



Development of an intervention programme theory to increase movement in care homes for people with cognitive impairment: Care homes achieving realistic movement strategies (CHARMS)

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ABSTRACT

There is an increase in both the number of people living in care homes, and the cognitive impairments they experience. Some of these experiences of cognitive impairments can be improved by appropriate movement and physical activity interventions, delivered in ways which take into account an individual's preferences, needs and abilities. A clear intervention programme theory (how we expect an intervention to work) can improve effectiveness, acceptability, transferability and sustainability. We used a systematic framework (Six Steps in Quality Intervention Development) and a co-production approach, to develop an intervention programme theory for Care Homes Achieving Realistic Movement Strategies (CHARMS). We identified twenty factors contributing to low levels of physical activity and movement which we grouped into four categories for change: i) cultural/staff; ii) residents; iii) environmental and iv) policy/system. A theory of change was developed using these categories plus additional theories to create ownership. It became evident that the intervention (the theory of action) needed to include activities in all categories; intervening in just one category (e.g. providing weekly physical activity) was not sufficient in itself. Developing the programme theory enabled care homes to develop activities to meet their specific contextual needs and develop ownership of the process and the intervention.

1. Introduction

The care home population is both increasing and changing, and many residents now experience significant physical and cognitive impairment. One study identified that 90% of care home residents have dementia (Lithgow et al., 2012) and Wittenberg, Knapp, Hu, Comas-Herrera, and King (2019) estimate a figure of 70%. Physical activity or even breaks in sedentary behaviour, can offer some important health benefits to all populations, and there is a consensus among service providers and researchers that physical activity is beneficial for people with dementia. Identified benefits are varied and include physical, cognitive, social and quality of life benefits (Pitkälä, Savikko, Poysti, Strandberg, & Laakkonen, 2013).

Some activities targeting physical activity are offered in care homes (e.g. dancing, chair based exercises). However, the more impaired people tend to be excluded from such activities, especially if it is offered as a standardised activity and as an 'add-on'. For example, trips out

require significant resource if they involve multiple wheelchair use, and people who are cognitively impaired may need one-to-one escort to avoid getting lost. Whilst recommendations for accessible exercise interventions exist, for example in the work of CAPA (Care About Physical Activity), an over-emphasis on 'active ageing', can overlook the reality of impairment and promote physical activity suitable for people who are relatively fit, both physically and cognitively (cf Holstein and Minkler, 2007). Furthermore, physical activity interventions for people who live with impairments can often be time limited, and benefits decrease once the intervention is complete (McEwan, Rhodes, & Beauchamp, 2022).

Our scoping study (Bowes et al., 2013) of physical activity for people with dementia drew both on a systematic review of the scientific literature and on a survey and interviews with care home service providers. The study found that attempts to promote physical activity for people with dementia are increasing, but that the evidence base remains rather limited. The study concluded that there are notable gaps in the scientific literature, and that many existing interventions lack a clear evidence

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bas. Understanding of how physical interventions work is limited. It is not always clear what outcomes are sought or expected from different interventions. More recently Hurley, Wood, Smith, Grant, and Jordan (2020) have also noted limitations on existing approaches to increasing physical activity in care homes.

The strong indications of benefit identified in the review led us to conclude that attempts to promote and support physical activity for people with dementia are worthwhile. Indicated benefits include improved well-being and quality of life, and physical benefits such as improved balance (preventing falls), and grip strength (supporting independence in activities of daily life (ADLs)). In addition, movement strategies may also be important and more achievable for some care home residents. We use this term to refer to approaches that are typically not as structured as physical activity interventions but can include helping with laying the table; craft work which includes movement; activities of daily living (e.g. dressing, face washing, hair brushing).

Ultimately, the effectiveness, acceptability and sustainability of any complex intervention is dependent on robust, thorough, developmental work. Too often interventions are developed for a specific context using time finite resources, with the focus being on effectiveness not acceptability, implementation and sustainability. This leads to the evaluation of interventions which may never be realistically implemented, no matter how effective they may be. Additionally because they were developed for a specific system or setting, their effectiveness may well be affected when they are transferred and implemented in a different setting. Interventions in journal articles are often poorly described and difficult to replicate because the underlying programme theory has not been clearly developed and articulated. Stages in the development of an intervention include undertaking a needs assessment, developing a theory of change and theory of action (programme theory) and testing out the intervention to see whether it works as intended (Rogers, 2008). We used the 6SQuID framework to develop this intervention (Jepson et al., 2022; Wight et al., 2016). The framework provides six steps in the development of the intervention which are described in Box 1. We report on the first five steps in this paper.

The framework also emphasises three other points which are key to success and sustainable intervention development. First is the engagement of key stakeholders during all of the steps. This involvement is essential to develop ownership of the problem and the solution. Second is the recognition that all interventions take part in a system (in this case, the system is the care home), and also more broadly the health and social care system. When any intervention is introduced into a system it will likely change the system to some extent or replace an existing intervention or activity. This means that there will be resource implications that should not be ignored at the developmental stage. There are

also potentially system restraints such as health and safety legislation, quality standards and professional guidelines and procedures which may limit some activities. Third, development of an intervention should include planning for the evaluation phase. Too often, an intervention is difficult to evaluate because the processes needed for a robust evaluation (e.g. measurement of outcome indicators) have not been considered during the development phase.

We also took a systems based approach, by recognising that the implementation and sustainability of the intervention is dependent on how adaptive the care home system is to change. We also recognised that implementing a change or activities into a system can have implications for other activities and resources within that system (Rutter et al., 2017). We aimed to develop an adaptive intervention that could be used in any care home regardless of their context and resources. As an adaptive intervention, the fidelity of the intervention is to the theories of change rather than being prescriptive about activities that catalyse change. Therefore to ensure transferability, it took into account the specific system (the care home, how it organised its work and how any new intervention would fit into the system) and context (e.g. layout of the care home, work flexibility, budget and resources available).

