

# Attitudes Towards Adapted Lifestyle-Integrated Functional Exercise Developed for 60–70-Year-Olds: Perceptions of Participants and Trainers

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## Keywords

Successful ageing · Exercise/physical activity · Intervention · Prevention

## Abstract

**Background:** Time commitments, limited access, or unwillingness to join a group are some of the many reasons for low adherence to structured exercise in older adults. A promising alternative approach is integrating exercise into daily routines. **Objective:** This study tested whether an adapted Lifestyle-integrated Functional Exercise (aLiFE) programme is suitable for adults aged 60–70 years. **Methods:** The aLiFE approach was evaluated by interviews and focus-groups with participants and trainers following 4-week pre-post intervention pilot study. For data analyses, Framework Approach was used. Coding was managed using NVivo, and subsequently organised into overarching themes. **Results:** Twenty women and 11 men (mean age  $66.4 \pm 2.7$  years) and

6 trainers ( $30.0 \pm 6.2$  years; 5 women) participated. Both participants and trainers were positive about the programme. Participants understood the concept of integrating balance, strength and physical activities into daily lives and valued the individual tailoring in the programme, the preventive approach, and the support of trainers. Trainers valued the flexible approach and peer support between trainers. However, both participants and trainers disliked the extensive study paperwork and reported some challenges to integrate activities into daily routines during the compressed intervention: busy and varied lifestyles, embarrassment performing activities in public, pain, difficulty of specific activities. Participants noted habituation of some activities within the short intervention period, even without continuous self-monitoring. **Conclusions:** aLiFE is a highly acceptable intervention amongst adults aged 60–70 years. Trainers are especially relevant as motivators and support providers. The effectiveness of the aLiFE approach should be tested in a randomised controlled trial.

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Published by S. Karger AG, Basel

## Introduction

Being active brings physiological and psychological benefits to older adults, reducing illness, improving functional ability and well-being [1]. However, for many older adults, structured exercise or sporting activities are not appealing [2, 3]. This is for extrinsic reasons such as transportation, limited access to facilities [4], time commitments [5–7], or intrinsic reasons such as unwillingness to join a group [5], or aversion to exercise because it does not fit with their identity (e.g., not perceiving themselves as “sporty” [2, 8]. Studies have highlighted older adults’ preference for lifestyle activities, such as cleaning or gardening, rather than performing specific exercises [9]. Where older adults have engaged in activities that they have found enjoyable, greater adherence has been reported [10].

The integration of exercises into daily life is a promising alternative to structured programmes [11, 12]. Integrated programmes turn daily routines into opportunities for exercise. Some studies focus on increasing daily walking time, for instance by getting off the bus earlier, or climbing the stairs instead of taking an elevator [13, 14]. Other studies have expanded this approach to integrate functional exercises for improving balance and strength [15, 16]. Functional exercises are performed with the purpose of enhancing basic activities of everyday living, for example, stair climbing or rising from a chair, and focus on specificity of training [15]. Functional exercise training has been found to be effective, because the exercises are linked to specific outcomes of relevance to daily life (i.e., enable someone to get up and down stairs more easily) [15, 17]. One advantage of integrated training is that it can be performed at any time, without having to put specific time aside.

As older adults’ participation in exercise and physical activity relates to intrinsic factors [8], behaviour change is an important component of any intervention. Structured programmes typically do not include a behavioural change concept for fostering long-term adherence and habituation of exercise [18]. Lifestyle-integrated approaches for those not interested in structured exercise, which include behavioural change concepts, have been shown to be attractive to older adults [6, 12, 19]. It has been proposed that integrated training may become habitual after a period of regular practice [11, 12, 20].

There is growing research on the feasibility and effectiveness of integrated training for older adults living in the community as well as in restorative home care [16]. The most extensively evaluated programme in this context so far is the Lifestyle-integrated Functional Exercise (LiFE) programme, which focuses on embedding functional ex-

ercises into daily life and enhancing overall level of physical activity [11, 12]. LiFE provides functional balance and strength exercises, embedded within daily routine, resulting in improved balance, strength, and a significant 31% reduction in fall rate [11, 12]. The original LiFE programme was conducted in community-dwelling older adults aged 70+ with a history of falls [11, 12]. LiFE is underpinned by concepts of habit formation, self-efficacy, skills training, and outcomes gained. Habit formation theory states that new behaviours must first be planned and visualised in a specific location and situation. Then, the behaviour should be performed repeatedly, in the same location and situation, until it has become habitual [21]. To increase the likelihood of habituation, prompts and cues can be used to remind the participant to perform the behaviour. Clemson et al. [11] found that LiFE had better adherence levels than structured training.

