Ageing Well in an Outdoor Gym

Hosted by the School of Population Health, The University of Auckland

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Community partners: Te Pouwhenua O Tiakiriri Kūkupa Trust, Maunu Garden Project Charitable Trust

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FULL REPORT

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Summary

Ageing Well in an Outdoor Gym (AWinOG) study is a Māori community-based, participatory action research with Kaumātua of the Te Parawhau Hapu to co-design a lifestyle intervention programme based on outdoor gardening. This study explored the impact of outdoor gardening on physical and psychosocial functioning in older adults, including those who are lonely. The study proposed: 1) to determine the feasibility of recruiting 40 older adults aged 50 years and over, with at least half of the study sample identified as experiencing loneliness/socially isolated, 2) to complete physical assessments at baseline, 6 months and 12 months using standardised measures. The research project is approved by the Northern B Health and Disability Ethics Committee on 11th February 2022. Written informed consent was obtained from the study participants.

The study was carried out between April 2022 and December 2023. Three interviews and physical assessments were completed at baseline, 6- and 12-months follow up. Data collected includes health habits (e.g., smoking and physical activity), medical history, cognitive function, self-rated health, emotional and social loneliness, physical function, grip strength, and flexibility.

We recruited 44 community-dwelling Māori, Pasifika Peoples and non-Māori/non-Pasifika men and women aged 50 years and over, particularly those experiencing loneliness/social isolation. The group were identified through the local community networks and general practices in Te Tai Tokerau. The average age of the participants was 70 years (ranging between 53 and 86 years old), 81% females, and 62% Māori (38% non-Māori). More than half of the group are married (51%), 22% are widowed, 16% are divorced/separated, and 11% are unmarried/partnered.

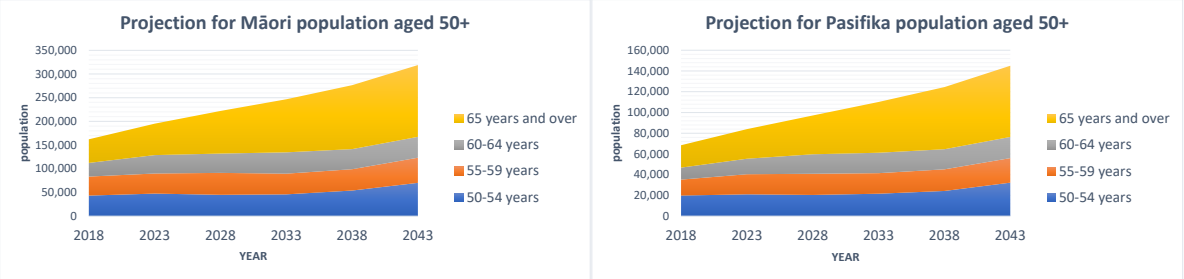
The study observed that the study participants received the AWinOG programme well. We have recorded good weekly attendance at the Maunu Gardens, with the participants engaged actively in various gardening activities identified by the site coordinator. The study participants' whanau and mokopuna have also enjoyed the interactions at the Maunu Gardens. This positive feedback mirrors the data collected using standardised measurements by research-trained interviewers.

The AWinOG programme raises awareness of healthy ageing through outdoor activities and socialisation among local communities. This project has generated interest in several agencies, including Te Runanga o Ngati Whatua, which has come forward with monetary funds expressing their interest in longer-term funding for transport costs for older adults.

We want to acknowledge all our participants for being part of the study, Maunu Garden Project Charitable Trust and Te Pouwhenua o Tiakiriri Kūkupa Trust Inc. for their partnership in this research. We remember Dr Benjamin Pittman, who passed away in early 2023. His dedication and guidance for this project was invaluable.

Background

The New Zealand population is ageing. By 2043, it is projected that the number of New Zealanders aged 50 years and over will increase by 50%. However, in Māori and Pasifika communities, this age group is projected to increase by 97% and 112% respectively (1). In the age group of 50 years and over, the 65 years and over is the fastest growing population segment, 203% for Māori and 218% for Pasifika. (Figure below)



The changing demographic over the next 25 years makes well-being and independence a priority for individuals, whanau, hapu, families, health planners, funders, providers, and wider society. For older adults, maintaining optimal physical and cognitive function is preferred over longevity. Healthy ageing is an intersection of different determinants, including individual lifestyle, cultural and environmental factors supported by social and community networks, and the health system. Healthy ageing is a complex process that needs approaches beyond disease prevention.

While there is an upsurge in health research with older adults in Aotearoa New Zealand to improve their health and well-being, the number of older Māori and Pasifika Peoples represented in the studies is still small. Various reasons can be attributed to the low participation rate in mainstream health research, including that most health interventions are targeted on specific health issues that may not be attractive to Māori and Pasifika Peoples who belong to a collectivistic culture (2).

Older Māori view healthy ageing as meaningful social relationships ('doing things together', 'mutual motivation and focus' – the collective), spiritual well-being, relaxation/meditation, regular exercise, and whole food (3). Gardening presents a more holistic intervention approach and might improve the existing information about the health and well-being of older Māori and Pasifika adults.

