability and context: acceptability of HomeHealth, engaging with HomeHealth, empowerment, goal selection, training, the pandemic context and fit within VSOs.

Acceptability of HomeHealth

HomeHealth was generally acceptable to participants. Most people receiving the service felt that either the intervention had been of benefit to themselves in some way or it would be beneficial for others with less support, resources or self-motivation.

> *I can think of lots of people that would benefit from it, really. I think [it's] just such a big help. Really enriched my life. [HomeHealth worker 2] really did.*
>
> *Participant 01122, F, 81, White British*

When asked, older participants were happy to recommend the intervention to others, but there were mixed views about whether they would pay for such a service. Those with a positive experience generally expressed a willingness to pay either a nominal or substantial amount but were unsure if they would have committed to this before experiencing the service and emphasised that it would not be affordable for everyone.

The main suggested points for service improvement were to moderate the amount of information so that it was not overwhelming. The frequency, length and number of appointments were viewed as appropriate. A few expressed a desire either for fewer appointments or to have ongoing appointments available on a less frequent basis, demonstrating the importance of flexibility in the service.

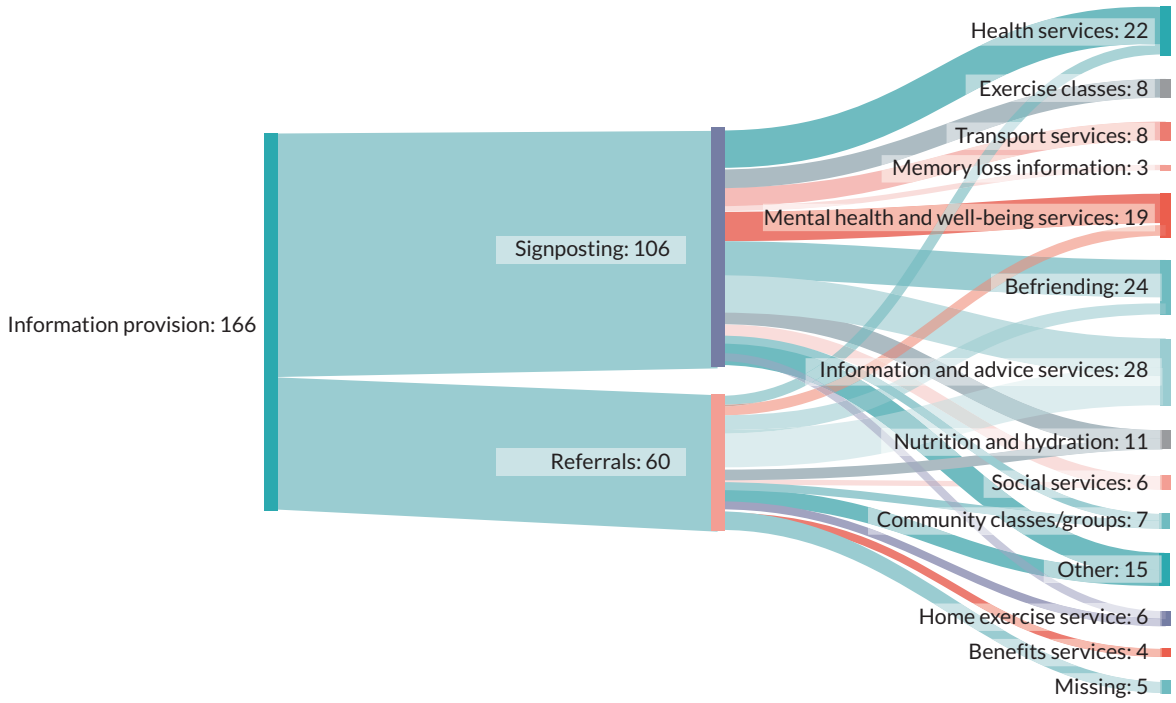

FIGURE 2 Plot of services referred and signposted to by HomeHealth workers.

> *[I]t would be nice if […] that you saw that person […] maybe every six months or nine months […] it's a shame that you get that block of help and then it's the end.*
>
> *Participant 01049, F, 74, White British*

Participants receiving the service praised their Home Health workers' communication skills, ability to make them feel at ease, their role as a friendly and non-judgemental outsider, their encouragement, guiding rather than leading the participant and being caring and helpful. Continuity was highly valued for rapport building, and as something lacking in other services.