The original LiFE programme was designed for older adults aged 70+, focusing specifically on falls. However, LiFE has the potential to be adapted for other populations and outcomes. There has been no research undertaken to identify whether LiFE or an adapted LiFE (aLiFE) would benefit a younger age group, who are functioning at a higher level; whether adapted exercises (e.g., more challenging) and behaviour change techniques (e.g., action planning; self-monitoring) are feasible to deliver. Through the PreventIT project ([www.preventit.eu](http://www.preventit.eu)) we developed aLiFE to address the risk of age-related functional decline in adults aged 60–70 years [22]. We aimed to target people at the point of retirement, when lifestyle changes often trigger a drop in physical activity. In addition, subtle changes in functional decline that begin at age 30 years become more marked at 60, hence the need to intervene at this point [23]. We piloted aLiFE over a 4-week period, and quantitative methods indicate that aLiFE is largely feasible and acceptable in 60–70-year-olds [22]. In the present study, we focus on participants’ and trainers’ experiences and perceptions of aLiFE, in order to improve the design of the intervention before a feasibility randomised controlled trial.

## Materials and Methods

This study was conducted as part of the PreventIT project, aiming to evaluate the aLiFE programme, designed to prevent functional decline in the specific population of young-older adults aged 60–70 years. The present study uses data from the PreventIT pilot study, which is a pre-post test study with a 4-week intervention period, conducted within the 14-month preparation phase of the project (January 2016 – February 2017). The pilot study aimed to evaluate the proof-of-concept of an aLiFE programme specifically developed

**Table 1.** aLiFE activity framework

Module	Principles	Activities	Example Levels
Balance module	Reducing the base of support Shifting weight and moving to the limits of stability Stepping over objects Stepping, hopping and jumping in different ways*	Tandem stand One leg stand Leaning forwards Leaning backwards Leaning side to side Stepping over a threshold Square stepping exercises on tiled floor or paved walkway*	1 – hold support 2 – no support 3 – no support and additional challenge (manual tasks such as brushing hair; cognitive tasks such as counting or taking over the phone; sensorimotor tasks such as eyes closed or head turning*; self-perturbation tasks such as pivot turning, crouching, or hopping*) 4 – no support and 2 additional challenges combined*
Strength module	Increase number of times use a muscle Use fewer muscles to move the same weight Increase the amount of weight you have to lift or move Move slowly Increase range of motion*	Bend your knees (squatting; one-legged squatting*; lunging*) Sit-to-stand (rising from normal chair; low chair; on one leg*) On your toes (standing, standing on toe one legged*/walking heels raised, increased distance*) On your heels (standing/walking toes raised, increased distance*) Up the stairs (climbing stairs; climbing up stairs with heavy item*, climbing two steps at a time*) Move sideways (stepping sideways; leg raises from lying position*) Tighten muscles (ankle/hip flexion/extension; wall sitting*)	For sit-to-stand: 1 – usual pace 2 – slowly, with control 3 – more weight on one leg than other 4 – more weight on one leg than other, very slowly
Physical activity module*	Walk more* Reduce time spent sitting*	Walk longer* Walk faster* Sit less* Break up sitting*	No predetermined levels. Participants encouraged to be more physically active than their levels recorded at baseline*

\* Additions to original LiFE programme for aLiFE programme. Full details about the comparison of LiFE and aLiFE and what has been updated in aLiFE are provided in Schwenk et al. 2019 [22].  
aLiFE, adapted Lifestyle-integrated Functional Exercise.

for 60–70 year olds. Quantitative results of this pilot study about feasibility and effects are reported elsewhere [22]. This paper reports qualitative results regarding perceptions of the aLiFE programme, from both participants and trainers. Ethical approvals from the local institution review boards, as well as written informed consent from participants, were obtained in all 3 study centres. The study is registered on the ISRCTN Registry (ISRCTN37750605), Full details of trial design, inclusion criteria are reported elsewhere [22].

