

**Activity 29: Exercise Physiology in Aged Care, Evaluation of An  
Implementation Project**

**Final Report**

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*As people age, they decline functionally and cognitively. This decline, especially for those who enter residential aged care, appears to be an accepted norm, but it shouldn't be. There should not be an expectation that people coming into aged care will deteriorate or that it is a waste of time doing anything to prevent further deterioration. While we may not be able to improve residents' functional and cognitive state, we can put measures in place that aim to contribute to maintenance of function and improvement of quality of life for residents. This report describes the evaluation of the EP in Aged care program run at Helping Hand Aged Care.*

## Executive Summary

A 12-week Exercise Physiologist (EP)-led exercise program for older adults living with dementia in a residential aged care facility supports that measures can be put in place to maintain the functional ability of residents. Data from functional assessments provided quantitative evidence for maintenance of, or improvement in, physical factors. Survey and qualitative evidence from partners in care (the family members and care staff of the residents) supported maintenance and a halt to functional decline during the 12-week EP program and provided a number of examples of positive individual outcomes, related to physical and cognitive factors, particularly social connectivity, for participating residents. In the early phases of the program, it was identified that some participants had difficulty completing the physical assessments. This led to trialling physical assessments that were modified to meet the capabilities of the participants; good test/retest reliability was demonstrated for the modified assessments. Sustainability activities were introduced after completion of the 12-week program, with inconsistent reports about maintenance of the effects of the initial program, and concerns raised about the residents' ability to access these activities. An individualised, person-centred wellbeing profile was developed for residents; however, this was not able to be implemented as intended, and therefore its effectiveness could not be evaluated. Although there was limited quantitative evidence for the effectiveness of the program for cognitive factors, data supporting maintenance for physical factors, satisfaction with, and acceptability of, the program from the perspective of partners in care, coupled with identification of the social benefits of participation, indicate that this type of program should be considered for residents living with dementia in aged care facilities. The researchers, industry partner, and consumers involved has committed to further embed findings at Helping Hand Aged Care and across other aged care organisations.

## Key Findings

### Residents

Residents demonstrated maintenance of function during the active Exercise Physiology program. Prescribed exercise period for several strength tests (sit to stand, and hand grip) and a mobility test (timed up and go), relative to decline in control group. Some evidence for a dose effect was recorded for 2-minute walk, timed up and go and increase in time in light activity behaviour.

No difference in objectively measured cognitive function.

#### Family Members

Family members perceived improvement (relative to deterioration) in physical function (strength, mobility and flexibility), cognitive awareness, socialisation and communication during the active training period. On the whole (>86%) they were very satisfied with the intervention provided.

#### Care Staff

Care staff perceived an improvement (relative to deterioration) in physical function (strength, mobility and flexibility) and cognitive awareness, socialisation and communication during the active training period. The perceived barriers to the intervention and the impact it would have on the care workers reduced following the 12-week active intervention.

Care staff were on the whole (>92%) very satisfied with the intervention provided and reported that the improved mobility and flexibility helped them (the care worker) perform their duties of care.

#### Sustainability

Sustainability embodied two concepts in the context of this project: 1) it was about having strategies in place for ongoing opportunities for residents to access physical activity once the 12-week program had ended; and 2) whether any improvements resulting from participation in the 12-week exercise program were sustained for a period of time. Initial sustainability activities were embedded into the day to day running of the units and were designed to have a minimal impact of staff activities and time. There was no statistically significant maintenance of change related to the initial intervention following sustainability activities for the residents. However, survey data from partners in care indicated perceptions of improvement (relative to deterioration) for physical, cognitive and social function. Relative to post-training, sustainability effects were inconsistent and site dependent.

A new initiative (a one-page profile) was developed in conjunction with a Designated Systems-Based Investigator, Wendy Hudson, in order to provide an individually tailored approach to support sustainability. The one-page profiler did not improve sustainability but was not implemented as intended.

Hand grip strength declined irrespective of the site the participant lived, but mobility was maintained in the first site, but declined post-intervention in the other sites.

Family members reported being mostly unaware of ongoing sustainability activities in the facility. For the most part, care staff reported that any positive change or improvement that had been seen as a consequence of participation in the 12-week program had dissipated once the regular program sessions ceased.

Care staff perceived that sustainability activities were accessible only to those residents who were either cognitively aware and able to follow the activities independently or functionally able to get to the activities to participate in them. Residents with cognitive decline or who

were unable to ambulate independently to attend the sustainability activities were perceived by care staff to be excluded from participation.

#### Modified assessments

Modified physical assessments were found to be reliable and resulted in a larger proportion of the population being able to complete the assessments.

## Background

Two thirds of adults living with dementia experience significant functional limitations, particularly individuals living in aged care homes. Providing ways for these residents to maintain functional capacity as dementia progresses is important and a key recommendation of the Clinical Practice Guidelines and Principles of Care for People with Dementia (Guideline Adaptation Committee 2016).

Exercise Physiologists (EPs) specialise in clinical exercise interventions for persons at high-risk of developing, or with existing chronic and complex medical conditions and injuries. These interventions include exercise prescription for specific pathologies, health and physical activity education, advice and support, and lifestyle modification with a strong focus on achieving behaviour change (Exercise and Sports Science Australia 2014).

As a relatively new profession, EPs are developing ways to work effectively with the specific needs of older people, including those living in residential aged care. In 2012, Helping Hand and UniSA trialed five students delivering EP activities to residents at one site, including delivering services to people with high level needs in a secure dementia unit. A further 16 students were placed between 2013 and 2015, which continued to demonstrate the benefits of prescriptive movement for residents living in aged care. This work has provided initial evidence around the positive impact exercise has on a range of chronic conditions (including dementia). Observed improvements include increased functional capacity and improved cognitive function. The positive impact on residents' well-being, as a result of improved function has had a ripple effect on family members, who saw better quality of life for their loved ones. Staff also responded positively to the changes they saw in residents.

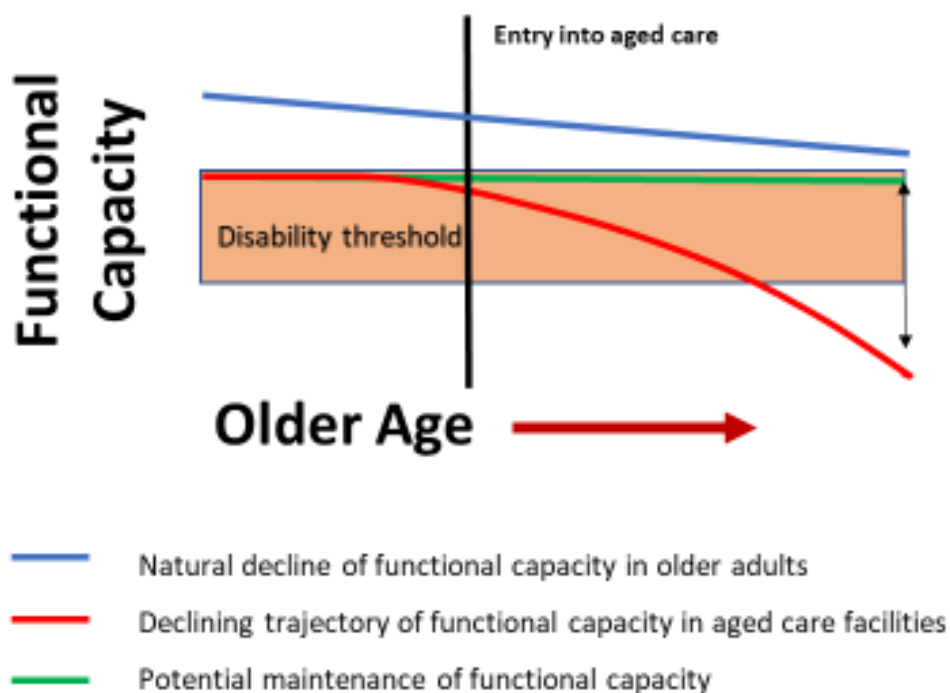
#### The aged care context

The aged care environment is a particularly challenging environment in which to instigate change and affect culture; this relates to the tight financial constraints under which the industry operates. As a result, staff often find it hard to do new things or adapt their approaches to new ways. They often feel really busy and focus primarily on care that has been prescribed routinely. The community has an expectation from aged care that relates to 'looking after' an older person rather than maximising their independence and improving function. This expectation plays out into the care planning for an older individual in care. More than ever before, older people in aged care are increasingly frailer and being admitted into care either in crisis or at a low level of function. Therefore, functional decline is an accepted pathway for that person, which likely impacts on the preparedness or motivation to actively consider or engage in strategies to mitigate decline.