> *You could talk to her easily which you need for what she's doing.*
>
> *Participant 02132, F, 87, White British*

Engaging with HomeHealth

Invitation through their general practice was seen as a positive way to engage participants as they trusted their GP's knowledge and expertise regarding their health. Further community engagement via local groups was also suggested by some for the future (this was limited due to the pandemic), and a few stakeholders also advocated self-referral, particularly to find those looking for a change.

> *… self-referral definitely is a big [source of VSO clients]. That's how we mostly got people at [VSO] and the waiting list was insane.*
>
> *SH2H – HomeHealth supervisor*

As indicated by the variation in progress towards goals, variable engagement with the behaviour change content of HomeHealth was also reflected in the qualitative findings, with some expressing a reluctance to identify or set goals. Older people often reported joining the HomeHealth service after a postal approach from their general practice with little understanding of the service's scope and potential benefits, and occasionally confused it with 'home help' services. HomeHealth workers needed to carefully communicate what the approach involved, including the remit of the service and what kind of goals would be feasible, but this could still lead to difficulties identifying relevant issues to work on, particularly if people did not want to feel like they needed help.

> *I felt I had to do a bit of work with some people to sell it to them in a way to help them realise they didn't have to do anything too massive and also not to feel […], people sometimes didn't want to feel that they needed any sort of service.*
>
> *HomeHealth worker 1*

People receiving the service recommended improving this in future by providing examples of how others benefited from the service. Those who were more enthusiastic about HomeHealth and behaviour change were those who felt a need for change, wanted to maintain their independence as long as possible or had better understanding of the service aims:

> *Well, that's where the common ground is [with HomeHealth's aim]. I have every intention of staying independent for as long as I possibly can.*
>
> *Participant 01067, M, 72, White British*

Initial screening for readiness to change was therefore recommended by some HHWs to ensure better engagement and to exclude those already knowledgeable and managing well. A few HomeHealth workers felt that some of their participants were more affluent and had higher health literacy, or were more motivated by receiving £10 vouchers for attending the trial baseline and outcome assessments, than a population they would work with outside of a research environment, with greater interest in research. Where HomeHealth workers struggled to engage participants in behaviour change content, they tended to focus on connecting with the person and tried to identify potential areas to provide information, signposting or suggest small changes.

> *I think if it became a service it would probably be more for people that hadn't as much knowledge about health already so there is probably some resistance with some people in this but we got through it in the end or found something that was very practical that they could measure.*
>
> *HomeHealth worker 1*

Empowerment

For some older people receiving the service, HomeHealth had a substantial positive impact on confidence, particularly in talking to people, seeking support, or resuming activities from prior to COVID.

> *She did encourage me to carry on doing the things that I'd done before COVID, like walking and things like that, was another thing we talked about. So, since her visits, yes, I think they helped just encourage me to carry on, really.*
>
> *Participant 01122, F, 71, White British*

HomeHealth workers achieved this through empathic listening, signposting and encouraging participants to take steps they were already considering (e.g. seeking

assistance on a flight), as well as providing positive feedback over appointments.

> *It was nice to have someone not criticise that you haven't climbed up Mount Everest, d'you know what I mean? It was nice to say, 'Well, at least you've done that. You know, you will be able to do it in your good days',*
>
> *Participant 01049, F, 74, White British*

This was particularly helpful for those trying to access health services. In some cases, HomeHealth workers helped participants to access their GPs prior to supporting them to achieve their goals or empowered them to regain confidence to insist they could be seen by professionals in person where needed.

> *You reach a certain point when you just think, What's the point [in ringing the doctor]? Is he going to give me some different painkillers when this lot is doing all right? Get on with it. Whereas she's saying, 'Ring him up and find out. Get on with it', and so I did at the finish.*
>
> *Participant 03098, F, 73, White British*

A few older people and HomeHealth workers highlighted that this approach was something they had not encountered before in health services.

> *Up to now nobody has ever come to encourage you.*
>
> *Participant 03038, M, 81, White British*

Others receiving the service however reported having not seen a change, as they could not think of further support or goals that would be beneficial beyond what they were already doing or services they were already receiving.