2. Aims and objectives

The aim of the study was to develop a theory-based personalised physical activity and movement strategy for people with dementia and/or cognitive impairment living in care homes.

The objectives were to:

1. develop a shared understanding of the 'problem'
2. identify the causal factors which were modifiable and thus able to be changed
3. develop a programme theory (theory of change and theory of action).

This paper reports on both the methods and the approaches we used to develop our programme theory.

3. Methods

We used a mixture of qualitative and quantitative methods to develop the intervention. The different steps required different types of data and approaches (see Table 1.).

3.1. a) Electronic survey of care home staff

A survey was developed by the research team to determine the

Box 1

The six Steps of Quality Intervention Development (6SQuID).

1. **Define the problem** – stakeholders may have different perspectives on the problem to researchers or intervention developers, and so a common agreement on the problem needs to be reached.
2. **Identify the causal factors that are modifiable and are amenable to change.** Most health problems such as physical inactivity have multiple causes, and therefore decisions need to be made about which causes can be addressed.
3. **Develop a theory of change** – an evidence based theory of change articulates the mechanism by which change in a risk or causal factor will occur.
4. **Develop a theory of action** – a theory of action will describe the activities (components of the intervention) used to 'activate' the theory of change.
5. **Test and refine the intervention** – the theory of action and theory of change in steps 4 and 5 are largely hypothetical. Stage 5 allows them to be tested 'on the ground' and refined as necessary.
6. **Collect evidence of effectiveness** – either to demonstrate that the intervention is likely to be effective if it goes to wider implementation; or to use to develop larger evaluation strategies.

Table 1
Data collection and approaches used to develop the intervention.

Steps of 6SQUiD	Data sources and methods	Output
1. Identify the problem	a) Electronic survey of care home staff b) Qualitative interviews with residents, staff and relatives	Shared definition of the problem
2. Identify the causal factors and those most amenable to change	c) Analysis and triangulation of data collected in a) and b)	Fishbone diagram describing the causal factors
3. Identifying theories of change	d) Brainstorming by study team e) Discussions with Advisory Group	Logic model for the theory of change
4. Identifying theories of action	f) Workshops with care home staff followed by discussions within study team and use of evidence	Logic model for the theory of action. Action plan for each care home
5. Testing and refining the theory of action	g) Short term testing in a range of care homes	Refinement of the intervention

nature of physical activity and other physical activity interventions in care homes. Participants were asked about the home and residents characteristics (e.g. percentage of residents with dementia, number and age of residents); levels of physical activity in their care home; current activities; and attitudes towards physical activity. The survey also asked the respondent to comment on the approach they would take if they had a resident with characteristics as described in vignettes. These vignettes represented different stages of dementia and differing physical abilities.

The survey took place in 2016, and was distributed to around 1500–2000 email addresses identified through:

1. Dementia Services Development Centre mailing list
2. Commercial database cross-referenced with regulated body lists
3. Enabled Network for Research in Care Homes (ENRICH)

A total of 92 people responded to the questionnaire, with responses from England (80.4%), Scotland (14.1%), Northern Ireland (3.3%) and Wales (1.1%). Around half of respondents worked in a care home with 26–49 residents (56.2%), 28.1% worked in care homes with 50 or over residents and 15.7% worked in homes with less than 25 residents.

Initially descriptive analysis was undertaken to explore topics such as encouragement of physical activity, the importance of physical activity, the amount and type of physical activity undertaken and the factors taken into consideration when making decisions about whether physical activity might be encouraged. Cross-tabulation, and tests of association (Cramer's V/Φ) were used to explore the relationships between different elements. For example, in respect of the vignettes, whether the stage of dementia was associated with views on encouraging physical activity, or whether it was associated with the types of physical activity (such as group activities) would be encouraged. A further example was in considering if the frequency of encouraging physical activity was associated with the vigour of the physical activity reported.

3.2. b) Qualitative interviews

Five care homes in England and Scotland took part in the qualitative work which took place in England and Scotland in 2016–2017. Across the homes we gathered data from interviews with 15 residents living with dementia, 13 managers, seven family members and 22 care home staff members (see Table 2). The qualitative work aimed to establish the times of the day when there might be opportunities for physical activities, the barriers to physical activities, and existing opportunities to maximise further physical activity. Interviews were transcribed verbatim and anonymised. Team members read early transcripts both to inform later interviews and to begin identifying emerging themes which would sharpen the focus of the interviews onto physical activity in the care homes. Early interviews started with a list of topics that had

Table 2
Breakdown of participants contributing to qualitative work.

	Resident interviews	Manager interviews	Family member interviews	Staff interviews
Care Home A (63 residents in home)	2	2	4	4
Care Home B (27 residents in home)	2	4	2	4
Care Home C (85 residents in home)	3	2	0	5
Care Home D (62 residents in home)	6	3	0	4
Care Home E (60 residents in home)	2	2	1	5
Total	15	13	7	22

The full results of the qualitative work are reported in a separate paper (Bowes et al., 2020).

emerged from the literature review and the survey. This was then used flexibly with subsequent interviews to allow emerging issues to be followed up, Activity supported, potential activity, and activity not supported were all included, and different relevant tasks, times, opportunities, ideas and practices considered.

Once the interviews were complete, the transcripts were coded using the initially identified themes, with any additional emerging themes added to the list as they were coded. The purpose of the analysis was to produce a systematic account for each care home of the current state of movement or sedentariness, alongside information about the care homes themselves. The themes were then considered across the care homes, comparing them and identifying the kinds of variability that existed. For example, one of the initial themes identified concerned the role of people outside the care home in supporting or facilitating physical activity. Following the coding process, this theme, when linked with other, related themes, distilled into a discussion of the boundaries of the care home and how these were negotiated and crossed (or not crossed) in relation to physical activity.