This report evaluates the effectiveness of exercise-based interventions delivered within a residential aged care facility. While there is evidence that exercise and physical activity improve and maintain cognitive and physical functioning in older people (Archer, 2011; Hess et al, 2014), there is less evidence within the residential setting and more specifically people living with dementia. This project aims to fill this gap, through an evidence-based evaluation of the EP in Aged Care Project.

Partners in care, such as family members and care staff, play an important role in the ongoing care of residents. Family members act as advocates for the residents (Vreugdenhil et al. 2012). They act to ensure that their family member has access to activities, also encouraging their family member to participate in activities at the facility. Given the relative age of many family members who visit, there are reciprocal benefits for partners in care when they provide purposeful engagement for their family member. In other words, actively supporting exercise, such as taking their family member for a walk, improves the family members' health as well. The staff's role in delivering care is underpinned by residents' cognitive and functional capacity (Lindelof et al. 2012); residents who can assist staff in activities of daily living, for example, likely make the role of care staff easier. Therefore, any maintenance or improvement has the potential to improve staff engagement with residents (Lindelof et al. 2012). There is also evidence that improved physical capacity of residents reduces the risk of injury to the staff members (Coman, Caponecchia & McIntosh 2018). Evaluation of the family members' and care staff's views and perceptions of the EP project was perceived to be fundamental to understanding the impact of the project, and for garnering ongoing support for this type of intervention, should it prove to be successful.

The importance of this evaluation should be emphasised. In research, we often work with the 'worried well', people who are concerned about their health and well-being, but who generally have strategies in place to achieve their optimal health and well-being. Exercise programs targeting this group of people tend to show improvement. In the case of this evaluation, it is unique in that we are working with a vulnerable population, people who could be considered too frail and are expected to decline until death once they enter the aged care environment (see figure below). The challenge with this population, and perhaps more specifically for the people who care for them, is to break the stereotype of what we think exercise, and its impact, might look like for this vulnerable group. Instead, we need to focus on the possibility that maintenance of current function is a positive outcome. The ability to maintain function, rather than deteriorate, contributes to a better quality of life for the resident.



Schematic 1. Trajectory of decline expected upon entry to residential aged care versus possible maintenance of function due to participation in ongoing physical activity (adapted from Kalache & Kickbusch 1997, in Kalache 2013).

## Aims

The goal of Activity 29 was to conduct an evidence-based outcome evaluation of an implementation project - EP in Aged Care. The Aged Care Project was funded by the Aged Care Service Improvement and Health Ageing Grant Program, through the Department of Social Services, in 2014. Helping Hand initially applied for the funding in response to observation of significant changes in people living at Helping Hand who were being visited by EP students. This funding was aimed at implementation, rather than research activities to objectively evaluate the effectiveness of the program. This evaluation of the EP project was subsequently funded by the NHMRC Cognitive Decline Partnership Centre (CDPC) Grant. This funding allowed for a rigorous research evaluation to occur whilst the actual implementation was being undertaken. The evaluation tested the impact of exercise prescription in an aged care environment and captures quantitative and qualitative measures of exercise within the residential aged care environment and reports the findings.



## Objectives

The objectives of the Evaluation were to:

1. Evaluate the impact of targeted, individually specific EP interventions for people who have significant dementia and other chronic health conditions and disabilities on cognitive, functional and behavioural constructs.
2. Evaluate the satisfaction, perceptions and acceptability of the EP program on the family members of participants
3. Evaluate the perceptions, impact and acceptability of the EP program on Care Workers and other staff.

The target population for the Evaluation were:

- Group 1 - Residents receiving exercise interventions
- Group 2 - Family members and significant others
- Group 3 - Care Workers and other staff

## Hypotheses

The following hypotheses were proposed:

Group 1 Residents receiving exercise intervention

- Functional capacity, cognition and behavioural symptoms will be positively affected by exercise.
- Overall well-being is improved by participating in exercise.

Group 2 Family members and significant others

- Families perceive an improvement in the wellbeing and quality of life of the resident.
- Families will be satisfied with the interventions being provided.

Group 3 Care Workers and other staff

- Care Workers and other staff perceive an improvement in the wellbeing and quality of life of the resident.
- Care Workers see value in undertaking exercise activities for residents as part of daily tasks.
- The level of care required for an individual by care workers and other staff is reduced as a result of improved physical and/or cognitive function of the resident.

## Phase 1

### Methods

The EP in Aged Care Project and subsequent evaluation were carried out across four aged care homes, located in metropolitan South Australia. One facility consisted of a number of wings, which were utilised separately for the purposes of the study. For pragmatic reasons (staff available to deliver the exercise intervention and program commencing ahead of funding for evaluation) a purposive sampling approach was used, with one wing exposed to the intervention at a time, following a 12-week control period. For analytical purposes, participants were randomly allocated (post program) to either the control group or intervention group, with stratification based on function (cognitive and ambulation) at baseline.

Consent and consent by proxy (where residents were not able to self-consent) were obtained by the EP prior to delivery of the program. Care staff, and family members, consented to complete surveys. The University of South Australia's Human Research Ethics Committee granted ethical approval for access to the data collected at Helping Hand and for the conducting of qualitative interviews with staff or family members of residents. Helping Hand also approved the evaluation, through an internal ethics process.

### Program

The targeted and individually specific EP intervention included one-on-one exercise prescription and group opportunities for exercise. Residents were free to engage in either or both opportunities. Across the 12-week period, a total of 36 sessions could be attended; 24 group sessions and 12 individual sessions. A record of attendance was maintained in an attempt to report 'dose' of exercise.

In the one-on-one sessions, that lasted 30 to 45 minutes, exercises were individualised to suit participants' physical and cognitive needs and abilities. The sessions focused on challenging proprioception, balance, strength, and incorporating dual task activities, such as throwing and catching a ball while pedaling. Moderate-intensity interval training was used for some individuals to improve cardiovascular health.

#### *Key features of the program were:*

- The use of portable exercise equipment, which could be moved around the care home on a trolley. The equipment included: bike pedals and arm ergometers; weights such as dumbbells and ankle weights; balls; exercise resistance bands; and balance training equipment (see Image 1).



Image 1. Portable exercise equipment used in the project.

- Engaging participants in the environment where they felt most comfortable and safe, rather than in a gym or other place outside the unit of the care home. For the one-on-one sessions this was their room or outdoors in the garden. The group exercise sessions were conducted in lounge areas of the care units not only to maximise participation from residents who felt comfortable in this space, but also to encourage participation by those who might be influenced by seeing others exercising. The intention was to empower residents by providing a sense of purpose; increasing engagement and opportunities to socialise; and contributing to improved physiological function.
- Residents were exercising where care staff could see them participating. This was an intentional strategy to challenge perceptions and assumptions that people with dementia are unable to participate in reablement activities.

#### Group 1 Residents receiving exercise interventions

A selection of standardized assessments was identified from the literature as appropriate to measure a range of function, details for these are provided below. However, it became clear early in the evaluation that the older adults in this population experienced difficulties either physically or cognitively in completing the standardized procedure – this is expanded on later in the report (see page 18).

Functional measures included:

**Five repetition sit-to-stand test:** This test was used to measure lower limb muscle strength. The resident begins the test in a seated position, stands up tall, and then returns to the seated position. This was done five times, with the time taken to complete this activity recorded (Hauer et al. 2012).

**Timed up and go:** the purpose of this test is to assess agility/dynamic balance in tasks that require quick maneuvering. The task involved recording the number of seconds required by the resident to get up from a seated position and walk 8 feet (2.44m), turn, and return to a seated position.

**Two-minute walk:** this test measures endurance, aerobic capacity, functional mobility, and gait patterning. The resident walked as far as he/she could in a two-minute period. The distance covered during this time was recorded.

**Hand grip:** this test measures upper body strength. The resident was seated and raised their arm, squeezing the hand grip dynamometer as they lowered their arm to the side; this was repeated three times, on both hands, and the force (in kilograms) was recorded.

**Four-metre walk:** this test measures gait speed. The resident begins this test in a standing position, with the time taken by the resident to cover the four metres recorded.

Habitual activity behaviour was measured with the use of a triaxial accelerometer. Residents wore a GENEActiv (wrist worn) accelerometer for 6 days pre-exercise intervention and following a 6-week exercise intervention period to measure physical activity. GENEActiv accelerometers are highly reliable and valid. They assess across the spectrum of activity intensity from sleep and sedentary behaviour, through to vigorous intensity. At least 18 hours, on 4 days is required to be considered valid (Esliger et al., 2011).

Cognition was measured using the Addenbrooke Cognitive Exam (ACEIII), a brief neuropsychological assessment of cognitive functions, and a development on the Mini-mental state examination. The ACEIII includes measures of language, memory, visuospatial skills, and orientation.