Gardening, the most preferred activity for both older Māori and non-Māori (4), is shown to benefit older adults. The impact of gardening on physical health and mental well-being is the accrued benefits from physical health (e.g., reduced blood pressure, BMI), functional mobility, social interaction and collaborations (5-9). Gardening promotes mental, physical, and sensory stimulation that provides the opportunity for social interaction and to help facilitate mind-body-spirit connection (10). In a scoping review, active gardening or simply being in a garden has been linked to improved mental well-being, increased physical activity and a reduction in social isolation (7). Gardening is reported to support positive ageing (5). It has the potential as an alternative, non-medical intervention to better manage complex long term conditions (7). However, there is insufficient empirical evidence to support the benefit of gardening on physical functioning.

In 2020, Ageing Well National Science Challenge funded the Ageing Well in an Outdoor Gym (AWinOG) project to co-design a lifestyle intervention programme to improve physical function in older Māori. The project was carried out with twelve Kaumātua (four men and eight women) in Otaika to test the concept of active participation in gardening activities over three months and the impact on physical function. The group reconvened at the end of the gardening programme to review the process and make recommendations. At the end of the three-month study, the group noticed an overall positive change in their physical function. Whakawhanaugatanga was an important aspect and outcome of gardening. The relationship through shared experiences and working together gives the group a sense of belonging to each other and the ancestral land where the outdoor garden was established at Otaika. The group recommended that the research extend the invitation to everyone in the community, particularly those who are lonely or socially isolated. An integrative review reports that social isolation, living alone, being female, being Māori and having impaired vision are at a higher risk of experiencing loneliness (15).

In view of this evidence and to address the knowledge gaps, the research project aims to explore the feasibility of recruiting those who are lonely/socially isolated and to explore the impact of outdoor gardening on physical and psychosocial functioning in older adults.

Methods

We recruited 44 community-dwelling Māori, Pasifika Peoples and non-Māori/non-Pasifika men and women aged 50 years and over living in the Whangarei. Lonely older adults are likely to be socially isolated. Local community networks and Dr Kyle Eggleton, a GP with the Northland Iwi Health Provider, Ki A Ora Ngātiwai helped identify older adults at risk of loneliness.

The lifestyle intervention programme – Ageing Well in an Outdoor Gym (AWinOG)- was conducted at the Maunu Garden. Participants engaged in weekly gardening activities over 12 months. Each gardening session lasted 2-3 hours in the morning, with breaks in between and a light lunch after the gardening session. Transports were provided where necessary.

Research-trained nurses completed face-to-face interviews and physical assessments at the Maunu Gardens or the participants' residences. The interview and assessment were completed at baseline, six and twelve months follow-up. Standardised questionnaires administered face-to-face: sociodemographic information, health habits, medical history, physical activity (Physical Activity Scale for the Elderly, PASE) (11), cognitive function (the Montreal Cognitive Assessment, MoCA)(12)), quality of life (SF-12) (13), and loneliness (De Jong Gierveld short scales for emotional and social loneliness (14)). Physical assessments: physical function (Short Physical Performance Battery (SPPB) (15), grip strength (Takei digital handgrip dynamometer–Grip D) (16), and flexibility (Chair Sit-and-Reach Test) (17).

At six and twelve months follow-up, we asked five open-ended questions about gardening experiences at the Maunu Gardens. The questions were provided to the study participants to reflect upon at home, and they discussed the responses with an interviewer the following week. Written responses were read several times and coded and grouped into themes representing their experiences in the garden. (18) The researchers (ET and RT) reviewed the initial themes from the codes, refined each theme's specifics, and presented the themes to Māori researcher Dr Mere Kepa for refinement from a Kaupapa Māori approach to research. Further iteration for

each theme was completed to generate a more explicit definition adopting the Mātāpono principles from Te Ao Māori, the Māori worldview. (19)

Each participant kept a Gardening Activity Diary throughout the study period. Information recorded by the participant at the end of each session: types of gardening tasks and their duration at the community garden. Each entry in the diaries was entered into a secured database, coded and matched to the compendium of physical activity; physical activity intensities are defined as light < 3.0 METs, moderate 3.0-5.9 METs, and vigorous ≥ 6.0 METs (20).

The site coordinator recorded attendance at Maunu Garden.

Results

We recruited 41 age-eligible community-dwelling adults over six months (May - October 2022) through study flyers distributed in local community networks, word of mouth, and Northland Iwi Health Provider, Ki A Ora Ngātiwai; three participants were enrolled between Dec 2022 and February 2023. (Figure 1)

Almost two-thirds who consented continued until the end of the study (28/44, 64%); half completed 12 months assessments (22/44, 50%). (Figure 2)

Figure 1: Recruitment rate.