3.3. c, d, and e) Analysis and triangulation of data

Following the qualitative analysis we proceeded to identify the modifiable causal factors; and started to develop our theory of change. This took several iterations, and included brainstorming within the research team as well as discussion with others such as our Advisory Group which comprised of a range of stakeholders including people living with dementia.

3.4. f) Workshops and development of action plans

We undertook workshops with all of the care homes who agreed to take part in the intervention. These took place either in the University of Stirling or in the care homes. The research team spent considerable time with six care homes assisting with the development of action plans for movement strategies to fit within the theory of change. At this stage, two new care homes became involved in the project (F and G). During this time, supporting materials and activities were modified according to feedback on what would make them easier to use. Once the action plan was drawn up, each care home implemented it themselves: importantly, it was not an externally determined intervention delivered by outsiders.

3.5. g) Testing in care homes

Following the initial implementation of action plans, we collected

Table 3
Interviews at the testing stage.

	Residents	Managers/staff	Family members
Care home C	6		
Care home F	6	2	2
Care home G	2	7	
Total	14	9	2

qualitative data through individual and group interviews at three care homes to evaluate the implementation and impact of the action plans. These care homes include care home C (from stage b)) and the two new care homes which joined at stage f, F and G. At care home C we interviewed six residents, at care home F we spoke to 6 residents 2 staff members, and 2 family members and at care home G, 2 residents and 7 members of staff were interviewed (Table 3).

3.6. Ethics

For the survey, ethical approval was obtained from the University of Stirling School of Applied Social Science Ethics Committee. For the qualitative interviews, ethical approval was received from NHS Social Care Ethics Committee in England. For evaluating the intervention tests, we obtained NHS ethical review in England (London- Camberwell and St Giles) and Scotland (Scotland A). This enabled us to include people without capacity to consent in this phase of the research, ensuring that the most vulnerable people in the care homes were not excluded from the potential benefits of the intervention.

4. Results and development of the programme theory

The results are presented using the 6SQuID framework, Steps 1–5.

4.1. Step 1. Defining the problem

The process of defining the problem used a range of data sources and was iterative.

a) Electronic survey.

From the electronic survey, 92 care home employees responded, covering care homes across the UK. Most of the care home respondents came from the private sector ($n = 77$, 83.7%), with 13 (14.1%) from voluntary / not for profit care homes and 2 (2.2%) from local authority care homes.

Number of residents ranged from 7 to 249 (mean = 48, s.d. 35.67). Number of residents with dementia ranged from 2 to 180 (mean = 33, s.d. 28.74). The percentage of residents with dementia ranged from 21.3% to 100%, with many respondents stating that they represented dementia specialist care homes.

All respondents agreed that “physical activity is important for the overall well-being of somebody with dementia”. Despite this, there was variation in the extent to which gentle, moderate or vigorous activity took place within care homes for people living with dementia (see Table 4).

On days where activity was encouraged, 36.37 min of gentle activity was encouraged (s.d. 29.83). There was a large spread in the amount of gentle activity encouraged with 1 min being the least amount of time encouraged and 180 min being the maximum amount encouraged. Average time encouraged for moderate activity was 16.65 min and for

Table 4
Intensity and frequency of physical activity.

N (valid %)	More than once a day	Daily	Weekly	1–3 days a week	Less frequently	Never
Gentle activity	23 (29.9%)	31 (40.3%)	9 (11.7%)	13 (16.9%)	1 (1.3%)	0
Moderate activity	1 (1.4%)	18 (24.3%)	26 (35.1%)	15 (20.3%)	12 (16.2%)	2 (2.7%)
Vigorous activity	0	2 (2.7%)	9 (12.2%)	7 (9.5%)	20 (27%)	36 (48.6%)

vigorous activity, 9.34 min. The spread was lower for moderate exercise (minimum 0, maximum 60) and even lower again for vigorous activity (minimum 0, maximum 30). Standard deviations were also smaller for moderate and vigorous activity, indicating greater consistency across care homes for the amount of encouragement that should be provided for more intense levels of physical activity.

Reflecting on these figures it is possible to conclude that within care homes there are still many people with dementia are not getting the recommended levels of physical activity. Guidelines indicate that people over the age of 65 should aim to undertake 150 min of moderate activity per week. Within our sample, moderate activity was most frequently encouraged on a weekly basis, with an average time of 16.65 min of days when this intensity of activity was encouraged. So whilst the benefits of physical activity were recognised by care home managers/staff there was still a need in many homes to increase the amount of activity being undertaken to ensure recommended guidelines might be met. Findings from the fieldwork (see below) suggest that opportunities to participate in these are often limited due to staff constraints and other barriers.

4.2. b) Qualitative interviews

Results from the fieldwork (Bowes et al., 2022; Pringle et al., 2021) suggested that the main outcomes associated with physical activity that participants thought were most important were a reduction in the symptoms of dementia – these included difficulty sleeping, agitation and restlessness, low mood and boredom. These were linked to well-being and improved quality of life. Participants were less interested in outcomes such as reduction in falls or better joint movement.

The definition of the problem in this way helped to identify the type of physical activity interventions which would be useful and acceptable. It was clear that any physical activity intervention needed to focus on activities which could have an impact on dementia outcomes, rather than perhaps more strength building and balance.

From the survey, the observational and qualitative work the problem was defined as a lack of both physical activity (e.g. activities designed to expend energy), and also movement (small movements of the body which may not expend much energy). The problem agreed by stakeholders and researchers is detailed in Box 2.