Well-being was measured with the ADQoL with care staff, and family members, completing the inventories for each resident. Residents with the capacity to complete the ADQoL also did one on their own behalf.

Each of these measures was recorded at baseline, after a 12-week control period, and post-intervention.

Group 2 Family members and significant others

Mixed methods (survey and qualitative interview) were used to evaluate the satisfaction, and perceptions of family members of the exercise intervention.

Group 3 Care Workers and other staff

Mixed methods (survey and qualitative interview) were used to evaluate the satisfaction, and perception of care workers and other staff of the exercise intervention, their ability to support the intervention and perceived impact of it.

For Groups 2 and 3, pre-intervention perceptions of who might benefit from exercise, based on cognitive and functional capability were assessed by survey. Post intervention assessment included collection of data related to who was perceived to benefit from the exercise intervention, which factors (physical and cognitive) were impacted by the exercise intervention, the value of the EP role in an aged care environment, and for care staff, the impact of the exercise intervention on their daily routine.

## Interviews

Semi-structured interviews were chosen to explore the perceptions and acceptability of the EP-delivered program. Interview questions were designed around *a priori* higher order themes of Barriers to the implementation of the EP program; Benefits of the program; and overall Perceptions and Acceptability of the program in the residential aged care environment. Responses to open-ended questions in the previously completed pre-and-post intervention surveys were used to inform the *a priori* themes. This process included discussion of the interview questions with the EP involved in the project, nursing staff, and research and development staff from the organisation, who had good knowledge of the organisation's care staff and the families involved. Changes were made to some of the terminologies, to ensure that they were less scientific and more dementia-friendly.

## Recruitment and data collection

Care staff and family members were asked to provide informed written consent to participate in qualitative evaluation of the program, with participants providing their contact details on the completed consent form. Purposive sampling of family members and

care staff by email and telephone occurred between December 2016 and September 2017, with potential interviewees targeted based on their responses to the quantitative survey exploring pre- and post-intervention perceptions of barriers, benefit, and acceptability. Interviews were completed either face-to-face on-site or over the telephone. Face-to-face interviews were preferred, to establish rapport and enable observation of facial expressions and body language, but in cases where interviewees could not attend in person (n=4), telephone interviews were completed. The interviews were allowed to progress organically, as a means of identifying new or unexpected themes or avenues for discussion, and interviewees were encouraged to expand on their responses to interview questions where relevant. Upon completion of each interview, the interviewee was provided with a verbal summary of their perspective by the interviewer. Interviews were recorded to an iPhone using the Livescribe transcription device and software (Livescribe Incorporated, 2017). Field notes were recorded consistently through the interviews. Interviews were transcribed verbatim and uploaded to the NVivo software program (QSR International Pty Ltd, 2017). Content analysis was applied to identify emergent higher and lower order themes (Hsieh & Shannon, 2005). Initially, the transcripts were read multiple times to become familiar with the data. Content was broken down into sections and statements were coded based on their meaning and subsequently categorised into one of the *a priori* themes, or an emergent theme. A second coder verified the coding. Disagreements were discussed and resolved between the two coders.

## Results

The number of participants, and functional and cognitive status of residents is reported in Table 1.

Table 1. Cohort information

Variable	n (%)
Total resident participants at baseline	59
No cognitive decline, ambulatory	1 (1.69)
No cognitive decline, not ambulatory	2 (3.39)
Cognitive decline, ambulatory	42 (71.20)
Cognitive decline, not ambulatory	14 (23.73)
Lost to follow-up (death)	12 (20.34)
Lost to follow-up (left facility)	2 (3.39)
Family members survey data	51
Care staff survey data	44

Randomisation: Participants in the exercise intervention were randomized to either the intervention or control group dependent on their functional and cognitive state.

## Intervention

Pre-intervention perceptions of likely benefit.

The general pre-intervention perception of family members and care staff was that residents who had no cognitive condition and who were ambulatory, were most likely to benefit from participation in the 12-week exercise program. As cognitive and functional decline increased, residents were expected to be less likely to benefit from participation.

## Assessment of cognitive and functional change for residents

Quantitative data indicated evidence of maintenance of function during the active Exercise Physiology prescribed exercise period for several strength tests (sit-to-stand, and hand grip) and a mobility test (timed up and go), relative to decline in control group (Figure 1). Data were significant ( $p < 0.05$ ) for handgrip and the timed up-and-go. There were no differences for objectively measured habitual activity, cognitive function, and quality of life.

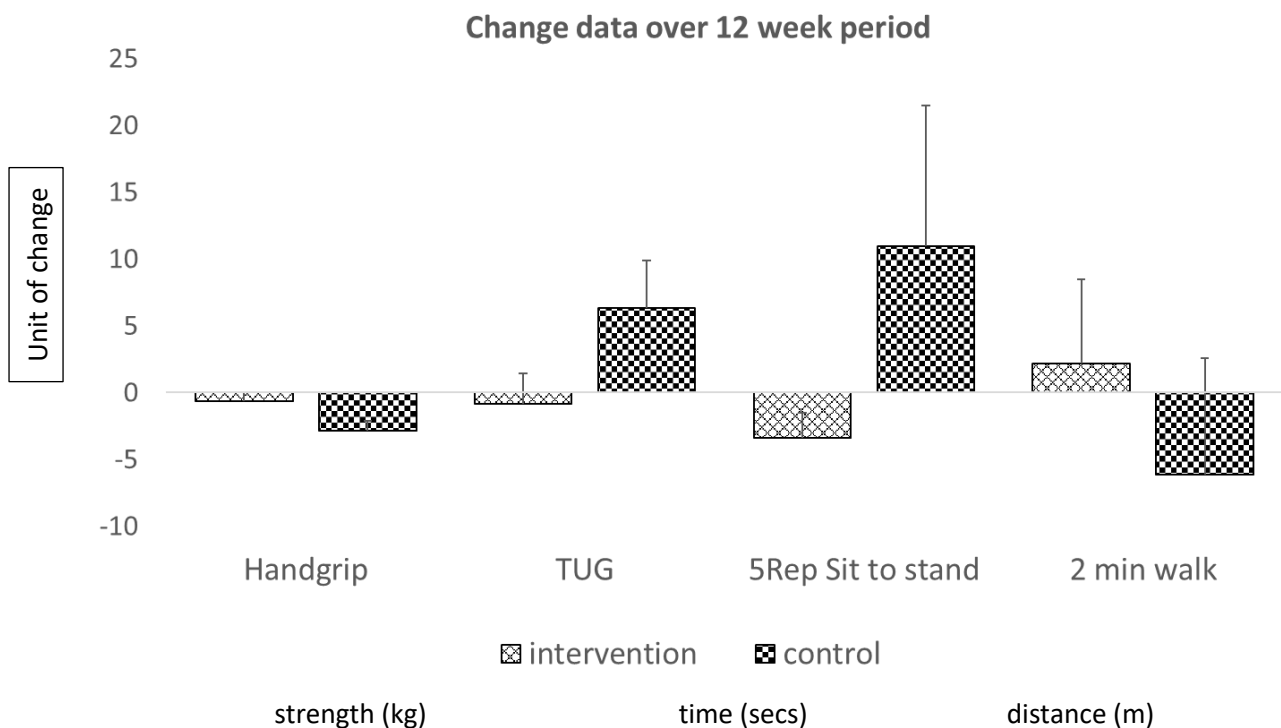


Figure 1. Residents' functional change data over the 12-week intervention period.

With respect to a dose response, the 2-minute walk, and timed-up-and-go were significantly ( $p < 0.05$ ) associated with the number of individual sessions attended by a participant; regression analyses indicated that eight sessions were necessary to have a significant positive impact on function. Dose of session also approached significance ( $p = 0.09$ ) for change (increase) in the amount of light activity, with more sessions attended over the 12 weeks associated with more time spent in light activity behavior over the seven-day period.

#### Survey data

Following the 12-week intervention period, care staff and family members reported that perceptions of improvement were greater than perceptions of deterioration. Statistically significant differences ( $p < 0.05$ ) for perceptions of improvement versus deterioration were identified post intervention for communication, social involvement, cognitive awareness, behaviour, physical strength, mobility and flexibility, and activities of daily living from the perspective of family members and care staff.

Post-intervention, there was an increase in perception of the degree of benefit from exercise for those in mobiclones (a mobile chair that reclines and has a footrest, for people who can weight-bear) ( $p = 0.01$ ) and princess chairs (a mobile chair that reclines and has a footrest, for people who are non-weight-bearing) ( $p = 0.01$ ) and for residents with moderate cognitive decline ( $p = 0.02$ ) and severe cognitive decline ( $p = 0.02$ ).