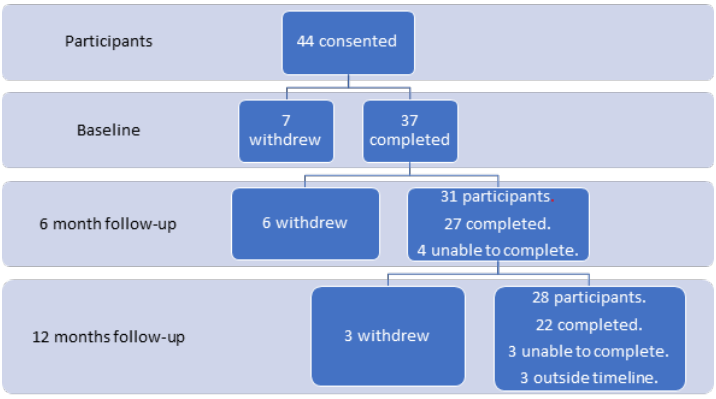


Figure 2: Participants flow diagram.

Participants' profile

Sociodemographic background

The average age of the participants was 70 years (range between 53 and 86 years old), more than half (57%) were aged 70 and above and 43% <70 years. Four-fifths of the sample were females, and 62% were Māori (38% non-Māori).

More than half of the group are married (51%), 22% widowed, 16% divorced/separated, and 11% unmarried/partnered. Nearly half of this group attained tertiary education (49%), and about a third (30%) completed primary/secondary education without a qualification. Figure 3 shows the proportions of the main lifetime occupations of the group, and Figure 4 shows more women than men living alone.

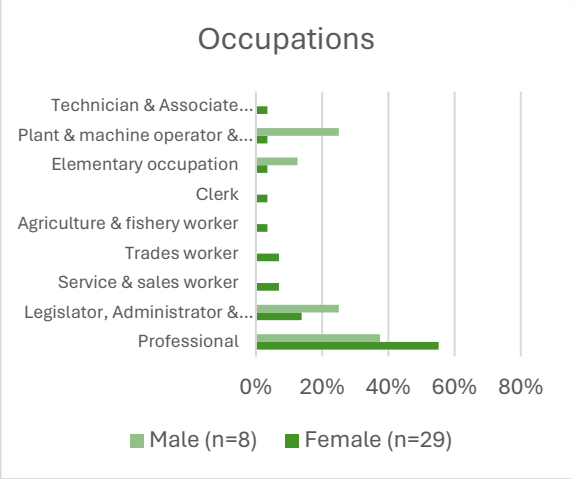


Figure 3 Participants main lifetime occupation.

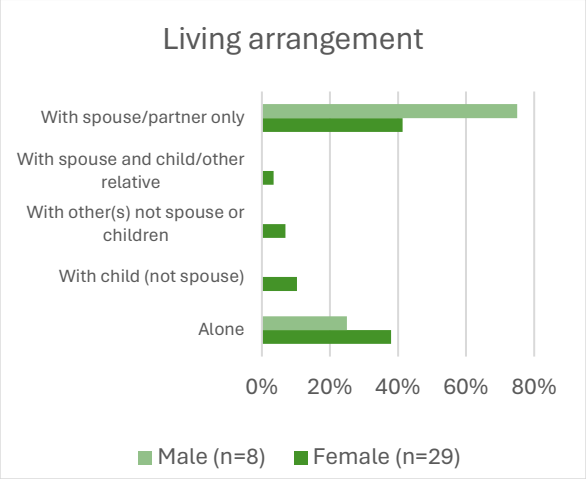
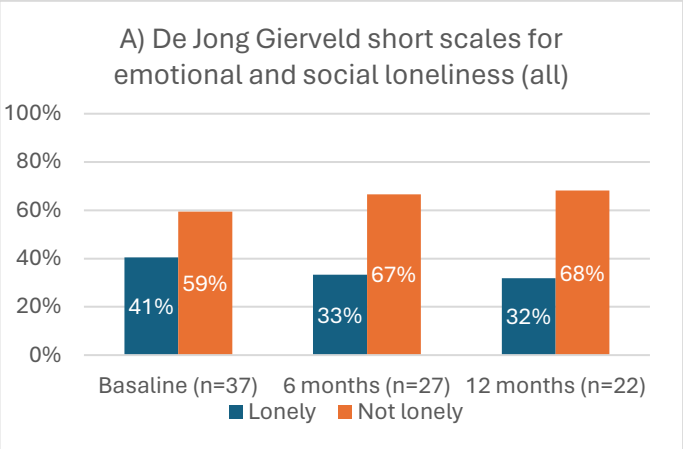


Figure 4 Participants living arrangement.

Structured interview and physical assessment

About 80% of the group reported that they had good/very good/excellent general health (female 79%; male 88%), satisfied/very satisfied with their life (female 79%; male 88%), good/very good quality of life (female 86%; male 88%). Despite these encouraging global self-rated health and life satisfaction, the study found two-fifths (41%) of the older adults enrolled in the study were lonely, higher in men (63%) than in women (35%) (Figure 5)

Emotional and social loneliness: our study observed that the proportion of lonely participants reduced from 41% to 33% at six months of follow-up and maintained at 12 months of follow-up. The lower proportion of loneliness was observed only in female participants, from 35% to 28% at 6 months and 26% at 12 months (Figure 5). The slight reduction in the average scores suggests that the AWinOG programme may impact the group's emotional and social well-being. However, only a small sample completed the 12-month follow-up.