> *[T]he idea of sort of keeping people independent in their own homes is something that we got covered through things that we had already done like you know we have a gardener, we have window cleaners. I've arranged with the Council to come and take our bins out for us.*
>
> *F White British carer of 03056 (F, 77, White British) in dyadic interview*

A few had been referred by HomeHealth workers, but these had been declined or no further information was heard. Older people who did not see much change reported enjoying the discussions with the HomeHealth worker, and some had made small changes but felt that the impact of these was minimal.

> *It certainly did give me a sort of an impetus to do something about the taxi thing [obtaining a discounted taxi card]. But I can't think of any other major things.*
>
> *Participant 02091, F, 82, White British*

Goal selection

Qualitative data suggested that the reason mobility goals were most frequently selected (see *Table 2*) was because those receiving the service saw exercises and mobility as the topic most closely linked to independence, which was highly prized.

> *So, in the long-term I just need to make sure that I've got the mobility. And also, really don't get into a stage of dementia. Yes, so those are two key things that I know that I've got to make sure that I do that because I don't want to lose my independence.*
>
> *Participant 01114, M, 71, Asian/Asian British*

HomeHealth workers felt that participants could more easily identify, discuss and set mobility goals when they were less familiar with the HomeHealth worker as it required less trust and rapport, and perhaps was seen as more 'socially acceptable' (HomeHealth worker 2) and easier to discuss than mood or nutrition.

> *What they would say to you on a sort of verbally written level would be, 'I want to walk further'. But actually, what you get from being in their presence is […] huge amounts of loneliness and depression.*
>
> *HomeHealth worker 4*

HomeHealth workers and stakeholders also felt that recommending exercise sets and monitoring exercise progress were much easier than other types of goals. Nutrition was seen as a particularly difficult topic to address as people felt little need for change unless they were overweight, which contrasted with the service aim of maintaining weight and preventing weight loss.

> *A lot of people found it really difficult to talk about nutrition and their food and what they are eating. I don't know what it is but it's a bit like, 'Well I'm eating fine I'm okay, I don't need to make any changes'.*
>
> *HomeHealth worker 3*

During follow-up visits, HomeHealth workers reviewed progress towards goals, but also focused on empathic listening, sometimes directing the focus away from goals. This was valued by participants but could lead to less focus on the behaviour change elements of the service.

> *There's quite a lot of sessions where you're talking about stuff that is actually really important to people it isn't the thing they might be working on for the research but actually you are still doing the talking.*
>
> *HomeHealth worker 1*

Training

The online initial training, a mix of asynchronous and synchronous lectures and activities, was viewed as positive and appropriate but very intensive and a lot to absorb, for example '*intense but it's brilliant*' (HomeHealth worker 6). Although exercise was previously one of the least familiar topics for most HomeHealth workers, who typically had experience in voluntary sector or social prescribing services, HomeHealth workers expressed confidence in delivering this and felt adequately supported by the topic expert (a postural stability instructor) and team leader and were less confident dealing with mental health concerns.

> *I felt very confident delivering that [exercise], and I wasn't so confident in actually doing the mental health side of things.*
>
> *HomeHealth worker 5*

When asked about improvements, there was no consistent area recommended for improvement, but a few HomeHealth workers and service managers mentioned that further training on mental health, bereavement, motivational interviewing, goal setting in cognitive impairment and setting boundaries with participants would be helpful.

> *I think more training around, I guess, the approach for goal setting for people with cognitive impairments, or when the dementia started to progress more would be valuable.*
>
> *HomeHealth worker 2*

It was felt that some of this could be achieved through refresher training on different topics, with a focus on reflecting on and discussing cases across a range of domains. Older people commented positively on HomeHealth workers' communication skills, but rarely on other aspects, and considered their local service knowledge to be mixed. Very few of those receiving the intervention felt particular further training or skills were needed for the HomeHealth workers.

Pandemic context

Intervention delivery began in January 2021 and was initially completely remote in line with pandemic-related restrictions in place in the UK at the time. However, remote appointments had a low uptake, with a preference for home visits, and we saw increases in recruitment once this option was available (April 2021 onwards, with variation according to individual VSO policy). Home visits provided face-to-face social contact not seen during lockdowns, which HomeHealth workers reported allowed them to read non-verbal cues and enabled people with hearing difficulties to fully participate.