4.3. Step 2. Identifying the modifiable and non-modifiable factors

Using the data from the survey, and the qualitative interviews, the team then brainstormed using the data from step 1 to identify twenty factors affecting physical activity and movement for people with dementia in care homes. We used the data to create a fishbone diagram (Fig. 1). We grouped the factors into four domains (each represented in the figure by a thick ‘fishbone.’): staff, resident, environmental and policy. The first domain related to staff and cultural factors (top left of the fishbone diagram). The data suggested that factors such as culture (e.g. being ‘lounge ready’ and division of labour) were important factors for the lack of physical activity and movement in residents. The second domain was the characteristics of residents (bottom left). The characteristics ranged from their physical ability to the perceived lack of voice and choice when it came to making decisions about the physical activity and movement they did within the care home setting. The third domain was the environment (bottom right) which included the physical space within the care home setting, as well as the external space (the facilities within the community) and external factors such as the weather. The

Box 2
Defining the problem.

There are low levels of physical activity and movement for people with dementia in care homes, particularly those with complex needs. This may negatively affect the symptoms of dementia such as anxiety, sleep and agitation and hence quality of life.

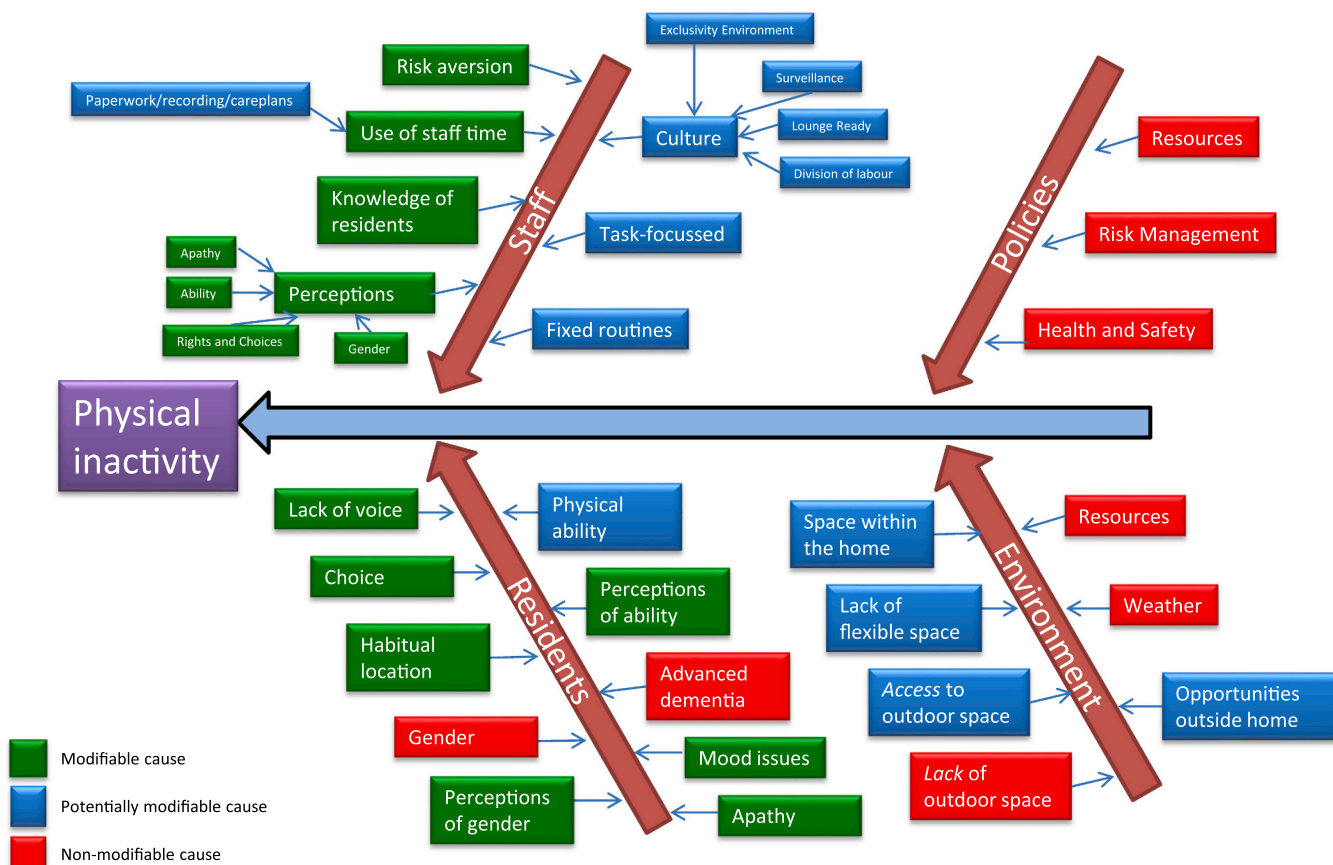


Fig. 1. Fishbone diagram representing the modifiable and non-modifiable factors influencing low movement and physical activity in care home residents.

Table 5
Causal factors to be addressed in the intervention.

Staff and cultural factors	Resident Factors	Environmental Factors
Care home culture	Habitual location	Use of space within the home not maximized for physical activity and movement
Lack of staff time	Lack of voice	Opportunities outside the home not maximized
Task-focus	Lack of choice	
Fixed routines		
Poor knowledge of residents		
Division of labour		
Lack of knowledge of benefits of physical activity and movement		
Misperceptions of abilities of residents		

fourth domain was policies and practices which impacted on physical activity and movement. This included health and safety policies, risk management and the actual resources that a care home received. It also included policies around where care home staff needed to be located within a care home.