While there was no difference post-intervention for care staff with respect to who they thought might benefit based on functional status, there were statistically significant differences in perceptions of likely benefit for residents with mild ( $p = 0.04$ ), moderate ( $p = 0.02$ ), and severe cognitive decline ( $p = 0.01$ ).

#### Qualitative findings

##### Post-intervention

Thirty-one post-intervention interviews were undertaken with family members ( $n = 13$ ), and care staff ( $n = 18$ ).

##### Main findings

Higher order themes identified included the *a priori* themes of Barriers to exercise, Benefits associated with participation in the program, Perceptions prior to and after the program, and Acceptability of the program, and within these, key emergent sub-themes included cognition, behaviour, physical function, mood, as well as social factors, and enjoyment and fun. Taking a person-centred approach and employing the likes and previous activities of

residents as a means of engaging them emerged as a key theme in the ongoing care of residents.

One of the key findings was in the family members’ expression that the previous likes and activities performed by individual residents were an important consideration in their care. Incorporating these aspects in the EP-prescribed and delivered exercise program was reported by care staff as a source of great enjoyment for residents and has been demonstrated as an effective means of engaging residents in exercise.

While positive impact in terms of functional or cognitive improvement was not reported by every interviewee, there were no negative perceptions of the program, or of the EPs’ role within the program. Acknowledgement of the addition of incidental activity for residents by some care staff demonstrated the influence of the program in promoting physical activity. This was, however, greatly impacted by the availability of time in the daily routine of care staff. In recognising time as a major barrier, care staff almost unanimously agreed that this type of program should be delivered by trained staff, such as EPs. See Table 2 for the higher and lower order themes and Appendix 1 for examples of interview data.

Table 2. Higher and lower order themes for partners in care.

<b>Higher order themes</b>	<b>Lower order themes</b>
Initial perception	Scepticism, or unsure
	Any activity likely to be beneficial
	Maintenance
Barriers	Time
Benefits	Physical
	Cognitive
	Behavioural
	Socialisation
	Engagement with program
	Gratification for staff
No Benefits	No program impact
Acceptability	Worthwhile program
	Program Staff
	Organisational considerations
	Funding impact
Person-centred approaches	Consideration of individual resident’s needs, history, culture
	Reporting progress to family



## Phase 2

Following the evaluation of the EP project in the initial sites of the organisation, additional funding was secured to re-visit the functional assessments and evaluate and modify the post-program sustainability activities. As indicated previously, these activities were originally designed to require minimal demand on care staff time. Sustainability embodied two concepts in the context of this project: 1) it was about having strategies in place for ongoing opportunities for residents to access physical activity once the 12-week program had ended; and 2) whether any improvements resulting from participation in the 12-week exercise program were sustained for a period of time. As part of this second phase, and strategies for residents to access activities, a post-intervention transition stage was introduced by the EP. The EP acted as a conduit between the resident and resources available to the resident (family members, allied health support – physiotherapists, occupational therapists, lifestyle staff and other care staff) and developed a personal profile/well-being mapping one-pager to facilitate ongoing individualised support and maximise sustainability. Details of the one-pager are provided on page 23. This program ran in a third site from August 2017 to April 2018.

## Methods

### Sustainability (original program)

To support sustainability, for 12 weeks after the exercise intervention participants were encouraged to attend the regular Helping Hand Aged Care lifestyles activity program and take part in two exercise initiatives – 5-Minute Moves and Movement with Benefits (circuits). Including the Lifestyles staff in the sustainability activities was an intentional approach, that was intended to engage a group of staff who we knew were passionate about the residents being involved in different activities.

5-Minute Moves is a short, chair-based exercise program delivered by trained lifestyle staff, EP students or volunteers. The exercises are done when a group of residents are sitting together, such as before regular activities and/or before meal times (see Image 2).



Image 2. A five-minute moves session

The Movement with Benefits circuit program was co-designed by the EPs and Helping Hand Aged Care lifestyle staff for more active residents who wanted to participate in structured exercise activities and do not require one-on-one assistance to exercise. Once a week a circuit of individual exercise stations (with colour-coded instructions on how to perform the activities) is set up in the care home's living area. Exercises occur in a seated position and include leg raises, arm raises using weights, and arm stretches using bands (see Image 3). Each participant is partnered with a fellow resident and they move between the stations, helping each other to complete the exercises. Partners in care assist residents throughout the circuit when needed. After five sessions, participants receive a voucher to use at the care home café.



Image 3. Movement with benefits.

### Modified assessments

In the early phases of the program, it was identified that due to either declining cognitive ability or declining functional capacity, some of the participants were unable to perform the standardised protocols of the functional assessments. For example, the standardised protocol for the 5-repetition sit-to-stand requires the participant to stand up from a seated position, with their arms crossed over their chest and their hands on the opposite shoulder. This can lead to some instability for the participant as they stand up, with the lack of control possibly contributing to a fear of falling. This is also counter to how older adults are guided to stand up. For example, it is usual to guide an older adult to use the arm rests to assist with standing. The standardised protocol was modified to enable participants to use their hands on the arm rests to push themselves up from the chair.

For the handgrip test, the standard protocol saw the participant instructed to raise his/her arm whilst holding the dynamometer and to then squeeze the dynamometer as he/she lowered his/her arm to the side. Some of the participants had difficulty in following this instruction. The modified protocol removed the need for the participant to raise and lower his/her arm and instead the participant kept his/her arm on the arm rest of the chair for the duration of the assessment.

The modified timed-up-and-go enabled participants to use his/her hands to push up from the chair and to guide him/her to return to a seated position following completion of the activity; however, verbal cues and physical assistance were also provided to the participants if deemed necessary by the EP.

The four-metre walk test was added to replace the two-minute walk test, as its completion required less cognitive demand on the part of the resident.

## Results

Analysis of functional and cognitive data collected after the sustainability period demonstrated that there was no statistically significant maintenance of change following sustainability activities for the residents. Relative to post-intervention analyses, sustainability was inconsistent and site dependent. As indicated previously, the ability to maintain a level of function relative to the expected level of deterioration upon entry to residential aged care plays a role in the quality of life experienced by a resident. Hand grip strength declined irrespective of site, but mobility was maintained in the first site, but declined post-intervention in the other sites.

After the sustainability period, care staff reported the barriers they perceived to delivering exercise had significantly reduced (Figure 2). This was demonstrated by some care staff reporting that they were now incorporating incidental physical activity for residents as part of their daily routine, for example, putting on music and dancing around if they had a few spare minutes when waiting for residents to be taken to other activities.

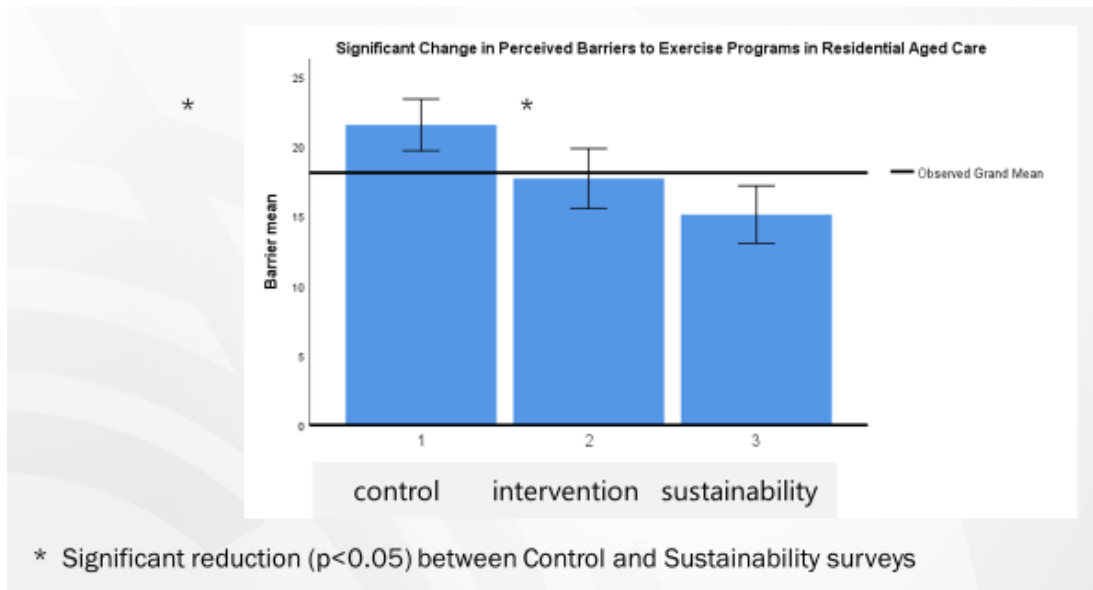


Figure 2. Care staff perceptions of barriers to providing exercise to residents.