> *I think some people were just very relieved to have somebody to talk to and to see.*
>
> *HomeHealth worker 1*

> *… despite my hearing aids, I can't cope well with a telephone.*
>
> *Participant 01023, M, 90, White British*

As intervention delivery progressed, precautions such as COVID-19 risk assessments and personal protective equipment continued to be used for the majority of service delivery. Although those receiving the service reported feeling safe during visits, personal protective equipment could be a communication barrier that interfered in rapport building, as some older people could not hear well or read non-verbal communication.

> *I think in the beginning you know with the masks you know a lot of them were saying, 'We don't understand what you're saying. You know we don't, we can't see whether you're smiling'.*
>
> *HomeHealth worker 6*

United Kingdom older people had been asked to shield (stay at home and avoid contact with others) during the initial waves of the pandemic, with fewer services available. HomeHealth workers therefore felt that there was a lot of underlying loneliness and isolation, and this was also reported by some older people:

> *[The COVID pandemic] was horrible because I couldn't go out. I couldn't, I had to stay in. I didn't like – No, it was not good.*
>
> *Participant 01046, F, 76, White British*

HomeHealth workers reported lengthening appointments beyond the recommended 30 minutes as their travel times were longer (service area depended on which general practices could be recruited rather than a specific cluster), participants could take a long time to answer the door or fetch equipment, and they wanted to fully explore barriers to achieving goals. However, the most important reason for longer appointments was reported to be the need to build strong rapport with participants and to allow them

to feel heard, particularly given the lack of contact with the pandemic.

> *It's a really, really important to like have that little bit extra time and you know listen to them and let them know that they are heard and they're not the forgotten people.*
>
> *HomeHealth worker 6*

Fit within voluntary sector organisations

Both HomeHealth workers and stakeholders felt that HomeHealth was a good fit with the VSOs and shared their values and vision, while adding a more holistic and person-centred service than other services they had on offer.

> *… our sort of vision is to help people live the best possible life, create age-friendly communities, value everyone's future and put people first, so when we first heard about the programme it really ticked those boxes.*
>
> *SH1B – VSO Service Manager*

The set-up process was reasonably smooth. However, HomeHealth workers and stakeholders recognised some difficulties with HomeHealth worker integration in the VSO because of COVID, which led to most staff working from home and a sense of disconnection from other VSO services, exacerbated at times when only a single HomeHealth worker was employed in the organisation.

> *I think [VSO 2] are fabulous, and I think they've been very warm and welcoming, but I don't feel connected to them particularly.*
>
> *HomeHealth worker 4*

The trial context also required more travel time and administrative tasks from HomeHealth workers than a usual service. All VSOs had some ongoing issues such as recruitment difficulties, changes of supervisor, changes in funding of other related services, staff turnover or temporary lack of office space.

> *Because there's such a high turnover in the voluntary sector, sometimes I'd meet with people and then the next time they were not there or people had left or there's been changes to services, funding has been cut and the teams have changed again.*
>
> *SH2G – HomeHealth Supervisor*

Voluntary sector organisation supervisors expressed a preference for receiving the full HomeHealth training to be able to better support the HomeHealth workers in their day-to-day role, but also gave less supervision than in a usual service as HHWs had outside supervision from the HomeHealth team leader employed centrally.

> *I was trying to, 'Do you want to go through client cases, would you like to talk about client?' She's like, 'Oh no I'm fine, I'm doing all of that at UCL [lead site]'.*
>
> *SH1C – HomeHealth supervisor*

Future improvements were for HomeHealth workers to be more involved in local teams and meetings, which did not always happen due to the temporary nature of HomeHealth.