Once all of the factors had been placed in the fishbone diagram, the

team then started to classify each factor as modifiable, potentially modifiable, and non-modifiable. Our decisions at this stage were derived from our own knowledge combined with the data from earlier stages. We classified many of the staff factors such as culture as potentially modifiable, as we knew from a range of literature that culture is harder to modify than other factors such as knowledge and perceptions.¹

Once we had classified the factors, the next step was to decide which of these we would address in an intervention. As can be seen from Fig. 1. we identified over 20 potential causes of physical inactivity and low movement, many of which were inter-related (such as cultural and staff factors). We based our decisions on a number of assumptions which related to our understanding of complexity and intervention development.

1) Intervening to change only one causal factor is unlikely to have much impact on the outcome of interest or to be sufficient to result in a significant effect. We needed to think about intervening on a number of causal factors. For example, intervening only with residents was unlikely to be effective; we needed to intervene at the environmental, system,

¹ There is a full discussion of the significance of care home cultures for physical activity in our complementary paper (Bowes et al., 2022).

staff and cultural levels as well.

2) The causal factors which were hard to modify (such as culture change) were the ones which we thought were likely to have the biggest impact on the outcomes.

3) Addressing as many of the causal factors, across as many of the domains as possible, was likely to have the biggest impact on the outcome (s) of interest.

4) We needed to build sustainability and ownership into any intervention or it would likely, at best, have a short term impact.

We decided not to intervene in the policy/system domain because most factors were classified as non modifiable or difficult to modify. This decision would mean that any intervention would be less effective, but we could still reach an acceptable level of change. The factors on which we decided to intervene are presented in Table 5.

4.4. Step 3. Developing a theory of change

Once we had identified the list of causal factors the next step was to identify any known ‘change mechanisms’ or theory of change. A theory of change is a description of how and why a desired change is expected to happen in a particular context. So for example, how to change the care home culture to be more conducive to increasing movement and physical activity in residents. A theory of change should ideally draw upon a combination of information and processes (Rogers, 2014), including:

1. needs assessment or determinant analysis that identifies what must be in place for success in documented objectives
2. previous evaluations and research on similar programmes or policies, particularly those that include analysis of how the programmes/policies work
3. expert opinion on these types of programmes/policies

Table 6
Developing theories of change.

Theories underpinning the intervention	Evidence base
Theory of change 1. Movement and physical activity can positively impact on health outcomes	Physical activity interventions can lead to increased and sustained physical activity (Conn et al., 2011). Increases in these outcomes can result in improved mental wellbeing (Penedo & Dahn, 2005).
Theory of change 2. Ownership encourages engagement with an intervention and sustained behaviour change	Giving people ownership in developing an intervention can lead to increased engagement and sustainability (Jepson et al., 2022).
Theory of change 3. Interaction is important for making physical activity enjoyable and fun	Collective, shared activities are more effective than individual activities for physical activity (Estabrooks, 2007). Social contact can lead to independent impacts on mental health (Dickens, Richards, Greaves, & Campbell, 2011).
Theory of change 4: Purpose and meaning	An activity needs to have purpose and meaning in order for people to engage with it and have a sustained commitment to it Any intervention needs to be consistent with a person’s identity in order for people to stay engaged in the intervention
Theory of change 5. Recognising and harnessing assets	‘Assets’ models accentuate positive capability to identify problems and activate solutions. They focus on promoting salutogenic resources that promote the self esteem and coping abilities of individuals and communities, eventually leading to less dependency on professional services. (Morgan and Zilio, 2007)

4. perspectives of staff, managers, partners and community members about how (not whether or not) the intervention works, or fails to work
5. feedback from relevant stakeholders on draft versions of the theory of change
6. research-based theories about how change occurs

For each of the causal factors in Table 5. we had to identify a mechanism for change. For example, in column one we had identified that care home culture was one of the biggest factors in lack of physical activity. We then had to identify a theory or theories that could help us to determine how to bring about change in the culture. We began with identifying theories based on points 1–5 above, and then linked to any research based theories about how change occurs (point 6). These are described in Table 6. We identified five theories of change to explain and understand how we could change the range of factors. Theories can be based on existing theories (e.g. behavioural or organisational) or those developed as part of the process (Jepson et al., 2022).

From this, we then developed a visual representation (logic model) of how we hypothesised change would occur (Fig. 2.).

4.5. Step 4: Developing a theory of action

There are two features of a theory of action. 1) the activities that will catalyse and sustain the theory of change and 2) the process by which the activities will be implemented to ensure success.

1) Developing the activities for the theory of change.

An activity can be anything from a dance class, to personalised plans, to educational activities to ensuring that care home staff have encouraging physical activity written into their job descriptions. To ensure relevance and acceptability of the intervention, we worked with the care homes to develop activities that would fit within their culture, context and resources. We undertook workshops using different methods. On one occasion we invited care home staff up to the University of Stirling for a two day event, in which we worked with them to identify the most relevant and achievable activities. We provided draft guidance materials and tools to support development of an action plan. These were subsequently revised using feedback from workshop participants.² We talked about the theories of change, and that the care home needed to develop and implement activities for EVERY theory of change. Without creating change on all levels, the intervention would be less than optimal, and might well fail. Table 7 lists examples of the kinds of activities that were discussed against the relevant theories of change, with a view to reviewing the range of potential activities that would be applicable in each care home’s own context.

During these workshops, working with two care homes in particular, we developed a name and a brand for the intervention, which was thenceforward to be known as Care Homes Achieving Realistic Movement Strategies, or CHARMS.

2) the process by which the activities will be implemented to ensure success.

For the theory of action to work as intended, we worked with the care homes to develop an action plan for each one which included details on:

- What activities to include
- Who will deliver the activities in the intervention
- When the activities will be delivered
- Where the activities will be delivered
- How it will be delivered
- What assets can be used as part of the activities
- How will it be funded (if necessary) and how will it be sustained?