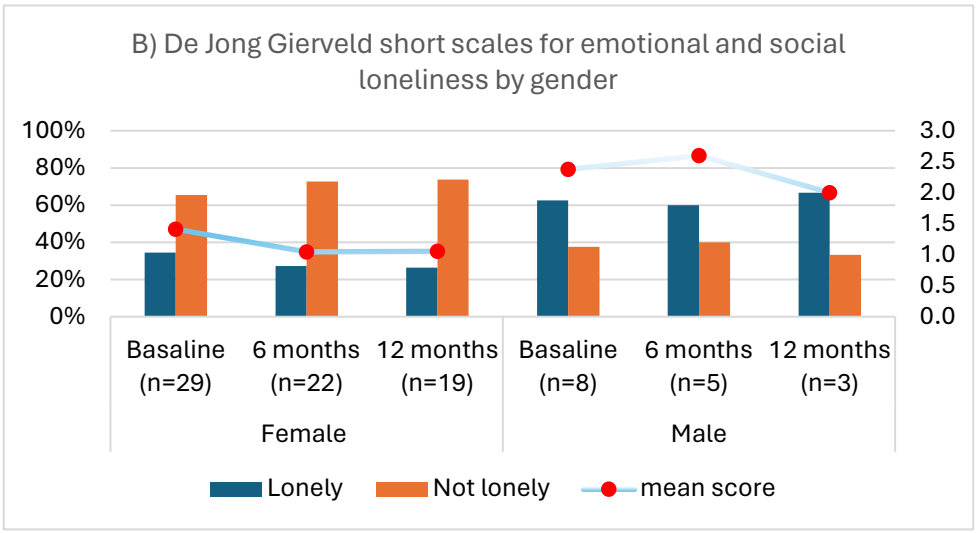


Figure 5: Proportion of sample who were lonely according to the De Jong Gierveld short scales for emotional and social loneliness (score 0-1) (21).
A) all study participants. (left)
B) by male and female (bottom right)

Health and lifestyle

Overall, the group has relatively healthy lifestyle habits. Nearly half of the group had never smoked, and 46% were a former smoker and only 5% smoke. The majority of the group use alcohol sparingly, and 10% consume alcohol weekly (*Figure 6*), and most of them reported that they are able to eat a healthy diet (*Figure 7*).

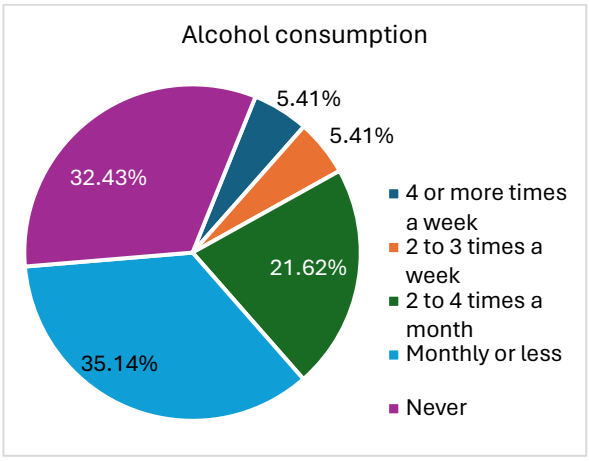


Figure 6: Alcohol consumption

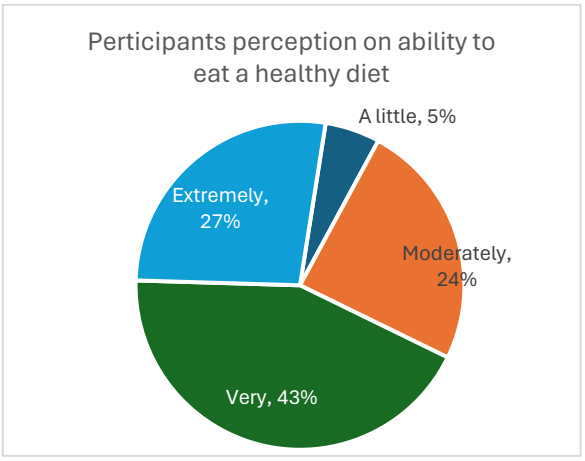


Figure 7: Perceived ability to eat a healthy diet

The study used a validated questionnaire to determine the average amount of leisure, housework, and work-related activities at baseline, 6 and 12 months. (11) More than three-quarters of the physical activities reported by the group were related to housework (light housework, e.g. dusting, washing dishes; heavy housework/chores, e.g. vacuuming, washing windows; home repair; lawn work; outdoor gardening; caring for another person), followed by leisure time activities (walking outside, light sport, moderate sport, strenuous sport and strength and endurance exercises) and work-related activities (pay or volunteer) (*Figure 8*).