> *I think if it was to become more permanent then it would be seen as a key part of the hub team, and we would hope that they would be popping in there to do any photocopying, admin work or to say, 'Actually, do you know a volunteer that can do this, because I've identified somebody that would really benefit from a volunteer',*
>
> *SH1B – VSO service manager*

Discussion

In general, HomeHealth was considered to be acceptable, with good engagement and most participants would recommend the service to others. The service was considered to have been implemented well in the VSOs and reached most of the intended population, with greater challenges in recruiting ethnic minorities. A substantial number of participants received information about or referrals to local organisations and services and were enabled to attend these; participants reported feeling empowered to seek out and attend relevant health and support services. HomeHealth was mostly delivered as intended, with good fidelity and good attendance. Most participants could identify SMART goals (on average 3.8 per participant) to work on and most (81%) made moderate or good progress on their goals. Qualitative data indicated variable engagement with goal setting from some participants. Goal progress varied with participants' understanding of the service, perceived need for change and engagement with behaviour change content. HomeHealth did not appear to work as hypothesised – specific goal types and progress towards goals were not associated with changes in functioning (BI scores). There were limited associations with domain-specific outcomes; however, this subanalysis had small numbers for each domain and was exploratory.

HomeHealth showed limited impact on clinical outcomes in the main trial analysis, with no change in independent functioning and small significant changes in distress and level of frailty at 6 months and well-being at 12 months.[18] It significantly reduced the risk of unplanned hospital admissions by more than a third and the costs of unplanned admissions but did not affect use of other health or social care services. Our process evaluation demonstrated that it is unlikely that poor engagement, poor implementation or poor goal progress was the main driver behind this lack of clinical effectiveness on our primary outcome of functioning. It may be that the exercise recommended for mobility goals was insufficiently intensive to generate a difference in functioning and other mobility outcomes. Although exercise has substantial supporting evidence for reducing frailty, there is less evidence for the effects of home-based approaches.[10] Data from our main trial suggest that some changes in physical activity occurred, with some of the least active participants moving from the inactive to active classification in the frailty assessment at 6 months,[18] but this may have been insufficient for those who were more active at baseline and support to attend exercise classes was limited by COVID-19 restrictions. It was encouraging that selecting a social goal reduced loneliness, but this was only a slight effect, which may partially reflect the low numbers of people selecting a social goal overall. Another explanation may be that HomeHealth addressed several domains, and so effects upon individual domains were diluted across the whole sample, who as shown in the process evaluation had a wide range of differing needs.

Reasons for the impact upon admissions are somewhat unclear, given the lack of impact on the primary and intermediate outcomes. There has been mixed results in reducing unplanned admissions in trials of other similar interventions – reviews suggest falls prevention programmes reduce falls but not falls-related admissions,[34] and case management programmes have no effects upon unplanned admissions,[35] while multifactorial trials in similar populations show inconsistent effects upon hospitalisations, although some effects on overall costs.[36–39] One of the interventions that lowered hospital costs included a diabetes education and self-management skills development component as well as exercise and diet components in frail older people with diabetes.[38] Another trial which reduced re-admissions in recently discharged older people attributed effectiveness to correcting medication misconceptions, identifying referral needs, providing health education materials, 24 weeks of support and the continuity of care from a single nursing professional.[40] Although a slightly different population, our data suggested HomeHealth identified needs, encouraged self-management and provided education, empowerment, ongoing support and continuity. Additionally, our qualitative data suggested HomeHealth workers empowered older people, particularly in connecting them to health-related services and enabling them to attend these and express their views, and our signposting/referral data further support this. These components may have contributed to reducing unplanned admissions and warrant further exploration.

Almost all HomeHealth participants received the minimum dose of three appointments, with a similar attendance level to the feasibility study,[14] and 88% of participants set at least one goal. However, attendance did not necessarily translate into engagement with goal setting at the group level, as participants varied in their enthusiasm for behaviour change and goal setting, and in understanding the remit and aims of the service. Communicating the aims of proactive health promotion services to older people has been noted as a challenge in another similar study.[6] Likewise, other similar complex interventions have also found variable engagement with goals and following care plan recommendations,[6,9,41,42] and noted different attitudes towards goal setting,[43] and, in particular, the differences in goal-related priorities between professionals and older people.[44]

HomeHealth was generally implemented as intended and fit well within the VSO setting. Mapping implementation onto Normalisation Process Theory,[31] the service had excellent *coherence*, as it was clearly understood and differentiated from other services by providers. It had good *collective action* as it was operationalised well and built upon worker and VSO skillsets. *Cognitive participation* (i.e. provider buy-in to set up and sustain the service) was also strong. With regards to *reflexive monitoring*, the service was valued and positively appraised by providers. The lower value parts of the service were felt to be mainly related to trial administration and few modifications (*reconfigurations*) occurred apart from lengthening follow-up appointments. Both of these are less likely to be problematic in a real-world setting. However, for future implementation, careful attention would need to be paid to the subdomains of *contextual integration* (resourcing HomeHealth fully within a VSO without a lead site) and ensuring full integration of HomeHealth workers into team structures with a stronger sense of connection within the VSO (*enrolment)*. This may be easier outside of a trial and pandemic context.