#### Intervention

The aLiFE programme includes an activity framework with 3 different modules: neuromotor exercise (balance and agility), strength and physical activity. The activity framework is presented in Table 1, where an asterisk marks additions to the original LiFE

programme. aLiFE includes more challenging balance, agility and strength activities and an entirely new physical activity module. Within each module, participants are encouraged to plan and perform activities to improve their balance (e.g., 1 leg stand; leaning to the limits of stability), increase their strength (e.g., squatting; lunging), to move more (e.g., walk further) and to sit less (e.g., break up sitting at regular intervals). Participants can choose from a range of activities that target their needs as well as align with their preferences. Full detail about the content of the programme is reported elsewhere [22]. The programme is underpinned by a behaviour change framework, using theory and techniques to support participants to turn their intention to be more physically active into action [24, 25]. The aLiFE programme is designed to make balance, strength and physical activities habitual, initially through

a conscious process of planning and practice. The development of this behaviour change framework is reported elsewhere [26].

The aLiFE programme documentation includes a 105 page participant manual, containing an introduction to the aLiFE programme, guidance for planning and performing the activities, a Daily Routine Chart for identifying opportunities for integrating activities and an Activity Planner and Counter for recording and monitoring activities.

Participants were visited at home by programme trainers, who assisted in planning and performing up to 4 new activities each week, once a week for 4 weeks, in order to investigate the acceptability of the activities and the feasibility of the programme. Trainers were provided with the participant manual, an instructor's manual and attended a 2-day training course prior to delivering the programme. For each participant, the activities to focus on were informed by completion of the aLiFE Assessment Tool, identifying the level of function in balance, strength and physical activity [22]. The trainer and the participant then agreed on the activities to be performed, based on participant preferences. Given the pilot study's need to gain feedback on as many aLiFE activities as possible in the 4 week timeframe, participants were asked to choose 4 new activities each week, based on their functional levels and personal preference. Pragmatically, personal preference meant that participants were more likely to perform the activities and be able to provide feedback.

#### Participants

For the purpose of evaluating the proof-of-concept of aLiFE in 60–70-year-olds, we included a convenience sample of 31 community-dwelling adults. Inclusion criteria for this study were community-dwelling older adults aged between 60 and 70 years; able to walk independently; no cognitive impairment (Montreal Cognitive Assessment [23] >26 points). Participants were excluded if they reported severe cardiovascular, pulmonary, neurological disease or mental disorder; attended exercise classes more than twice per week or exercised independently for >2 h per week. As such, participants were neither very active nor experiencing life-limiting conditions. We did not target sedentary older adults specifically, but they were also not excluded. Participants were recruited in Germany (Robert-Bosch Hospital, Stuttgart), Norway (Norwegian University of Science and Technology, Trondheim) and the Netherlands (Vrije Universiteit, Amsterdam). Each site recruited 2 trainers to deliver the programme to participants. Trainers' professional backgrounds were medical doctor ( $n = 1$ ), medical student ( $n = 1$ ), physiotherapist ( $n = 2$ ) and exercise scientist ( $n = 2$ ).

#### Data Collection

Basic demographic data and medical history were collected at baseline by trained research staff. All older participants and trainers were approached to take part in a semi-structured one-to-one interview or focus group after the final intervention contact. The researcher who conducted the interview/focus group was involved neither in the assessment, nor the training, to avoid their role influencing the focus groups and introducing bias. Topics discussed included views about the structure and content of the aLiFE intervention; training and instruction; using the manual and monitoring materials; behavioural change and suggestions for improvements to the intervention.

We conducted 8 interviews and 9 focus groups at the 3 different research centres. All interviews/focus-groups were audio recorded and transcribed verbatim in the original language. Transcripts

**Table 2.** Characteristics of the participants ( $n = 31$ )

	Mean (SD) or % ( $n$ )
Country	
Germany (Stuttgart)	35.5 (11)
Norway (Trondheim)	32.3 (10)
The Netherlands (Amsterdam)	32.3 (10)
Age, years	66.3 (2.7)
Women	20/31
BMI, kg/m <sup>2</sup>	29.8 (6.5)
Comorbidities	1.7 (1.2)
Reported falling within last 12 months	22.6 (7)
One fall	85.7 (6)
Two falls	14.3 (1)
BMI, body mass index.	

were subsequently translated into English, so that the data could be pooled for analysis. Data from the participants were analysed separately from those of the trainers.