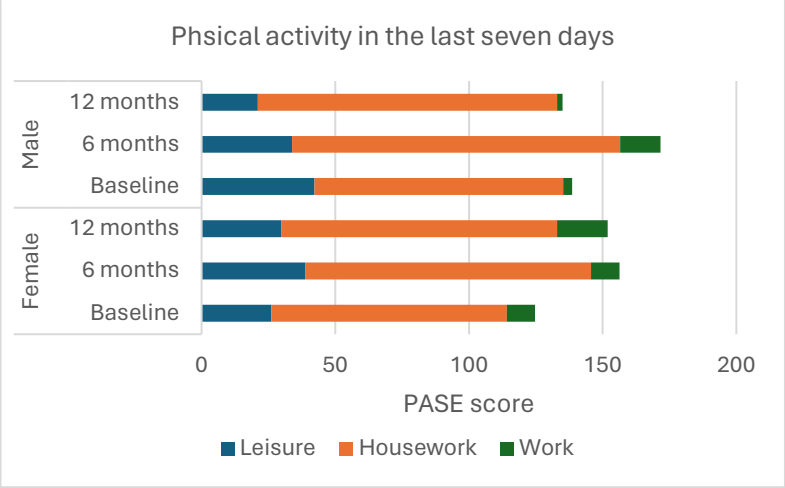


Figure 8: Physical activities in the last seven days.

Note: PASE, Physical activity scale for the elderly

At baseline, 46% of the group reported that they had a fall. Twelve months later, 15 dropped out from the study; of those who remain in the study at 12 months (n=22) 50% had a fall in the last six months.

Physical and cognitive functions

The bar chart below (Figure 9) shows the average Mini-Addenbroke's score throughout the study period. Those aged 70 years and over had a slightly lower score than those below 70 years for both men and women. We observed that the score did not decrease over the 12-month study period. A possible reason is a short observation period.

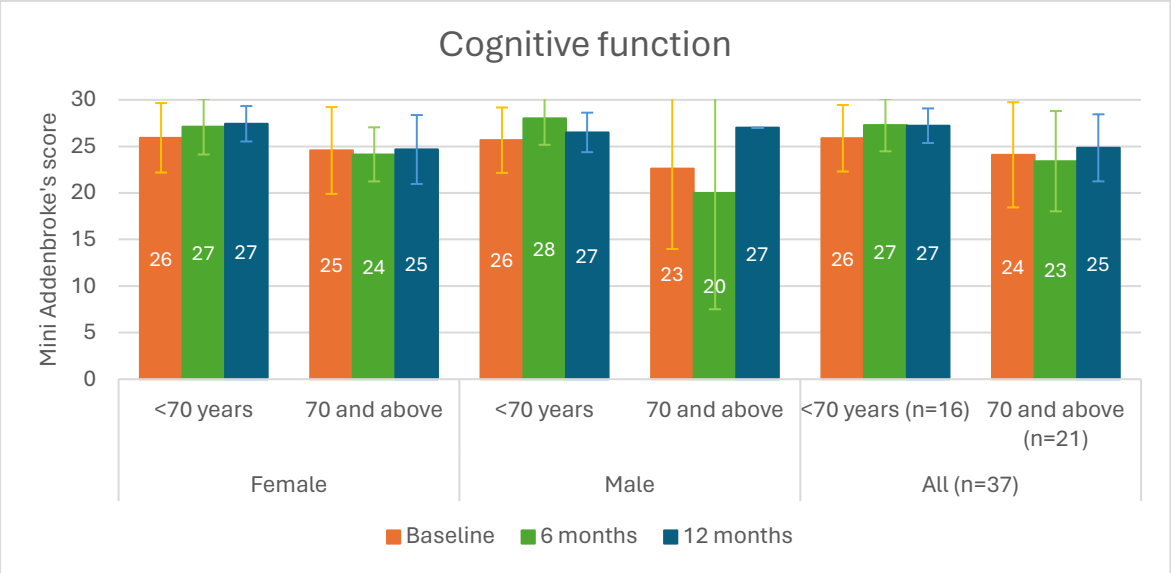


Figure 9 Mini-Addenbrooke's cognitive examination score by gender and age group at baseline, 6 and 12 months.

More than half of the study sample (57%) had a mobility-related disability at the baseline, and this remains unchanged, except for male participants who showed a marked improvement at 12 months; this may be skewed by the small number of men in the study.