Our study is one of the first to assess how far the intervention reached into the local expected community (population reach). Previous health promotion studies

in older people have conceptualised reach in terms of numbers recruited versus those approached, or simply described the age, gender, living status and frailty level of those recruited.[7,8] One physical activity trial in people aged 45–75 years which did assess population reach found lower rates of recruitment in men and Asian people similar to HomeHealth but also lower recruitment of people from deprived areas.[45] Under-recruitment of Asian people may be particularly important as UK general practice data suggest that those who are Asian are more likely to transition from mild to moderate frailty than those who are white, with no difference for black people.[46] Our qualitative work suggested this under-recruitment may have partly arisen due to the context of being delivered as part of a trial, as some participants expressed a desire to contribute to research rather than necessarily receive a service. We offered interpreters or multilingual staff members to screen or assess participants; however, this only resulted in a small number of extra participants from ethnic minorities. However, under-representation may be less than it appears from our data as the census data available were grouped by those aged over 65 and no further breakdown was available. The average age was 82 years in our study, which reflects a demographic with fewer men and less ethnic diversity.

We can conclude that further work would be needed in a future intervention to reach out to those who are migrants and from ethnic minorities. While community-based sources of recruitment are often suggested as a way to achieve outreach, particularly local organisations,[45] a related HomeHealth study showed that this actually led to a less diverse sample (paper under review). More face-to-face approaches, which were substantially hindered during the COVID-19 pandemic (e.g. community groups for older minority ethnic populations were largely closed or online only), may improve outreach. Consequently, any future implementation of HomeHealth may result in higher take-up from the groups underserved by our trial. We did however recruit a population similar with regards to deprivation level, and those with higher deprivation levels are more likely to transition from mild to moderate frailty than those who are less deprived.[46]

Strengths and limitations

This process evaluation used a rigorous mixed-methods approach, which allowed us to explain findings from the main trial and economic evaluation. It was led independently from the main trial team by YBM. Our qualitative work drew on a diverse sample of participants, and our analysis had input from researchers from a wide range of disciplines and public contributors. Although we collected a substantial amount of process data, we were reliant upon the completeness and accuracy of HomeHealth workers for much of this data, while fidelity was independently rated from audio recordings of appointments. Consequently, our attendance and signposting data may be less accurate and consistent across workers than desired. We were unable to use a validated measure of goal progress (the GAS), as this was not acceptable to participants, and instead used a non-validated simple 0–2 scale of goal progress that had worked well in the pilot trial. Although there was clear variation in progress towards goals, this may reflect scoring differences between HomeHealth workers rather than actual differences. Therefore, our mechanisms analysis may have not shown an impact upon outcomes due to problems in accurately measuring goal progress rather than a true lack of effect. We also did not assess the quality of the SMART goals set, and whether they encompassed all SMART domains. If these were poor quality, the true intervention fidelity may be lower or goal progress may have been more difficult to accurately rate. Only small numbers of participants were available for some quantitative comparisons (e.g. most attended 3+ sessions, few set certain goal types), and so we are limited in the conclusions that can be drawn from these comparisons.

Implications

This process evaluation concludes that the HomeHealth service did not work through the mechanisms hypothesised. Our pre-planned analyses focused on the mechanisms of effects for the primary outcome, so we were not able to explore the mechanisms associated with improvements in unplanned admissions. Our qualitative and signposting/referral data suggested that HomeHealth workers empowered older people to connect to healthcare professionals and health-related services, and this may have resulted in more preventative care and fewer unplanned admissions. As complex health promotion interventions in older people show mixed impact on admissions,[36–39,47] future research needs to explore these mechanisms.