#### Data Analysis

We used the Framework approach to qualitative analysis, outlined below [27]. Three authors (E.B., H.H.-H., M.W.) individually familiarised themselves with the transcripts and performed the initial coding of the transcripts. The authors compared applied labels and agreed on a set of codes. Based on this working analytical framework, 2 raters (E.B., M.W.) independently coded all transcripts generating a matrix in a Microsoft Excel spreadsheet. The authors discussed the spreadsheets, compared and agreed on coding allocations. As codes were compared and contrasted, overarching themes emerged from the data analysis. Data source triangulation was carried out through the comparison of participant and trainer data and codes [28]. For validation, extracts from the data, matched to themes, sub-themes and codes were presented to the researchers who facilitated the focus groups and interviews. This process enabled us to check that the translation and analysis of the data in English still reflected the participants' and trainers' views and contributions. Feedback received resulted in some recoding of the data, but largely supported the analysis.

#### Results

Participants were approached through newspaper advertisements and flyers. Sixty-one older adults were screened for eligibility, with 30 excluded due to either severe health problems ( $n = 4$ ); engaging in >2 h of exercise per week ( $n = 25$ ); or a cognitive ability score below 26, using the Montreal Cognitive Assessment [29]. A total of 31 participants aged  $66.3 \pm 2.7$  (range 60–70 years; 64.5% female) were included in the pilot study. Participant characteristics are summarised in Table 2. Six trainers aged

**Table 3.** Summary of data analysis framework

Overarching theme	Sub-theme	Example codes
<i>Participants</i>		
Programme and content	Overall programme	Flexible approach; liked the programme; personalised; too short for effects
	Activities and progression	Activities liked; activities disliked; suggestions; unnatural activities; making things more difficult
	Documentation	Helpful manual; lot to read; monitoring; suggestions for change
Behavioural change	Motivation and barriers	Benefits gained; embarrassment; fun; noticed decline; pain; trainer support
	Habit formation and integration	Easy to integrate; finding opportunities; irregular routines; lack of time
<i>Trainers</i>		
Reviewing the programme	Positive about the programme	Benefits to target group; enjoyable; personalisation; programme suggestions
	Activities	Activity preferences, combining activities; easiest to integrate; meaningful activities
	Behavioural change	Finding opportunities; integration into daily life; reviewing progress and performance
	Training and support	Peer support, trainer background; well trained
Challenges with implementation	Facing barriers	Adapting the programme; difficult to advise on physical activity finding opportunities; reluctant to push participants
	Putting training into practice	A lot to remember; different in practice; difficult to talk about long term goals; location practice not easy
	Documentation	Monitoring activities; participants disliked counting activities; too much paperwork

30.0 ± 6.2 (range 25–40 years; 100% female) delivered the aLiFE intervention. To complement the qualitative data presented here, a summary of the quantitative data collected in the pilot study is presented; full details are reported elsewhere [22]. Participants walking and sedentary time were measured over 7 days pre-intervention and during week 3 of the intervention using a DynaPort MoveMonitor, (McRoberts, Netherlands), with results reported previously [22]. In summary, expressed as a percentage of total daily activity, average walking time pre-study was 8.99% ± 2.01, compared with 9.69% ± 3.04 during intervention week 3. Whilst walking time increased, the changes were non-significant ( $p = 0.131$ ). Time spent sedentary, as a percentage of daily activity, was 44.96% ± 5.84 pre-study, compared with 44.47% ± 5.46 during intervention week 3 [22]. Again, the changes were non-significant ( $p = 0.355$ ). A bespoke questionnaire to assess the feasibility and acceptability of the aLiFE intervention was

administered during the study [22]. In brief, median scores for how helpful the activities reportedly were for improving strength, balance and physical activity were 5.5–6 out of a maximum possible score of 7. Participants' median scores for how easy the activities were to incorporate into daily life were 4–6, with leaning and stepping being the most challenging. Median scores for feeling safe while performing activities were 6–7, again out of 7.

Analysis of qualitative data from participants identified 2 overarching themes, with 5 sub-themes. The same data analysis process was undertaken for the trainer data, with 2 overarching themes being identified, including 7 sub-themes.

The final framework was agreed by 3 authors (E.B., H.H.-H. and M.W.), and a summary is presented in Table 3. Exemplar quotes are presented in the following sections, with participants identified by gender and age (e.g., F68, M69), and trainers identified by number only (e.g., TR1, TR2).