From the perspective of partners in care following the sustainability period, improvements in factors such as physical strength, mobility and flexibility, activities of daily living, social involvement, cognitive awareness, behaviour, and communication were judged to be greater than deterioration for those same factors (Figure 3 – Figure 5).

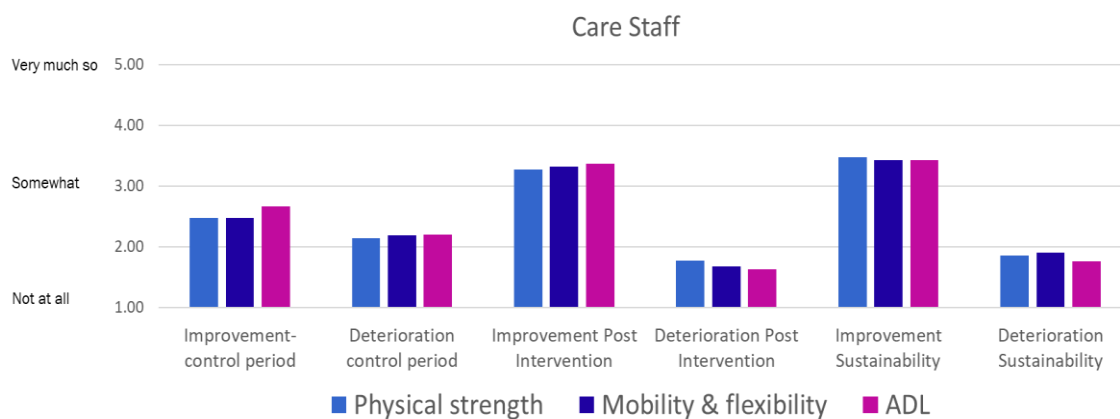


Figure 3. Care staff's perceptions of improvement vs deterioration for physical strength, mobility and flexibility, and activities of daily living across the study period.

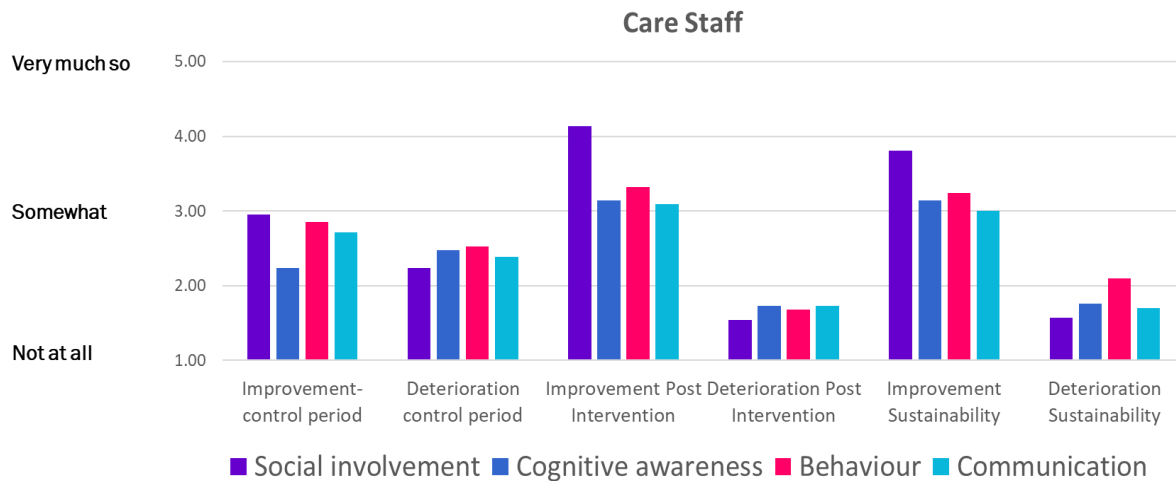


Figure 4. Care staff's perceptions of improvement vs deterioration for social involvement, cognitive awareness, behaviour, and communication across the study period.

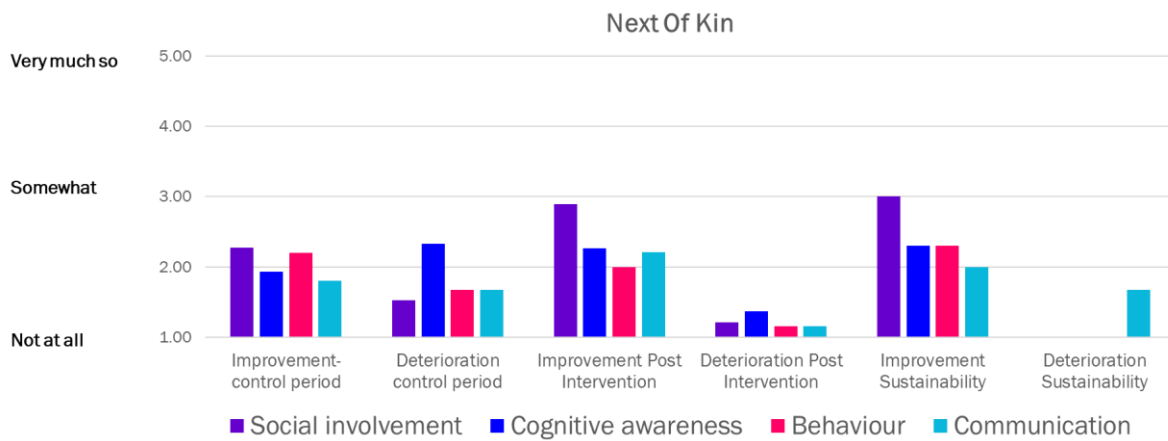


Figure 5. Family members' perceptions of improvement vs deterioration for social involvement, cognitive awareness, behaviour, and communication across the study period.

The modification of protocols for the physical assessments, provided good test-retest reliability and enabled a higher number of participants to be involved in the assessments. The coefficient of variation varied from good for the 4-metre walk and handgrip to acceptable for the 30-second sit-to-stand (Table 3).

Table 3. Percentage of participants able to complete the standard protocol for physical assessments.

Physical assessment measure	Published reliability of the standard protocol (ICC)	Participants able to complete modified protocol (%)	ICC trial 1 to trial 3 (Cronbach's alpha)	Test/re-test reliability (Pearson's)	Coefficient of variation (%)
Timed-up-and-go (Alfonso-Rosa et al. 2014).	.98	70	.91	.87	11.9
Five-repetition sit-to-stand (Schaubert & Bohannon 2005).	.81	64	.95	.75	12.7
Handgrip strength (Alfonso-Rosa et al. 2014).	.98	100	.98	.94	7.16
Two-minute walk (Chan & Pin 2019).	.98	70	.93	.87	*
Four-metre walk (Peters, Fritz & Krotish 2013).	.96	64	.84	.83	7.2
30-second sit-to-stand (Alfonso-Rosa et al. 2014).	.92	70	.77	.93	14.8

ICC = Intraclass Correlation Coefficient. \*The two-minute walk was completed once and does not have a coefficient of variation value.

One-page profile (Pilot modification to EP-delivered program)

As part of our engagement with the CDPC, we were assigned a Designated Systems-Based Investigator (DSBI), a partnership representative on the project whose role was to facilitate translation across the project. Wendy is the Wellbeing and Dementia Support Coordinator and as part of her work at Brightwater, was trialing a one-page profile. Working with Wendy, and as a means of seeking further solutions to try to sustain opportunities for physical activity beyond the 12-week program, our EP developed a one-page profile. This profile (Images 4 & 5), contains details about the resident, what is important to them; what people like and appreciate about them; the types of activity they used to do; tips about how to help them stay active; and their favourite exercises. The back page of the document provides images of the resident undertaking the exercises, accompanied by clear instructions on how to perform them. The production of such a document centres on the 'important for' concepts associated with the medical or care model, in contrast to the 'important to' concepts associated with the motivational or person-centred model. In the context of the medical or care model, what is 'important for' the resident might be being physically active in an attempt to prevent dementia, cardiovascular disease or type 2 diabetes, for example; however, this may not be 'important to' the resident from a motivational or person-centred perspective. Instead, their 'important to' may be being able to go out for meals with their family once a week. As such, being able to get in and out of a car becomes 'important for' the resident and is what motivates them to be physically active to achieve this. Understanding the residents' previous likes and activities helps to tailor physical activity that they are motivated to do.

# Betty's\* Wellness page-

\*Not Resident's real name



## WHAT IS IMPORTANT TO BETTY?

1. Her family.
2. Singing with other residents and having a chat.
3. Betty enjoys the company of others and creating a community feel.

## WHAT DO PEOPLE LIKE & APPRECIATE ABOUT BETTY?

1. Her positive and friendly nature.
2. Her ability to always look on the bright side.
3. Always up for a joke and a laugh.