Patient and public involvement

Public contributors were involved throughout all stages of the trial, from applying for funding to dissemination of results. Four public contributors and co-authors (JH, CJ, RK and RE) were involved throughout the process evaluation. They attended regular meetings to provide feedback, reviewed coding of goal types, read transcripts, contributed to thematic framework discussions, commented on the results of quantitative analysis and reviewed and provided feedback on this paper.

Conclusions

Our process evaluation suggests that health promotion and behaviour change services for older people with mild frailty can be delivered mostly successfully by VSOs in a UK setting. Older people with mild frailty show good willingness to attend and set goals, with overall moderate progress on meeting them. Engagement with the behaviour change content and progress towards goals were variable, with particular challenges for those who struggled with the concept of behaviour change and health promotion. Future services or studies may benefit from focusing on those who self-identify a specific need for change. A potential benefit is the empowerment of older people with mild frailty to self-manage their health and enable them to access and use more preventative services, which may have led to the observed reduction in unplanned hospital admissions.

Additional information

CRediT contribution statement

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Data-sharing statement

Requests to share suitably anonymised data for scientific purposes should be made in writing and sent to priment@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 was approved by the Health Research Authority Social Care Research Ethics Committee (ref 20/IEC08/0013) on 2 July 2020.

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

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List of abbreviations

BI	Barthel Index
CACE	complier-average causal effect
GAS	Goal Attainment Scale
GHQ-12	12-item General Health Questionnaire
GP	general practitioner
HHW	HomeHealth worker
IMD	Index of Multiple Deprivation
IPAQ-E	International Physical Activity Questionnaire – Elderly
MD	mean difference
MNA-SF	Mini Nutritional Assessment Short Form
RCT	randomised controlled trial
SD	standard deviation
SMART GOALS	Specific, Measurable, Achievable, Relevant and Timely goals
TAU	treatment as usual
t-MOCA	(Telephone) Montreal Cognitive Assessment
UCLA-3	University of California Los Angeles 3-item loneliness scale
VSO	voluntary sector organisation

List of supplementary materials

Report Supplementary Material 1
Researcher fidelity checklist 1st appointment

Report Supplementary Material 2
Researcher fidelity checklist subsequent appointments

Report Supplementary Material 3
Researcher fidelity checklist final appointment

Report Supplementary Material 4 Topic guides for all interviews

Supplementary material can be found on the NIHR Journals Library report page (https://doi.org/10.3310/MBCV1794).

Supplementary material has been provided by the authors to support the report and any files provided at submission will have been seen by peer reviewers, but not extensively reviewed. Any supplementary material provided at a later stage in the process may not have been peer reviewed.

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Appendix 1

TABLE 3 Comparison of HomeHealth sample demographics to local census data

			Total (%)	Site 1 (%)	Site 2 (%)	Site 3 (%)
Age	65–69	HomeHealth	4.40	2.80	5.90	4.50
		Census 2021	27.63	28.80	24.91	29.43
	70–74	HomeHealth	13.90	16.20	14.10	10.80
		Census 2021	26.57	26.43	25.79	27.70
	75–79	HomeHealth	22.90	24.60	23.70	19.80
		Census 2021	18.45	19.08	18.19	17.98
	80–84	HomeHealth	26.50	26.10	28.10	25.20
		Census 2021	13.38	13.11	14.22	12.70
	85–89	HomeHealth	22.90	19.70	19.30	31.50
		Census 2021	8.70	7.43	10.71	7.86
	90+	HomeHealth	9.30	10.60	8.90	8.10
		Census 2021	5.27	5.15	6.18	4.33
Gender	Female	HomeHealth	64.18	64.08	65.19	63.06
		Census 2021	55.62	57.12	55.54	53.80
Country of birth	UK	HomeHealth	84.02	71.13	88.89	94.59
		Census 2021	76.85	60.06	86.01	87.19
Ethnicity	White	HomeHealth	93.81	88.03	97.78	96.40
		Census 2021	87.66	79.21	94.62	90.01
	Asian/Asian British	HomeHealth	2.58	4.23	1.48	1.80
		Census 2021	6.62	8.99	2.33	8.81
	Black/Black British	HomeHealth	1.55	2.82	0.00	1.80
		Census 2021	2.66	5.36	1.60	0.49
	Mixed/multiple ethnic groups	HomeHealth	0.52	1.41	0.00	0.00
		Census 2021	0.90	1.81	0.53	0.20
	Other	HomeHealth	1.55	3.52	0.74	0.00
		Census 2021	2.15	4.63	0.92	0.48

continued

TABLE 3 Comparison of HomeHealth sample demographics to local census data (*continued*)