## *Participants Views*

### *Programme and Content*

*Overall Programme.* All participants were positive about the overall programme. They understood the concept of integrating muscle balance, strength and physical activities into their daily lives and thought that it was “a well thought out programme; quite extensive, well constructed” (M67). They appreciated the flexible approach, that one was “able to adjust it to your own capabilities” (M68) and valued the personalised nature of the programme. However, the nature of the 4-week pilot study, with its aim to gain feedback on all of the activities within the programme, caused some difficulties. Participants reported that the study period was too short, that “there needs to be more time to implement all of the things, because I really want to, but I don’t think I can manage” (F69). Participants were asked to add new activities each week and, by the end of the study, had too many to practise. When asked for suggestions for improvements to the programme as a whole, many participants recommended reducing the number of activities to be practised concurrently. “It is not the case that when adding a new one the old one was stopped. In our case it was 13, that is really not possible... I don’t think it is good if people spend their entire day doing this. I think that for me a maximum of 5 activities per day is good” (F66).

*Activities and Progression.* All participants talked about activities that they liked such as “that standing on one leg, I liked that” (F65), and those which they did not like such as “walking on the heels; really did not like it” (F66). The activities that were disliked were often related to those that they found were too difficult for them, were not perceived as helpful, were viewed as “unnatural” or that they felt were pointless. “I just don’t see the point in walking on my heels. It just, you don’t get going” (F66). Conversely, useful and purposeful activities were appreciated. Walking more should not be aimless, but “you should go somewhere and have a goal” (M68). Some participants enjoyed challenging themselves “to try to make it more difficult for myself” (M67) and also said that “the parts that were the most physically challenging were the ones I liked best” (M69). When asked about additional activities, which they would like to see added to the programme, many participants suggested exercises “for the arm muscles and the muscles in your hand” (F68).

*Documentation.* In the main, participants found the manual helpful, finding the explanations and photographs of the functional exercises “very clear” (M67).

However, many found the manual to be too long, with even those who were very positive about it, confessing that they had not read it all: “I haven’t read much in it. I haven’t the patience to sit down and read it” (F68). Suggestions for improving the manual included “shortening it” (M67), having a “loose sheet system with the exercise programme as its own little part” (M69), and more and clearer pictures. Some participants really valued the paperwork designed to help them plan and monitor their activities: “I placed (the Activity Planner) in the living room, where I always see it. I can look something up as a reminder” (F62). However, many found daily recording of activities undertaken too onerous.

### *Behavioural Change*

*Motivation and Barriers.* Many participants described their motivation to take part in the programme arising from a realisation that they were experiencing functional decline: “We’re all afraid of not being able to do this anymore, and that’s why” (F65). Having begun the programme, most participants were motivated to continue by the benefits gained such as “walking more confidently” (F62) and that their “balance has improved” (F62). Support from the trainers was also reported as a strong motivator within the programme. Participants valued the home visits and the clear instruction from trainers, whom they regarded as “really, really friendly” (F61), “helpful” (F66), “motivating” (M67), “competent and precise” (M69). Some participants talked about their trainer’s good sense of humour and how important it was to have fun during the programme. Being able to share the experience with someone else provided important social support to continue. There were some clear barriers to performing some of the activities in the programme, notably the embarrassment that many participants felt when performing activities outdoors: “Lunging, well it looks a little weird. At home I could do it, but not in the park” (F66). “One dreads to do things which makes neighbours wonder what you are doing” (M67). However, one participant had overcome this problem by telling his neighbours that he and his wife were involved in the programme to explain “why we are acting the way we are!” (M67). Another barrier often reported was pain, either caused through performing the activities or an unrelated pre-existing pain. Some strength activities were found to be hard on the knees for some participants and caused them anxiety about continuing with them: “I am convinced it is a good exercise, but I am unsure about my knees, how good it is for my knees” (F67).

*Habit Formation and Integration.* Within this pilot programme, all participants were able to identify some opportunities to integrate activities into daily life, finding that “there are so many exercises you can easily integrate into your daily routine” (M70). Fixed and regular routines such as tooth brushing, shaving, or kitchen work were easiest to integrate aLiFE activities within. By contrast, irregular routines got in the way of integrating activities, as the cues to perform the activities were not encountered regularly or consistently. This was perceived to be a problem for some participants who had busy and varied lifestyles: “I don’t really know what a normal routine will be for a retired person” (M67). Although for others, it was simply a case of adapting and keeping to the more fixed routines, such as “waiting for the kettle to boil” (F62). While the 4-week pilot study was not intended to provide sufficient time for activities to become habitual, there were some participants who reported that habitualisation had occurred: “And what I have adjusted totally into my daily life is brushing my teeth and standing on one leg. So much that my husband said to me “Are you doing it again?!” (F65). For the most part, however, there was recognition that a focus on fewer activities and opportunities, and a longer period of practice, would be required before the activities became automatic: “Standing up for example. You need to think of it. It will increasingly happen with everyday practice” (M70). In the meantime, many participants continued to require and use reminders, “I have some notes sticking where you’re likely to think about it more often. That’s down my alley. I think about it more often when I read it” (F67).