² The materials can be obtained from the authors.

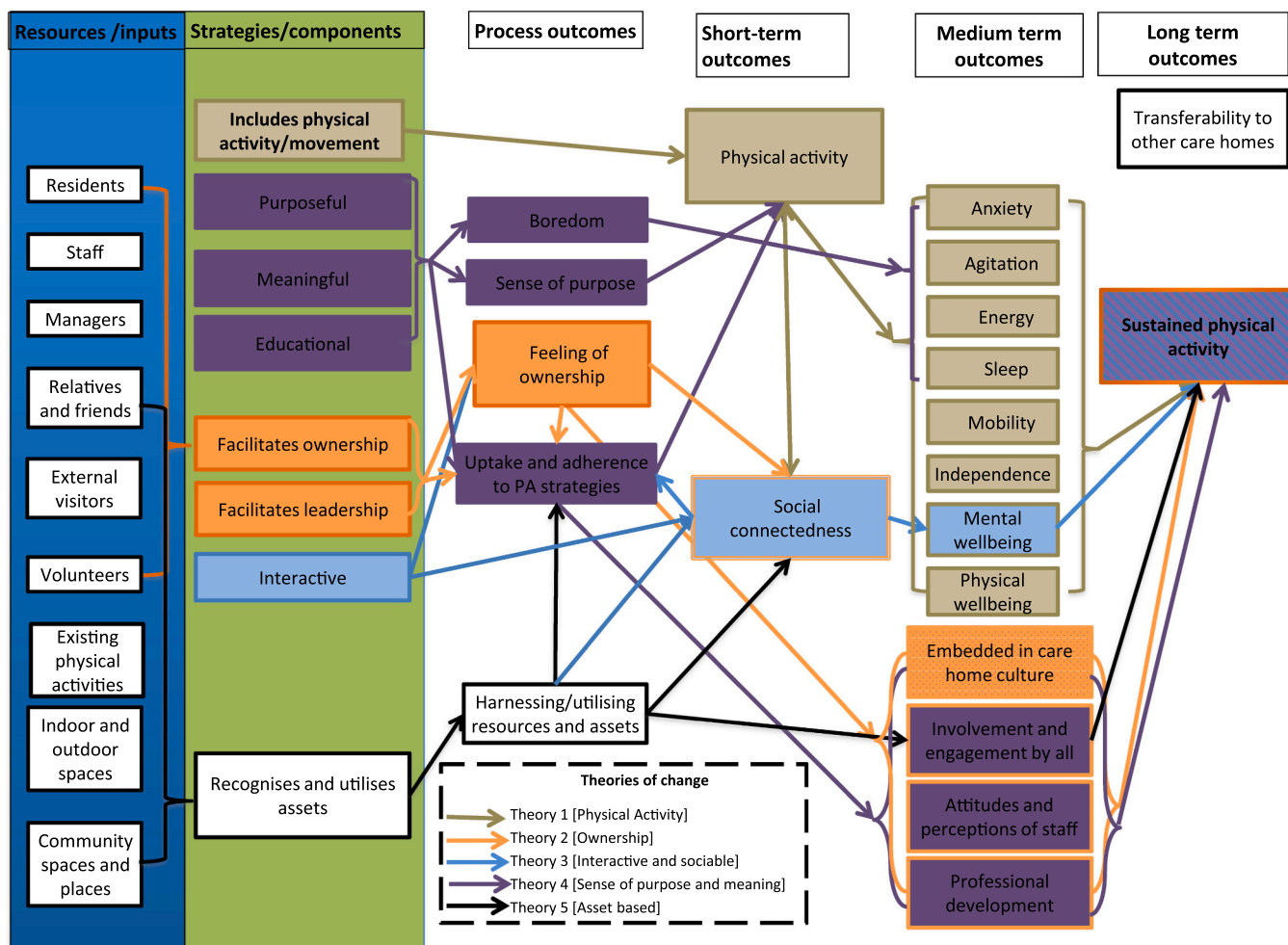


Fig. 2. Programme theory for the CHARMS intervention.

4.6. Step 5. Developing and refining the intervention

Five care homes were initially involved in piloting CHARMS and we managed to collect evaluation data from three of them (C, F and G). Each of the care homes developed its own movement strategy and action plan, initially based closely on the materials provided. We collected qualitative data in the form of interviews with 9 staff, 14 residents and 2 family members from care homes C, F and G. We had intended to pay a member of care home staff to collect data from the residents: this simply did not work, and the feedback from the care homes was that it felt like additional work that they could not accommodate, even if paid. We also found that the process of implementation was not smooth, as the care homes regularly faced staffing shortages and changes, which diverted leadership focus onto other matters. We believe, though we cannot be certain, that issues of this kind led to care homes moving out of the study, having already invested as much time as they felt they could.

Despite these difficulties, we gained valuable insights into how the intervention was working and what some of the barriers to and facilitators for success might be. Here, we present findings from each care home, in keeping with the CHARMS approach to ensuring the intervention is tailored to the context.

4.7. Care home C

Staff in leadership positions enthusiastically adopted the CHARMS approach, being strongly committed to improving levels of physical movement in the care home, in the context of improving the whole

quality of their provision. Amongst the activities involved in their action plan and subsequent delivery were a ‘wishing tree’ allowing residents to propose activities they would like to do; the use of an ‘app’ to record and monitor activities; external engagements to publicise activities; acquisition of pets to stimulate activities. The original version of the CHARMS approach involved a suggestion to identify a ‘movement champion’, and this was done. It was quickly dropped however, as other staff tended to leave the movement work to the champion and were less inclined to engage with activity themselves. In this care home, it was clear that the leadership and commitment of the management was of great importance: the individual concerned actively promoted the CHARMS approach and the action plan over a long period (2 years). Despite this leadership, the implementation of the action plan took considerable time and was regularly interrupted by exigencies of running a care home, such as staffing changes. Furthermore, over the period the resident group had changed to include more people in greater need of support: this had necessitated developing different kinds of movement-focused activities, particularly involving smaller groups of people.