## WHAT TYPES OF ACTIVITY DID BETTY DO?

1. Enjoyed cooking.
2. Reading.
3. Quizzes and Crosswords.

## HOW TO HELP BETTY STAY HEALTHY AND ACTIVE

1. Remind Betty on Thursday and Friday mornings she can complete group exercises.
2. Where possible, try to encourage Betty to complete activities that require her to move and use her body parts such as hanging the washing or cleaning the dishes.
3. Betty enjoys participating in activities alongside of her friends while having fun!
4. Encourage Betty to help other residents be active by being the leader in group ball throwing.

## BETTY'S FAVOURITE EXERCISES

1. Ball Throwing.
2. Sit to Stands (using the chair when needed).
3. Balance.

LOOK ON THE BACK  
OF THIS PAGE TO SEE  
BETTY EXERCISING &  
HOW TO HELP HER  
ACHIEVE HER GOALS!

If there are any changes to this individual's mobility and/or health status and this sheet needs updating OR if you have any feedback, concerns or comments about this sheet, please contact the Exercise Physiology Team.

Date Created: 01/05/2018

Date for Review: 01/11/18

Image 4: One-page wellbeing profile



# Betty's favourite 3 in action-

1

ARM  
PEDALS



- Place the arm pedals in front of me on a trolley or tray table.
- Have me standing up tall with my arms on the pedals.
- Ask me to pedal my arms around - you may need to assist me with the initial movement.
- Let me do this for 5-10 minutes. If I am feeling tired, let me rest, encourage me to pedal the opposite way, or let me sit down to complete the remainder of the pedalling.

2

SIT TO  
STANDS



- Make sure I am sitting on a chair, with my arms on the arm rests.
- Ask me to 'sit down and stand up from the chair 10 times'.
- I sometimes do need to use my arms on the chair to help me stand up. If this is the case, please encourage me to do so.
- I like doing this exercise with someone standing next to me - it makes me feel safe!

3

BALANCE



- Ask me to stand tall and hold onto the hand rail.
- Stand by my side to 'spot' me, so I have more confidence.
- Ask me to place my feet close together and to close my eyes - still keeping my hand on the rail.
- If I am comfortable and look like I'm doing well, encourage me to lift my hand off the rail... keeping my eyes closed. I find this a bit scary, so please give me a few goes!!

If there are any changes to this individual's mobility and/or health status and this sheet needs updating OR if you have any feedback, concerns or comments about this sheet, please contact the Exercise Physiology Team.

It was intended that the one-page profile be distributed within the third site of the facility so that staff and visiting family members could use the profile to encourage the residents to be physically active. In the case of family members, it was intended that the profile contribute to purposeful visits with their relative.

To evaluate the implementation of this strategy, knowledge of the availability of the one-page profile and any use of it was assessed in the interviews with care staff and family members, undertaken after the sustainability period. Evaluation of the processes associated with the development of the one-page profile occurred through a semi-structured interview with the EP responsible for the development of the document.

#### Sustainability interviews

Eleven interviews were undertaken following the sustainability period with family members (n=4), and care staff (n=8). The reduction in numbers at this time point is mostly attributable to the death of residents between the post-intervention and sustainability periods. It was decided not to contact the family members of deceased participants for interview.

#### Main findings

Analyses of qualitative data indicate that there are conflicting reports as to whether or not change has been sustained for participants in the program. For the most part, interviewees perceive that any positive impact or changes as a result of participation in the program have dissipated, with physical and behavioural status returning to that prior to program implementation; however, it was also reported that some residents had maintained abilities to undertake certain activities. These reports mostly came from Lifestyles Staff, who likely see residents undertake motor function-based activities that care staff would not be witness to. Any deterioration reported was perceived to be in accordance with progression along the dementia/ageing continuum. One of the barriers we faced at the end of the project was ensuring that the project would continue. This related to the main project having ended earlier than the evaluation and the capacity of HH to retain the EP's in similar roles.

Care staff voiced concerns about the inclusiveness of the sustainability activities, with the perception that the activities were only being accessed by those who know when and where they were occurring. Some staff reported that additional exercise had been incorporated in the daily routine of the units, as a result of the initial program.

Family members reported varying outcomes with respect to maintenance of change that came about due to participation in the 12-week program. There was one report of a resident maintaining mobility-related improvements and not wanting to use a walker. Another family member described a general improvement in his/her mother that had been maintained in conjunction with a reduction in her medication. In contrast, yet another

family member reported a marked deterioration in socialising and ability to mobilise for his/her relative.

Despite the apparent reversion to prior behaviours, such as calling out, there were a couple of statements from care staff related to the perception that participation in the program enabled some residents to remain ambulatory after falls, rather than being moved into mobile chairs. Another resident, who had previously been a 'double transfer assist' prior to program participation, had maintained the ability to self-transfer after the program.

The perceived loss of benefits that arose from participation in the original EP program seemed to reinforce the belief of interviewees that the program should be a regular occurrence for all residents, and should be delivered by trained staff, such as the EPs, or by volunteers. In the interim, two family members reported paying individuals to attend the facility on a regular basis to do activities with their respective family members as a means of continued stimulation and an attempt to prevent further decline. Please see Table 4 for the higher and lower order themes and Appendix 2 for examples of interview data.

There were a number of reports from family members that they were unaware of the sustainability activities, nor had they been informed if his/her family member/s were involved in these activities. Suggestions were made that regular updates from the staff would be appreciated and useful from the family members' perspective. With respect to the one-page profile, none of the staff or family members interviewed at the third site were aware of it.

Evaluation of the implementation of the one-pager profile occurred through a semi-structured interview with the EP. The interview was conducted over the phone and lasted approximately 30 minutes.

The one-pagers were developed by the EP and were informed by data collected from the individual resident's lifestyle and social care plans; through experience in the exercise sessions; through discussion with staff (and family where possible); and through discussion with residents who were able to.

Approximately 15 of the one-page profile documents were created, and following this, a workshop was organised by the EP, to be held with the Lifestyle staff and volunteers. The workshop lasted approximately 2 hours, with the EP explaining the purpose of the one-page profile, demonstrating the exercises, and making sure that the exercises were understood.

The EP reported a mixed reaction from the staff and volunteers to the profile and the delivery of exercise to the resident. For the most part, the perception was that the reaction was quite positive, with the concept liked and acknowledgement of the likely benefit of such

an approach. However, there were some concerns from the perspective of some volunteers who were nervous and worried about the consequences/apportion of blame should something go wrong. In a couple of instances, volunteers stated outright that they would not be doing it, that they hadn't been required to do so previously, so would not do it now. The Lifestyles staff were provided with a list of residents who were to be targeted for participation in ongoing activity.

Implementation of the one-page profile was further impacted by the staffing changes within the organisation, with the resignation of one of the EPs who was going to be responsible for overseeing the implementation and application of the one-page profile. It was suggested by some of the Lifestyle staff that a volunteer oversee the program, and a volunteer was 'appointed' and went through the profiles with the EP, there was no further action. It is the opinion of the EP that an ability to spend more time with volunteers as they worked with residents may have improved the likelihood of successful implementation of the one-page profile.

The Movement with Benefits activity was reported by the EP to be more successful and was still occurring at each of the three sites. It has been adapted at each site relevant to the site and its available resources. The circuits have been left set-up as a means of increasing availability to residents, who can use it whenever they like. Some of the group sessions have continued, which has contributed to social engagement of 15 to 20 residents at each class. From the EP's perspective, keeping in contact with the family members is important, as they don't see what is being done with the resident. Ideally, it is important to do this for all residents, as a means of 'planting the seed' for the family, so that they understand the role of exercise and the benefit, but some families are not involved with the resident. The EP reported that the family of all participating residents received information about the number of sessions attended by the resident.

The EP reported a number of possible barriers to program sustainability, including needing to work around all of the other activities occurring within the organisation. Further, the EP described feeling like she was always defending the EPs' role, what they were doing in the program, and deflecting negativity, to other non-program staff.

Key recommendations were to nurture and foster the relationship between program staff, the care staff and volunteers; to let them see what the program is about. The use of the mobile equipment – taking the program to the residents – coupled with the energy of the people delivering the program was seen to be positive for program success.

Table 4. Sustainability analysis, higher order and lower order themes

Higher order themes	Lower order themes
Benefits not sustained	Social interaction reduced
	Behaviour
	Motor Function
Benefits sustained	Motor function
Barriers	Access & Inclusion
Program-associated outcomes	Integration of exercise within daily routine
	Functional maintenance
	Sense of achievement
	Awareness of ongoing activity
	Change in staff/resident relationship
	One-page profile

## Project outputs

There are a number of outputs resulting from this evaluation, as follows:

### Journal articles

Parfitt, G, Post, D, Penington, A, Davison, K & Corlis, M, 2019, 'Evaluation of an Implementation Project: The Exercise Physiology (EP) in Aged Care Program', *in preparation, intending to submit to PLOSOne*.