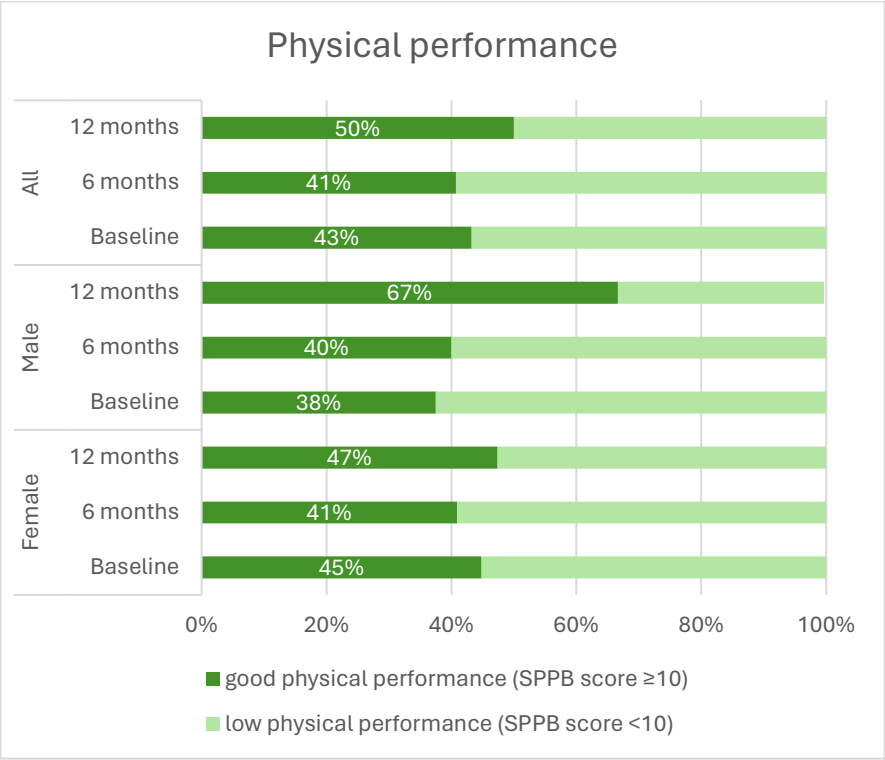


Figure 10 Physical performance according to Short Physical Performance Battery (SPPB) score.

The **flexibility test** measures the degree of movement available at the lower back and the hamstring. Greater flexibility gives you a more comprehensive range of motion, allowing your muscles to work more efficiently and maintain healthy muscles and joints. The figure below suggests that the group's flexibility improves over time.

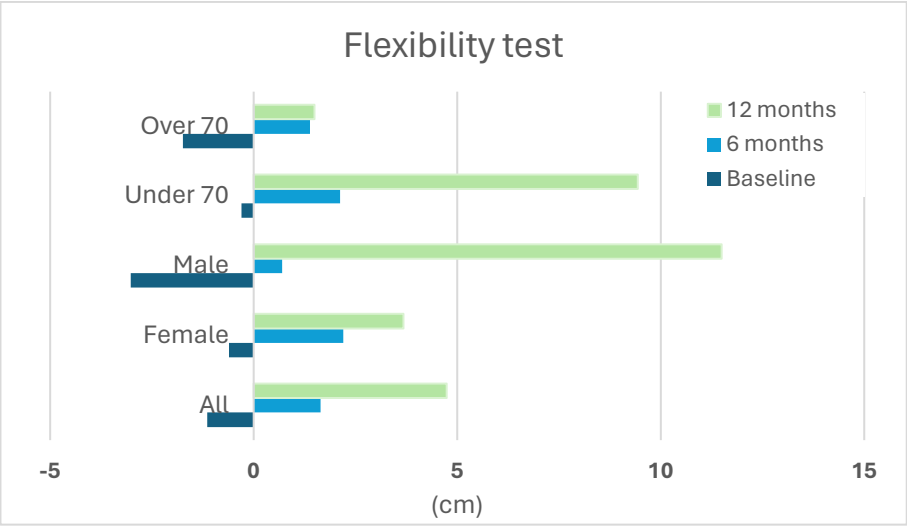


Figure 11: Chair sit-and-reach flexibility test by gender and age at baseline, 6 and 12 months.

Energy expenditure at each gardening session.

Each study member completed an activity diary at the end of the gardening session. The information recorded includes the type of gardening activities and the duration. The bar chart below (*Figure 12*) showed that, on average, women burned approximately 520 Calories[1] per session (3 hours including a light lunch) at baseline, mostly from light-intensity activities (e.g. planting, potting, transplanting seedlings or plants) followed by moderate-intensity activities (e.g. planting crops or garden, digging, spading, filling garden, composting) and some vigorous intensity activities (e.g. digging, spading, filling garden, composting, pushing a wheelbarrow, vigorous effort). At 6 months, there was a 20% decline in calorie expenditure, which remained the same at 12 months. For men, 570 Calories burned per session at baseline, 600 Cal at 6 months (600 Cal) and remain the same 12 months (597 Cal); moderate intensity activities (e.g. trimming shrubs or trees, manual cutter, picking fruits/vegetables) were the main contributors to the total energy expenditure, followed by light (e.g. removing garden waste, cleaning gardening tools, tidying up shed, cleaning/sorting pots, general repair, painting) and vigorous activities (e.g. weeding, cultivating garden, using a hoe).