#### *Trainers’ Views*

##### *Reviewing the Programme*

*Positive about the Programme.* All of the trainers were positive about the overall programme, finding it fun and interesting to deliver. They could see that there would be benefits to the target group and that “a lot of people will be interested in this way of being active” (TR5), particularly as there are people “who don’t pack their sports bag to go to the gym or a sports group” (TR3). The trainers recognised that there were clear differences in the abilities and preferences of the participants that they were working with. The flexibility of the aLiFE programme enabled them to personalise the programme to suit individuals, thereby encouraging them all to participate. “I just have to deliver what is most relevant to get them to feel it is relevant themselves” (TR5).

*Activities.* The trainers thought that they had the greatest success with integrating balance activities into participants’ daily routines because “balance in this age group is something where they realise they may have problems... and therefore have an understanding of why they should train” (TR3). Trainers started with an activity that “maybe was easy to integrate, because I already had good experiences with it” (TR6). Activities that were perceived as meaningful were also easier to introduce, particularly if a physical reaction was experienced: “The one with sitting against the wall, for example, became very popular. It was like everyone thought it was (meaningful). Because it makes your thighs burn, you know” (TR5). Some trainers reported that participants had combined different activities “because some activities lead onto another one” (TR4). Starting with leaning and moving onto a heel walk was one example of participants sequencing their activities.

*Behavioural Change.* All of the trainers were able to support the participants in finding opportunities within daily life to integrate the activities. In the beginning, this was easier, as there were fixed routines, which everyone can latch onto, such as teeth cleaning and getting dressed. Towards the end of the 4-week pilot study, trainers reported that this had become much more difficult. The large number of activities to test within the pilot study meant that for some “the whole morning routine consists of exercises” (TR2). Some participants found it easier than others to identify opportunities throughout the day, which was a challenge for the trainers in terms of creativity. Trainers reported some participants “really absorbed it and structured their daily life looking for opportunities to integrate the programme, then they really internalised it” (TR4). Some others “maybe never quite understood it” (TR5). Reviewing participants’ progress each week and providing them with positive feedback, regardless of their performance was important to trainers: “There was always something to praise. For example, that they had managed to do the exercise more times” (TR6). When participants were able to see improvements and demonstrate them to the trainers, this was highly motivating.

*Training and Support.* All of the trainers felt that the training and written materials they received prepared them well to deliver the programme, feeling they were “well trained, only of course that in practice it is different” (TR1). The professional background and experience of the trainers had an impact on their confidence and experience of visiting participants at home, with those lacking that experience leaning more on the written guides for

each home visit: “It was good to have it, the structured points and what I was supposed to do. So I just went through it systematically” (TR6). Some trainers’ previous training and experience made it easier for them to advise on pain and exercise dose, which became an issue we needed to address in later stages of the study: “I often said don’t do it if it hurts, but I think it is different if you are a physiotherapist or that you are a medical student” (TR2). Peer support between trainers in each site was highly valued, but this was not formalised in regular meetings: “Maybe we could have been better coordinated you and I, or just had a few more conversations like that before we went out” (TR5). Similarly, a supervision meeting every few weeks with colleagues in each site would have been valuable.

### Challenges with Implementation

*Facing Barriers.* Whilst the flexibility and personalised nature of the programme had distinct benefits, this also presented challenges to the trainers, who had to adapt the programme to each different participant: “Small women in our study didn’t manage to climb 2 stairs at a time because of the angle. Then I suggested to climb stairs on toes or balls of the feet” (TR3). Trainers reported difficulties in advising participants to incorporate more physical activity (walk more often, walk longer distances) into their daily routines when they were often already very active. They were “already walking >5 km per day, so it is difficult to say walk even further, we have said to them try to walk faster. Also interrupting the sitting, because they say, yeah but I never sit” (TR2). Trainers were reluctant to push participants in these situations: “If I notice someone does not want it, I’m bad at pushing and saying you must do this” (TR1).