Parfitt, G, Post, D, Penington, A, Davison, K & Corlis, M 2019, 'Challenges associated with physical assessments for people living with dementia: modifying standard assessment protocols', *in preparation, intending to submit to International Psychogeriatrics*.

Post, D, Corlis, M, Penington, A & Parfitt, G 2018, 'Exercise physiology in aged care: Perceptions and acceptability from the perspectives of family members and care staff in the residential aged care environment', *Dementia*, <https://doi.org/10.1177/1471301218816246>

Parfitt, G, Corlis, M, Hudson, W, Penington, A & Post, D 2018, 'Personalising exercise prescription for people living with dementia', *Australian Journal of Dementia Care*, vol. 7, no. 4, pp.24.

Parfitt, G, Corlis, M, Penington, A & Post, D 2017, 'Evaluation of an implementation project: Improving cognitive and functional capacity of older people with dementia in residential

aged care through an exercise prescription approach', *Alzheimer's and Dementia*, vol. 13, no. 7, pp. 1408.

#### Presentations

2019, 'Evaluation of an Implementation Project: Sustainability of Exercise Physiology in Aged Care', D. Post, G. Parfitt, M. Corlis, A. Penington, *Abstract submitted*, NNIDR Forum, Hobart, Tasmania, June 2019.

2019, 'Evaluation of an Implementation Project: Exercise Physiology (EP) in Aged Care', G. Parfitt, D. Post, A. Penington, K. Davison, M. Corlis, *Abstract submitted*, NNIDR Forum, Hobart, Tasmania, June 2019.

2018, 'Maintaining functional capacity of people living with dementia in the aged-care environment', G. Parfitt, M. Corlis, D. Post, A. Penington, Poster Presentation, SA Population Health Conference, Adelaide, December 2018.

2018, 'Exercise Physiologist prescribed exercise in aged care: outcome evaluation', D. Post, G. Parfitt, M. Corlis, A. Penington, Australian Association of Gerontology (AAG), National Conference, Melbourne, November 2018.

2018, 'Collaborating to create a dementia-friendly society: a symposium translating the impact of multi-sectorial collaborations', D. Post, K. Laver, A. Smith, LASA National Congress, Adelaide, October 2018.

2018, 'Translating CDPC outcomes into practice – A collaborative model in action', G. Parfitt, L. Quirke, M. Corlis, CDPC Annual Meeting, Canberra, October 2018.

2018, 'Partnering Aged Care Organisations to encourage exercise benefits for residents with dementia', G. Parfitt, D. Post, A. Penington, M. Corlis, Public Health Association of Australia National Conference, Cairns, September 2018.

2018, 'Exercise Physiology prescribed exercise for people with dementia living in residential aged care: who benefits?', G. Parfitt, D. Post, K. Davison, A. Penington, M. Corlis, Hammond Care International Conference, Sydney, June 2018.

2018, 'The Cognitive Decline Partnership Centre: a national research partnership model enabling improved care for people with dementia in Australia', S. Kurrle, S. Grosvenor, A. Kitching, J. Long, S. McDermott, J. Thompson, J. Henderson, G. Parfitt, M. Corlis, W. Hudson, International Federation of Ageing, Canada, August 2018.

2017, 'Perceptions of prescribed exercise for people with dementia in aged-care', G. Parfitt, M. Corlis, D. Post, A. Penington, Symposium presentation, Australian Association of Gerontology (AAG), National Conference, Perth, November 2017.

2017, 'Evaluation of an implementation project: Improving cognitive and functional capacity of older people with dementia in residential aged care through an exercise prescription approach', G. Parfitt, M. Corlis, D. Post, A. Penington, Poster Presentation, NNIDR Forum, Melbourne, October 2017.

2017, 'Evaluation of Targeted Exercise Prescription for Older Adults Living in Residential Aged Care',

2016, 'Activity 29: Evaluation of an Implementation Project - Improving cognitive and functional capacity of older people with dementia in residential aged care through an exercise prescription approach (Exercise Evaluation)', G. Parfitt, M. Corlis, D. Post, A. Penington, Poster Presentation, Cognitive Decline Partnership Centre (CDPC) Annual Meeting, Sydney, Australia, November 2016.

2016, 'It's never too late...', G. Parfitt, UniSA Alumni Seminar, UniSA, September 2016.

#### Radio interviews

October 2018, Coast FM morning session, brief overview of project.

#### Newsletters

UniSA School of Health Sciences Newsletter, article on the program, March 2017.

Helping Hand Aged Care Organisation, article on the program, February 2017.

#### Workshops

'Seated and Safe or Active and Engaged?', G. Parfitt, M. Corlis, D. Post, CDPC, Sydney, October 2018 – 34 participants.

'Seated and Safe or Active and Engaged?', G. Parfitt, M. Corlis, D. Post, Brightwater, Perth, November 2018 – 32 participants.

#### Teleconference workshop – *in planning*

'Seated and Safe or Active and Engaged?', G. Parfitt, M. Corlis, D. Post, A. Penington, Dubbo Health Service, New South Wales, scheduled for September 2019.

Open source material to be made available  
Papers, workshop presentation slides, one-page profile template, testimonials/interviews from care staff, program staff, and dementia advocates.

## Discussion

The aim of Activity 29 was to conduct an evidence-based outcome evaluation of an implementation project – the EP in Aged Care program. The evaluation was intended to capture quantitative and qualitative measures of exercise within a residential aged care environment and identify cognitive and functional outcomes for residents.

The objectives of the outcome evaluation were to:

1. Evaluate the impact of targeted, individually specific EP interventions for people who have significant dementia and other chronic health conditions and disabilities on cognitive, functional and behavioural constructs.
2. Evaluate the satisfaction, perceptions and acceptability of the EP program on the family members of participants
3. Evaluate the perceptions, impact and acceptability of the EP program on Care Workers and other staff.

Overall, the evaluation identified some statistically significant findings with respect to improvement in some aspects of physical function as a result of participation in the 12-week exercise program. There was evidence of a dose response, particularly linked to individual EP-delivered sessions. From the data, only eight individual sessions were necessary for significant change/maintenance of function relative to the typical trajectory of decline. Improvement in physical, social, and behavioural factors post-intervention was perceived to be greater than deterioration from the perspective of family members and care staff. The interviews provided context for these findings, with a number of reports of benefits realised that were related to physical function, social engagement for both residents and staff alike, as well as changes for some residents in what are deemed challenging behaviours. Very high rates of satisfaction with the program were reported by care staff and family members, with descriptions of program staff being accommodating to the routine of care staff and of space allocations required by lifestyle staff. Perceptions of who might benefit from involvement in a program of this nature were challenged and changed for some people.

Sustainability analyses demonstrated that the physical benefits seen as a result of participation in the 12-week program were not maintained at the population level; however, survey data suggest ongoing maintenance or improvement for individual residents. Qualitative evidence related to maintenance was varied and in parts, inconsistent. The implementation of some of the sustainability activities did not occur as intended, and



these were subsequently not effective; however, other aspects have been judged to be successful and to have contributed to ongoing social engagement for the residents.

The overwhelming majority of interviewees indicated that this type of program should be provided for residents from the time that they enter residential care. In a number of cases, family members stated that they would be prepared to pay for such a service. From a care staff perspective, it was unanimous that this type of program should be delivered by someone qualified to do so; however, it has also been demonstrated that some care staff have incorporated incidental activity for residents within their daily routine, where time permits.

There were a number of barriers identified specific to sustainability of the program, with the key factors being accessibility issues for residents with cognitive and/or functional decline, time available to care staff to incorporate additional activity into their routines; and the inability to effectively implement the one-page profile document into the organisation. While engagement of family was indicated as important in particular, to make them aware of the program and its associated activities and to encourage increased activity for residents, this did not always occur. The majority of family members interviewed reported not knowing what was happening with the program or of their family member's involvement.

## Recommendations

Following the evaluation of the EP in Aged Care Project, the following recommendations have arisen:

1. All people be assessed for their activity level on admission to aged care, and every 12-months; this would include people on high care packages in the community. The EP would assess for current function and possible improved function.
2. Exercise should be made available to all older people living in residential aged care, regardless of their cognitive or physical capacity. There should be a clear focus on general activity, that encourages maintenance of function.
3. Assessments and individually tailored programs by accredited EPs should be made available to all older people. This includes providing access to subsidised services such as private health insurance, Department of Veterans' Affairs (DVA), and Medicare.
4. A case should be made to the Commonwealth related to possible policy changes to incorporate exercise and provide access to exercise.