Interviews with six residents indicated that they enjoyed activities organised in the home, whilst having personal preferences for, for example, something less noisy or more useful. The residents did not speak about physical activity as part of what they might do now, more as something they had enjoyed in the past, and regretted they were no longer able to do. The researcher’s observations indicated that the initiative had contributed to change, and that people were moving around more than had previously been the case. Despite this, the awareness of staff of the CHARMS initiative was rather low and

Table 7
Examples of activities in each of the areas:

Theories underpinning the intervention	Examples of activities
<p>Theory of change 1. Movement and physical activity can positively impact on health outcomes. Activities need to be often enough to create the desired change, and relate to the outcome – so if the outcome is to reduce anxiety, then low impact, mindful, relaxing exercises may be more beneficial than high impact, high stress. Even small movements such as hair brushing, teeth cleaning, if carried out regularly can add up to significant movement over a number of hours</p>	<p>Low impact to reduce anxiety</p> <ul style="list-style-type: none"> • Tai Chi • Throwing and catching balloons • Gardening • Walking • Care home chores <p>Higher impact for improving sleep</p> <ul style="list-style-type: none"> • Dancing • Playing bowls • Aerobics and exercises
<p>Theory of change 2. Ownership encourages engagement with an intervention and sustained behaviour change. Rather than prescriptive activities, staff and residents encouraged to create their own which fitted in with the culture and identity of the care home.</p>	<ul style="list-style-type: none"> • Creating CHARMS bracelets for members of staff and residents • Creating CHARMS champions • Writing physical activity and movement into job descriptions along with other activities of daily living • Events and themes that can include movement and physical activity
<p>Theory of change 3. Interaction is important for making physical activity enjoyable and fun</p>	<ul style="list-style-type: none"> • Group based activities • Music – dancing (both on foot and adapted for chairs) • Singing, involving standing, movements with songs etc • Chair based exercises to music • Conversation during day-to-day movement, such as moving to the dining room or whilst doing activities of daily living • Engaging family and community members • Ball throwing; keeping balloons in the air
<p>Theory of change 4: Purpose and meaning. Linking with previous behaviours and hobbies creates purpose and meaning and will mean staff and residents more likely to engage</p>	<ul style="list-style-type: none"> • Brushing hair teeth, tying shoelaces, lifting arms above head to put on clothes, walking to the day room or the dining room • Helping with care home jobs such as cleaning, tidying, folding washing • ‘Virtual’ cycling from Land’s End to John O’Groats <p>Residents clocked up miles on borrowed adapted hand and seated cycles from their local bike lending library</p> <ul style="list-style-type: none"> • Gardening and remembering the names of plants. Can include a range of activities from planting, weeding, watering, pruning, picking, digging. Walking around a garden and try to name plants can also be meaningful and purposeful • Walking to shops to buy a paper, walking in a mall looking in shops
<p>Theory of change 5. Recognising and harnessing assets. Making use of local assets can increase the range and meaningfulness of the activities</p>	<p>Examples of local assets</p> <ul style="list-style-type: none"> • Parks and local green spaces • Shops and malls • Gardening and volunteer clubs • Schools and workplaces • Friends and family • Members of staff who may know how to do yoga or Tai Chi, or enjoy walking or gardening • Space inside or outside the care home that can be re-purposed for physical activity and movement

managers acknowledged the need for additional encouragement for some staff to take active parts in supporting more movement. They explained that the CHARMS initiative had been useful as a catalyst to support increased movement.

4.8. Care home F

This care home adopted the CHARMS approach as a high profile way of promoting physical activity for residents, staff and relatives. The plan was put together, and a high profile launch of the scheme held. For this, we designed T-shirts and pens as promotional materials, using the CHARMS logo, at the care home’s request. These were popular, and the activity continued to be attached to the CHARMS branding. A key part of the action plan was to set up a virtual challenge to cycle from John O’Groats to Land’s End, adding up cycling distances achieved on many kinds of cycling equipment, including hand cycles, seated foot cycles, exercise bikes and road bikes. After thirteen weeks, groups of residents, staff and relatives ‘met’ virtually in Penrith. The project generated considerable enthusiasm amongst those involved, and has produced an archive of comments, pictures and so on that they used to sustain and promote the CHARMS work. This also generated publicity for CHARMS within the large company to which the care home belongs. Subsequently, other trips have been identified and completed, including rides outside, using various conveyances including a tri-shaw, led by volunteers and relatives. This care home produced publicity materials about their involvement in CHARMS, with pictures of residents working with the bikes, and quotations from residents and relatives about their enjoyment of the initiative. From this care home, there is evidence that the intervention was well received by many residents and relatives, and certainly contributed to well-being. This suggests its potential for wider application and for measurable effectiveness, though we have only qualitative data at present.

Interviews with six residents and two family members indicated the enjoyment of the cycling. One relative had led cycle rides outside, and had felt they benefitted from this: they also noted that staff members had got involved too. Relatives had donated the hand bike and foot bike, which were used by residents in a seated position. It was clear that many people in the care home had joined in, and there was an air of excitement about the activity. One volunteer helper spoke about videoing people participating: when the video was played back, she described residents as ‘egging each other on’ to get involved. Residents reported both physical and psychological benefits to the cycling.