			Total (%)	Site 1 (%)	Site 2 (%)	Site 3 (%)
Education	No qualifications	HomeHealth	32.47	19.72	31.11	50.45
		Census 2021	35.72	30.35	36.72	41.37
	Level 1 and 2 – General/O levels	HomeHealth	18.30	12.68	20.74	22.52
		Census 2021	14.93	11.99	17.50	15.56
	Levels 3 – A levels and higher national diploma	HomeHealth	20.36	11.98	32.59	16.22
		Census 2021	7.60	6.86	8.35	7.62
	Level 4 – degree and higher degree	HomeHealth	28.87	55.64	15.56	10.81
		Census 2021	30.59	43.43	25.15	20.79
IMD	Mean decile	HomeHealth	5.94	6.08	7.29	4.11
		Census 2021	5.99	6.23	8.09	3.14
Home ownership status	Owned	HomeHealth	69.07	64.79	82.22	8.56
		Census 2021	66.21	48.81	78.12	74.00
	Social rented	HomeHealth	24.23	28.17	13.33	32.43
		Census 2021	26.90	44.54	78.12	74.00
	Private rented or lives rent free	HomeHealth	6.19	6.34	3.70	9.01
		Census 2021	6.88	6.65	5.60	8.74

TABLE 4 Variation by HomeHealth worker (HHW) in session attendance, progress towards goals and fidelity

	N participants assigned	Participant's session mean attendance (including all participants in the intervention group)	Mean progress towards SMART goals (0–2)	*N* appointments fidelity checked	Researcher fidelity rating (%)	Fidelity (sensitivity analysis) (%)
Site 1 – HHW1	29	5.00	1.33	12	61.28	45.8
Site 1 – HHW2	42	5.36	1.59	19	89.75	72.4
Site 2 – HHW1	38	5.45	1.18	18	87.74	60.1
Site 2 – HHW2	30	5.63	1.18	15	85.86	64.2
Site 3 – HHW1	21	5.07	0.63	13	81.81	59.8
Site 3 – HHW2	13	5.00	0.27	5	68.22	45.2
Site 3 – HHW3	12	5.42	1.06	4	74.65	55.4
Site 3 – HHW4 (only completed nine appointments in total, all first sessions)	N/A	N/A	N/A	1	100	64.3
Site 3 – sessions evenly split between two HHWs[a]	10	5.71	0.78	N/A	N/A	N/A
Total	195	5.33	1.15	87	81.7	60.4

N/A, not applicable.
a Fidelity data for these participants included under HHW1 as only their appointments were recorded.

TABLE 5 Goal type and outcomes

	N choosing this goal	Measure	Impact at 6 months (MD)	Impact at 12 months (MD)
Choice of mobility goal	129	Self-reported gait speed	−0.012 (−0.374 to 0.351)	0.104 (−0.256 to 0.465)
		IPAQ-E[a]	0.209 (−0.135 to 0.554)	−0.004 (−0.352 to 0.345)
		BI	−1.073 (−2.867 to 0.721)	−0.715 (−2.518 to 1.088)
Choice of psychological goal	35	GHQ-12	−1.212 (−0.2154 to −0.269)	−0.564 (−1.521 to 0.392)
		BI	−0.067 (−1.315 to 1.180)	0.291 (−0.971 to 1.552)
Choice of social goal	19	UCLA-3	−0.294 (−0.572 to −0.016)	0.233 (−0.515 to 0.048)
		BI	0.017 (−1.202 to 1.236)	0.376 (−0.858 to 1.611)
Choice of nutrition goal	15	MNA weight loss category (odds ratio)	0.985 (0.937 to 1.036)	0.982 (0.925 to 1.043)
		BI	−0.205 (−1.416 to 1.007)	0.152 (−1.076 to 1.379)
Choice of cognitive goal	4	MoCA	N/A – insufficient numbers	
		t-MoCA	N/A – insufficient numbers	
		BI	N/A – insufficient numbers	

BI, Barthel index; N/A, Not applicable.
a Log values.