5. The EP profession needs to further explore activity options for more vulnerable people, including older people, but also those with a disability or mental health challenges.
6. EP profession needs to investigate an appropriate staffing model for providing exercise / activity for example, the safe and appropriate use of assistants and/or volunteers. Teaching other staff or volunteers how to deliver activities should be trialled and evaluated.
7. Going forward, models of delivery of exercise in the aged care environment should be explored, with discussion around whether this is an allied health activity or should be considered a lifestyle activity.
8. In alignment with Recommendation 1, residents with cognitive or physical capacity issues should be encouraged and assisted to be involved in the 'sustainability' activities, such as the Movement with benefits circuits.
9. Ongoing reporting of residents' involvement in program-related activities and any impact associated with their involvement should be regularly reported to family members. Helping Hand should explore opportunities to facilitate the engagement and involvement of family and friends in activity with older family members. Involvement relates to participation in activity, and communication about activity.
10. To facilitate sustainability, efforts should be made to implement and evaluate the one-page profiler as a means of increasing physical activity for residents, and for providing purposeful visits for relative and friends of residents.
11. Efforts should be made to explore other avenues for sustainability, to increase the opportunities available to older adults to participate in physical activity, and to engage relatives and friends of residents.

## Concluding statement

This evaluation has provided evidence for the effectiveness of a 12-week, Exercise Physiologist-led exercise program for people living with dementia in a residential aged care facility. Some evidence identified benefits across levels of physical and cognitive status, and there have been several examples provided in this report of general maintenance of, or improvement in, physical and cognitive factors. However, to continue any benefit seen as a result of participation, ongoing strategies that are accessible and inclusive for residents, regardless of their cognitive and functional status, should be implemented. This includes engaging partners in care, such as family members and care staff, to encourage incidental physical activity. The program has had a ripple effect for partners in care, with the realisation that older adults living with dementia are not just on a trajectory of decline.

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## Appendix 1

Table 2. Post-intervention analysis

Higher order	Lower order	Supporting Comments
Initial perception	Scepticism, or unsure	Interviewees reported being sceptical or unsure of the likely impact of the program, due to funding constraints, and therefore program longevity, or through not being sure if it could have an impact, but still having an open mind.
	Any activity likely to be beneficial	Some interviewees acknowledged the likely benefit of physical activity, and thought that any physical activity would be beneficial.
	Maintenance	A small number of interviews thought that the program might just maintain the level of activity the residents had, rather than improve their situation.
Barriers	Time	A barrier for care staff to provide exercise to residents as part of their routine.
		NOK observation that care staff don't have the time to encourage residents to use a walker to get somewhere; a wheelchair is a quicker option, which contributes to decreased mobility overall.
Benefits	Physical	Improved mobility.
		Retention of ambulation rather than progression into mobility.
		Improved ADLs.
		Resident now getting up and getting himself ready, rather than waiting for care staff.
		Resident using wheelchair less, and returned to using walker more regularly with family member.
		Resident seems fitter to family member.
	Cognitive	Reports of cognitive benefit were not widespread, one or two specifics, such as improved memory (recalling exercises performed to demonstrate to a family member); acknowledging a member of staff verbally, rather than with a grunt.

Higher order	Lower order	Supporting Comments
		Resident has improved reading.
		Resident gained confidence in use of body.
	Behavioural	No calling out during exercise sessions, compared to other times when calling out occurs often.
		Residents more relaxed.
		Residents more cooperative.
		Resident had his daughter purchase hand weights so he could do exercises in his room.
	Socialisation	Inclusion and engagement aspects.
		Residents asked when they could go to exercises.
		Residents who wouldn't previously attend activities began to do so.
		Increased communication with care staff.
	Engagement with program	Residents asking when they were doing the exercises.
		Reacting positively when program staff named, or the exercise sessions mentioned.
		Residents laughing, enjoying the exercise sessions.
		Residents asking to get ready early so that they could go to the exercise classes.
		Resident telling his wife she couldn't come on a particular day, as he had exercises.
	Gratification for staff	To see the looks on the residents' faces, and the pleasure they got from the program.
No Benefits	No program impact	In the dementia unit (GC), staff reported no impact. NOK, perceived no impact, and that their relative was 'too far gone' cognitively for the program to have any impact.
Acceptability	Worthwhile program	All interviewees thought the program worthwhile – even if physical benefits not always there, social advantages outweighed everything.

Higher order	Lower order	Supporting Comments
		Needs to be implemented and available to residents as soon as they enter the facility.
		Needs to be long-term.
	Program Staff	Program staff reported as being enthusiastic, encouraging, and inclusive. Program staff fit in with the routine of the care staff. EP staff necessary; expectations on care staff to provide this service would detract from the residents' care.
	Organisational considerations	Better explanation to care staff of program intentions required at the outset.
	Funding impact	Programs being implemented and then being halted once the funding runs out.
Person-centred approaches	Consideration of individual resident's needs, history, culture	Linking activities individuals liked or participated in when they were younger, or prior to entry into residential care, to the activities being undertaken during the program.
		Understanding the individual's history, as a means of tailoring the approach to them.
		Understanding the individual's cultural identity, as a means of tailoring the approach to them.
	Reporting progress to family	Providing regular feedback to family members about the resident's progress.

## Appendix 2.

Table 4. Sustainability analysis

Higher order	Lower order	Supporting example
Benefits not sustained	Social interaction reduced	Some reports of continued cohesiveness of the group in activities; this contrasts the reports that interactions among residents were no longer happening as they had when the program was occurring. NOK reported that family member had deteriorated, now using a chair, and doing very little additional activity.
	Behaviour	Residents who had displayed less calling out during the exercise program had reverted to calling out again “often”, once the program ceased in regularity.
	Motor Function	Resident who had regained ability to open hand had now lost this ability upon cessation of regular exercise sessions.
Benefits sustained	Motor function	Motor skills (i.e. using scissors) improved for some residents during original program; this improvement maintained.
		Maintenance for these residents means they do not need to be accompanied to activities, and staff can devote more time to all residents/spread time more evenly among residents.
		NOK reports that family member has maintained fitness, no longer wants to use walker, and physical mobility ‘is okay’.
		A particular resident has maintained ability to mobilise, when they have previously been a double assist for mobility.
		Reports of improved ‘friendliness and support’ among one unit of residents – attributed to group sessions – that continued in sustainability period.



Higher order	Lower order	Supporting example
Barriers	Access & Inclusion	Not accommodating for the individual needs of residents (i.e. visual or hearing) may preclude them from involvement in activities.
		Program attendance not as inclusive, residents that need/should be attending the program not accessing it.
		Residents that are not cognitively capable of locating the sustainability activities are missing out.
		Care staff perceive that exercise activity should be occurring for residents every day, with suggestions that it is delivered either by trained staff, or volunteers.
		Perceptions from NOK that there is a need for stimulation of the residents and that the care staff don't have time for that.
		Perceptions from NOK that it is quicker and easier for staff to use wheelchairs, rather than take the time to assist someone to walk somewhere.
		Everything that happens, happens too quickly for residents with dementia. Activities need to be broken down into segments.
		NOK perception that professionals need to get into the world of the resident with dementia and work with them, rather than expect them to come into the professional world.
Program-associated outcomes	Integration of exercise within daily routine	Some teams have taken the exercise concept on board and encourage a little bit of exercise among the residents before going to lunch.
		One of the care staff regularly plays music and has the residents up and dancing.
		Staff who have seen residents do particular activities in the exercise sessions, now ask those residents to do that in completing their ADLs, for example, 'come on lift your arm so I can get your top on, cos you did it with the ball'.
		Staff member reports that residents still participating in exercise are very keen to attend, and often check that it is the 'right day'.
		Staff were able to catch up on other activities while the residents were in the group sessions; not so much now.
	Functional maintenance	Belief that residents who have had falls have been able to 'get back on their feet', rather than go into a mobicline due to their participation in the program.
		Perception that some residents would not still be walking if it wasn't for their participation in the exercise program.

Higher order	Lower order	Supporting example
	Sense of achievement	Care staff report that residents appear to have a sense of achievement in being able to undertake the exercise activities.
		Gratification for lifestyles staff when residents can come along and participate.
		NOK reported increased confidence in their family member.
	Awareness of ongoing activity	Staff aware of the ongoing activities think they have been beneficial.
	Change in staff/resident relationship	Not a vast acknowledgement among staff; however, there was mention of a shift in the relationship or interaction between care staff and residents, a sense of gratification in seeing the residents mobilise and participate in activity.
	One-page profile	None of the interviewees knew about the one-page profile.