In summary, study members engaged in various physical activities at the garden in pairs or small groups according to their physical abilities.

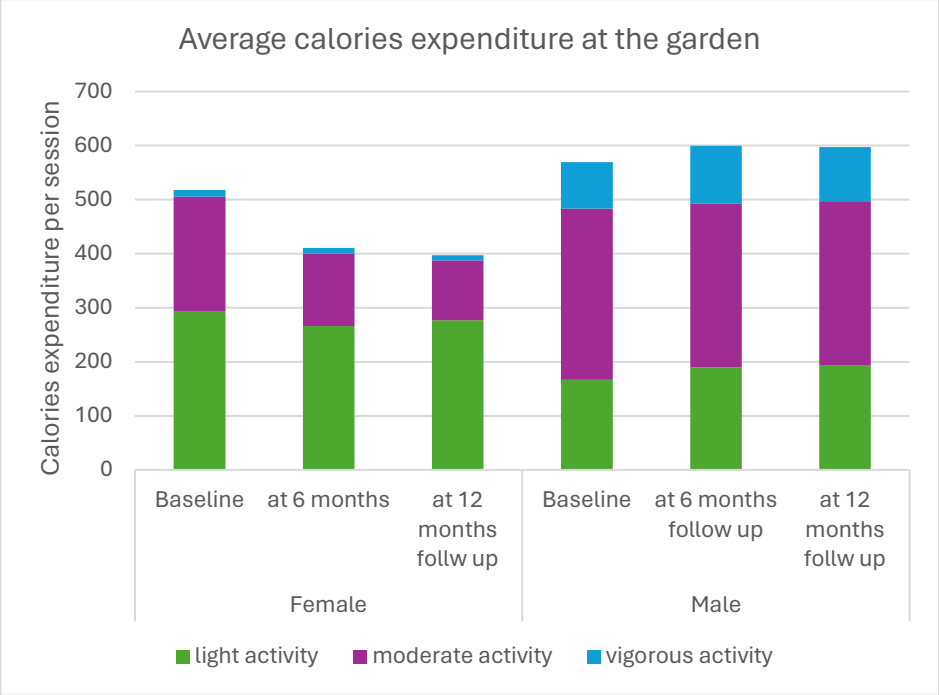


Figure 12: Average energy expenditure per gardening session at baseline, 6 and 12 months.

Acceptability of the programme

The programme's acceptability is determined using the attendance rate at six and twelve study duration. At six months, the average attendance percentage was 42%±26% for women and 36%±28%) for men. At twelve months, it was 35%±24% for women and 31%±27%.

[1] Two medium SunGold™ kiwifruit is approximately 100 calories.

Gardening experience

We interviewed 22 participants at six and 12 months about their gardening experience at Maunu Gardens. Overall, there were five main themes: Kotahitanga (togetherness), Manaakitanga (caring, support, hospitality), whakawhanaungatanga (process of establishing relationships), Ako (to learn) and Oranga (wellness, well-being, and good health).

Kotahitanga (togetherness)

All study participants expressed that they felt a sense of belonging, sense of being valued and a sense of community at Maunu Gardens. This was shared by those who live alone or with others, those whose personalities were more introverted, shy, or reserved, and those who like to connect, gather, and socialise. Of those who lived alone, one reported that the most important aspect of the project for them was the social contact.

> *"As part of the program, it was great to meet new people. Mostly I garden and maintain property alone. Please don't underestimate the social connection and sense of belonging. Mostly important for me was the social contact and to have a place to be on a certain day, at a certain time."* (Female, New Zealand European).

All respondents expressed that they enjoyed the social connectedness in the gardens. This included things like socialising, exchanging life experiences, exchanging recipes, making new friends, sharing a meal, and some referred to it as their safe place or happy place.

> *"I feel better since this project started as I have a place to go to. I look forward to coming here as normally I would be home alone."* (female Māori).

Manaakitanga (caring, support, hospitality)

Some participants enjoyed participating in the programme so much that they looked 'forward to going there all week'. These strong feelings or motivations to be at the garden were driven by having a sense of purpose to help others. In return, they felt the group appreciated and valued their contribution, making them feel happy. The participants also expressed that they felt respected, cared for and supported.

Manaakitanga is interviewed with whakawhanaungatanga. Participants expressed some concerns when starting the gardening programme. These concerns include their physical ability to participate in outdoor gardening activities; others were shy, worried, or unsure what to do on the day. Despite these, theparticipants were comfortable to carry on with the assurance from the Maunu garden team and the supportive environment in the garden.

> *"At first, I was [a]bit worried would I be able to do it but, by the end of the first day I saw how much I did, and I felt happy, and I realised I can do it."* (Female, Māori)

Concerns about physical ability were also raised at twelve months. Three of them reported that they were mindful of their physical limits and were more careful in the activities they were participating. We recorded four new concerns due to two of them having fallen, one reporting a

sore wrist and one a sore back. Nonetheless, they all enjoyed being in the gardens; they felt a sense of belonging and were valued, welcomed, respected, cared for, and supported.