*Putting Training into Practice.* The programme is multi-faceted, and there is “a lot of information” (TR2): “The instructions actually were good. But of course it becomes something completely different when you start doing it for real” (TR6). The programme requires participants to try a new activity in the location where it will be performed, but this was not always possible or appropriate when participants “did not like that I went upstairs and went to the bedroom” (TR2). There were occasions when trainers and participants felt uncomfortable demonstrating an activity: “He feels stupid, I feel stupid and although you always try to do it, it didn’t always work according to the book as we’ve learned it” (TR3). Another challenge for trainers was talking about long-term goals. This process was formalised in the documentation and training and is an essential element of the aLiFE ap-

proach. Whilst participants were motivated by the benefits received, they tended to see these as more immediate (being able to stand on one leg for longer; not getting out of breath as quickly when walking up the stairs) as opposed to the much longer-term goals of being able to maintain independence or go on a hiking holiday. Due to the focus on trying out as many different activities as possible during the pilot study, the link with more aspirational long-term goals became somewhat lost.

*Documentation.* Trainers in all 3 sites reported that the Daily Routine Chart had not been used as the programme intended. Rather, opportunities for integrating activities into daily routines were identified “through a conversation” (TR3). Only the Activity Planner was actively used by all participants, although to varying degrees: “You always saw that the crosses were filled in the Activity Planner, but that they had put exactly the same curls with the same pen” (TR2). Trainers stated that participants had disliked counting their activities and that, in fact, “the more they live the programme and the more they internalise it, the more difficult it is for us to adhere to structured documentation” (TR3). There was consensus amongst trainers that there was too much paperwork in the study. Whilst some of this was integral to the aLiFE programme, much of it was related to the piloting of the programme and placed a high burden on trainers and participants alike: “I’m not sure how we can find a solution, but that was that for a bit, it was not entirely right for my feelings” (TR1).

### Discussion

Data from both the focus groups and the questionnaires (Table 3) suggest that, overall, both participants and trainers found the aLiFE programme acceptable, flexible and that it could be integrated into everyday life. Participants felt that the activities had to have a purpose relevant for them and be perceived as achievable and easily integrated or they were less enthusiastic in adopting them. They also discussed the number of activities and how these were, at times, difficult to fit into daily routines.

Previous literature looking at group-based exercise has found that individually adapted content was important to enhance adherence to the exercise programme [30]. Studies exploring the adoption of the LiFE programme have also outlined the importance of relevant activities that are appropriate to each individual [31]. Findings from the focus groups with trainers supported participants’ feed-

back, illustrating how the trainers actively tailored the programme, so it was most relevant to each individual. An important suggestion from participants is the fact that upper-body and upper-limb activities were not considered within the aLiFE programme because the original LiFE programme focused on lower limb activities generated from evidence-based fall preventing programmes. Including upper body and limb activities may be important in helping participants achieve their long-term goals in future.

The documentation as part of the programme was found to be too onerous, by both the participants and the trainers, and had a potentially negative impact on adherence. During each home visit, participants were asked to review their aLiFE programme documentation (Activity Planner and Counter) as well as complete a study evaluation. The latter would be unnecessary in any roll out of the programme, so perceptions of the paperwork burden may differ. Our need for study evaluation may have biased the findings regarding acceptability of the programme. However, Burton et al. [32, 33] also found that documentation for the original LiFE programme was too time consuming.

Participants also discussed the paperwork, in relation to it becoming less relevant as the activities started to become habitual (one of the long-term aims of the programme). Even in this short 4-week timeframe, participants were able to create new habits, integrating some activities into their daily routines, and found reporting on those to be an unnecessary inconvenience. We plan to explore the relationship between habit formation and adherence reporting further in the PreventIT feasibility RCT, thus adding to the emerging evidence on habit formation [34].

Participants stated that they took up the programme to improve their functional performance and reduce their risk of decline. Once they started to see improvements, this motivated them to continue. This very much emulates the existing exercise literature where achieving outcomes has been found to be particularly important to continuation [30, 35]. Trainers did feel that during this short pilot, short-term achievements of goals and physical improvements experienced were more important than the achievement of long-term aspirations, which could not be assessed and were not seen as relevant. For some participants, pain was a barrier to carrying out their activities and is a common factor cited in previous studies [36], which again supports the importance of tailored and individualised activities.