4.9. Care home G

Care home G took a long time to implement CHARMS, due to difficulties within the building (a flood) and staffing changes, whereby both staff who had initially led on the CHARMS project left their jobs: notably however, they remained committed throughout several months of such problems. Their action plan had two main activities; a virtual ascent of Ben Nevis and a ‘Take Ten’ approach with an emphasis on physical activity, encouraging staff to spend time with residents, particularly residents who did not usually get involved in activities. They appointed new activity coordinators to take the work forward.

Interviews with two residents suggested that they were being encouraged and supported to move about, though recognised their own limitations. Being physically active in the past was again referred to, with a strong focus on current difficulties.

Interviews with seven staff indicated that the workshop the team had run had made an impression on staff who spoke about being more conscious about movement and encouraging residents to move more, even by encouraging people to raise their arms and clap their hands (in response to staff dancing). This approach was evident from domestic staff, who saw a need for activity to continue throughout the day rather than being confined to the times when the activities coordinator was present, and interviewees generally felt that the whole staff team could and did take part in promoting movement. Staff here spoke about movement integrated in everyday life, with less emphasis on specifically organised sessions. There were also more negative views, which referred to being short-staffed, the limitations on the physical and mental capacity of residents, and the difficulties of bringing about change. It was

notable in this care home that several staff who had taken part remembered the workshop the team had held as part of the process of developing the movement strategy six months after it had taken place, and there were examples of staff changing their behaviour as a result.

Qualitative data suggested that the care home staff tried out the activities, and when some failed, they introduced their own activities. The intervention, by creating ownership, enabled them to have the confidence to create their own solutions.

The pilots confirmed many of the predictions we had made in our theory of change about what would be effective and what factors would make for success in increasing levels of physical activity. It was notable that staff had taken ownership of the CHARMS action plan, particularly more senior staff, and that the residents and in some cases families had engaged in the activities positively and with purpose. In the short term, we saw positive engagement across the board, and over time, the physical activity became more embedded in the culture. Although our long term follow-up was, perforce, time-limited, we know that the programmes were sustained over at least two years.

5. Discussion

5.1. Strengths and limitations of such an approach

There are a number of strengths to the 6SQuID approach – developing and testing a programme theory makes explicit the assumptions and hypothesised pathways and enables testing of these assumptions both in the context in which it was developed, but more importantly in other contexts. We believed that the most important step is developing a theory of change. The theory of action (the activities and how they are delivered) is designed to activate the theory of change. As every intervention takes place within a set of systems the fidelity should be to the theory of change rather than a pre-specified set of activities that have to be followed slavishly. For example each care home operates within at least two systems: 1) the macro – health and care system that sets our policies and regulations; and 2) the individual care home system, which has a set of actors, resources and context unique to that care home. To develop any intervention which is prescriptive in its activities and insists on fidelity to the activities is by implication non-adaptive to the system in which it is implemented. A better way is to have an overall theory (or theories) of change to which activities can be added to suit the context and the resources available in either the micro or the macro culture. Such an approach means that transferability of the intervention can take account of and adapt to different contexts with ease. It also enables alternative activities to be developed and implemented when there are finite resources. It is acknowledged that there may be some activities that are more important than others, and that will contribute more to effectiveness than others, but by giving ownership to the people delivering or receiving the intervention, they can then work out their own solutions.

The limitation of the approach is that it does take more time than just implementing an ‘off the shelf’ intervention, and requires the participation of stakeholders including residents, staff and relatives. The approach does require commitment and some resources. However the likely benefits are likely to outweigh these limitations.

6. Conclusions and lessons learned

The development of CHARMS using co-production methods led to a physical activity and movement intervention that operated on three levels, individual (staff, residents and relatives), cultural, and environmental, and promoted ownership and sustainability. This approach led to care homes trying out the suggested activities and also creating their own activities to suit their context. It now needs further testing in a wider range of care homes.

To date, the key lessons learned for policy and practice include firstly, the importance of ensuring that any physical activity and

movement intervention is generated by the care homes themselves, using the CHARMS theory of change, but developing activities (the theory of actions) that suit their context and culture. This is in contrast with many interventions reported in the literature that are short term, and introduced from the outside. The CHARMS programme, founded on an evidence-based theory of change with adaptive properties and sustainability built into the theory, lasted considerably longer and became more strongly embedded. Secondly, the case studies demonstrated the importance of leadership within the care homes. This could work in different ways – from management, or with the appointment of champions – but looks an essential factor for success. Leaders need to understand the culture and context of their care home as a whole, and include staff, residents and relatives in the process. Thirdly, and in contrast to the literature, different kinds of physical activity and movement can produce similar benefits. We found no evidence of a ‘magic bullet’ type of activity that fulfilled all purposes and that suited all residents.

In terms of undertaking further research, the staged nature of the project entailed several applications for ethical approval. These processes added considerably to the time taken to complete the work, especially when it proved difficult to persuade the Ethics Committee that people lacking capacity to consent should be included in the research. If such interventions are to be effectively researched, the ethics processes need to be factored into the timelines and expected to be lengthy. Finally, our experience confirms the challenges of conducting research in care homes, in which labour shortages and staff turnover can be a problem at all levels, meaning that time and patience are essential to ensure projects are delivered. In the context of the Covid 19 pandemic and the disastrous treatment of the sector, these issues are likely now to be magnified considerably.

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Jepson: Conceptualisation, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualisation, Writing – original draft, Writing – review and editing. **Dawson:** Conceptualisation, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualisation, Writing – review and editing. **McCabe:** Conceptualisation, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review and editing. **Greasley-Adams:** Data curation, Formal analysis, Investigation, Project administration, Resources, Validation. **Biggs:** Writing – original draft, Writing – review and editing. **Bowes:** Conceptualisation: Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Resources Resources, Supervision, Validation, Writing – original draft, Writing – review and editing.

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