The trainer was cited as a key source of support and motivation by participants, and the trainers also dis-

cussed the ways in which they provided support to participants. Previous research has found that the trainer to play a very important role in participant's uptake and adherence to exercise [8, 30, 35, 37]. In this study, we established that their role was important in terms of support to carry out the activities but also from a social perspective. The trainers had an important role in re-affirming self-efficacy for participants by allowing them to demonstrate the activities they had been doing and receive positive feedback. Trainers were also able to assist participants in tailoring the programme to fit in with their physical needs, preferences and individual lifestyles. Trainers supported participants to look for alternative activities and situations to overcome barriers such as embarrassment, dislike or failure to connect an activity with expected benefit.

#### *Strengths and Limitations*

Overall, this pilot study gives us insight into the experiences of both participants and trainers participating in aLiFE across 3 different European countries. The pilot study was designed to include a convenience sample and, as such, the majority of included participants were likely to be open to increasing their physical activities. Participants who regarded themselves as physically active at the start of the pilot study found that they could still make improvements to their levels of physical activity, particularly in balance, strength and reducing sedentary behaviour. Whilst we did include people who did not regard themselves as "sporty," we did not capture the experiences of those resistant to participating in any kind of physical activity.

There are limitations, due to our relatively small sample of trainers, making it hard to establish a full picture of the experience of delivery, and we are not able to reliably comment on whether professional background influences delivery. The short delivery time of the intervention also limits the applicability of the findings as we do not know whether participant experience may have changed over time. Although participants did discuss some of the activities starting to become habitual and this is promising, it is almost impossible to test whether activities have become truly habitual over such a short period and with a limited sample.

The main limitation in this paper is related to the nature and design of the pilot study, with the intervention being compressed into 4 weeks. Since we wanted to pilot as many of the activities as possible before use in our feasibility RCT, participants were expected to try out planning a large number of activities and both the trainer and participant found this burdensome. Any roll out of this

approach would not involve the same quantity of different activities being planned and undertaken concurrently, over such a short time span.

## Implications and Conclusion

To further assess the feasibility of the aLiFE programme and also to establish whether the activities become habitual for participants, a longer study is required. This pilot has informed the development and planning of a feasibility RCT [38].

Changes to the paperwork for both trainers and participants and changes to trainers' training have already been made to reflect suggestions from this pilot study. The content was rationalised and reduced to shorten the instruction manual. Authors of intervention guidance should ensure that material is organised clearly and with minimal duplication of information. Instruction on how to understand and manage types of pain has been added to the manual and training materials to provide the guidance which participants and, to some degree the trainers, found lacking. When developing guidance for interventions, which participants or the general population will use independently, authors should provide clear information about pain and how to recognise and manage different types of pain (e.g., acute pain indicating injury being different to expected muscle ache following physical activity). As participants particularly valued the support that they received from trainers, future interventions should take into account the need to incorporate support at both the social and instructional level.

Overall, the qualitative data from the pilot study have suggested mostly positive experiences across multiple European sites and the intervention is currently being tested as part of a feasibility RCT.

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## Acknowledgements

We thank the developers of the original LiFE from the University of Sydney Maria Fiatarone Singh and Jo Munro, along with author Lindy Clemson, for allowing us to develop aLiFE. We thank Siri Lund Gjerde, Synnøve Ulseth and Isis Huisman for their help in performing the aLiFE study.

## Statement of Ethics

Ethical approval was granted by committees in the 3 sites: Stuttgart: Ethik-Kommission am Universitätsklinikum Tübingen, 033/2016BO2; Amsterdam: Medical Ethical Committee, VU University Medical Center, NL56456.029.16; Trondheim: 2016/48 REC central. All participants provided written, informed consent to participate.

## Disclosure Statement

L.C. own the copyright of the original LiFE programme. The authors have no conflicts of interest to declare.

## Funding Sources

This work was supported by the European Union's Horizon 2020 research and innovation programme (689238). The content is solely the responsibility of the authors and does not necessarily represent the official views of the European Union.

## Author Contributions

M.S., E.B., H.H.-H., R.B., K.T., J.H., A.M., C.B., C.T. and L.C.: adaptation of the LiFE concept. M.W., J.V.A., N.H.J. and K.T.: data collection was undertaken. E.B., M.W., H.H.-H. and E.B.: data analysis was undertaken. M.W., H.H.-H. and M.S.: led the drafting and preparation of the manuscript. All authors contributed to the development of the final manuscript, have read and approved the final manuscript.

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