> *"They [site coordinator and garden manager] know what I can do or can't do."* (Female, NZ European)

> *"This place is a lovely and friendly place. People are helpful. I like the community spirit."* (Female, NZ European)

The product of manaakitanga enables relationships to flourish, form new friendships or reconnect with family and whanau.

Whakawhanaungatanga (a process of establishing relationships)

In this project, the principle of whakawhanauagatanga converged from two pathways, i.e. reconnection with family and whenua, and forming new friendships. This was likely attributed to the recruitment approach driving the assumption that the participants have shared a common interest, i.e. gardening; no gardening experience was required, so they ranged from beginners to experienced gardeners. There was also the aspect of local networks inviting those who were perceived to be lonely. The weekly gardening session consisted of three time intervals: arrival and preparation for the day, gardening activities (including indoor activities, e.g. lunch preparation) and then shared lunch and departure time.

At the first interval, the participants are welcomed; they have time to settle in, chat amongst themselves, get comfortable, have a cup of tea and prepare for their activities of the day.

> *"Vibrant environment, sometimes there is lots of people coming meeting old friends and mixing with close whanau."* (Female, Māori)

Two hours were allocated for gardening time. Activities varied from preparing lunch, cleaning indoors, sitting down activities such as preparing seedlings, trimming flowers, weeding; others using heavy tools for digging and preparing the soil, planting, harvesting, cleaning the yard and or constructing garden boxes, tables, chairs etc. The garden manager reviewed the weekly activities with the site coordinator and each member participants in the activities according to their ability. Activities were done in groups, but they were still allowed to work autonomously if preferred.

> *"I enjoy all of the gardening processes involved from the start of digging the soil to harvesting the fruit and vegetables. I feel … sense of achievement. I definitely enjoyed the social interaction here."* (Female, NZ European)

The participants prepared a shared lunch; the study provided ingredients, but they also improvised with ingredients harvested on-site and/or with cooked meals they brought from home.

> *"I enjoy meeting new people, finding out about them, like which tribe they are from and stuff like that. I enjoy socialising, and I enjoy lunch too."* (Male, Māori)

The positive social aspects or the whakawhanaungatanga experienced by the participants were attributed to over half of them saying they had improved mental health at both six and twelve months' time points.

> *"I made a wonderful connection with people here at the gardens and on the project. Devoted friendships and sense of belonging."* (Female, NZ European)

> *"I live alone and here I have friends and nice people to talk to."* (Male NZ European)

> *"My mental health is better since coming here because people here like me and appreciate me."* (Female, NZ European)

The three themes discussed activate older persons' intrinsic (feel good, enjoyment) and extrinsic (improved health) motivation, and this is done through learning for the groups.

Ako (to learn)

Fifteen participants commented on learning something new, exchanging/sharing knowledge, skills and/or experiences, which can be divided into ways of learning and their perceived benefits. Learning is through sharing experiences and doing things together.

> *"I like being here, talking to sensible people, exchanging experiences."* (Male, NZ European)

> *"I like the fact that there are Pakeha and Māori participants in this program as we all can learn from each other."* (Female, Māori)

Another participant recalled a happy memory involving learning to garden with his spouse.

> *"When I was young, I didn't take much interest in gardening. I liked to fix things more but with my wife I learned and started to enjoy gardening." (*Male, NZ European)

One older participant commented on the benefit of learning at the garden, which improved her mental health.

> *"My mental health is better because I have been coming here. I'm learning more stuff about plants, how to plant, where etc., also I like exchanging food recipes and stuff."* (female, Māori)

Oranga (wellness, well-being, and good health)

Many factors impact well-being. Oranga encapsulates whakawhanaungatanga, kotahitanga, manaakitanga, and ako, which was previously discussed. This section will cover me kori tonu (be active), and me aro tonu (take notice), which many mentioned as positively impacting oranga.

Me kori tonu (be active) requires an activity that one enjoys. Gardening is the physical activity they enjoy. Gardening involves physical movement of the body and has different difficulty levels, so gardening is suited for all states of wellness, well-being or good health.

> *"I feel more physically fit. By participating at the Maunu gardens, I am stronger and fitter so now I have a wooden garden box at home which I can manage and maintain by myself.*

> *Gardening is like a gym, you are doing many physical activities, exercising, but it's better because it's something you like to do. I like to watch plants grow."* (Female, Māori)
>
> *"Yes, it [gardening] is like a gym. Moving and walking is like cardio, weeding is a bit like lifting weights so yes, it is like being in the gym, just outside."* (Female, Māori)

Me aro tonu (take notice) requires spending time outdoors. This gardening project was mostly outdoors. The participants enjoyed being in nature, smelling fresh air, feeling the warmth of the sun, watching plants grow, and listening to the birds. Most of them found this was peaceful, relaxing or rejuvenating, or it recharged them.

> *"I feel relaxed, peaceful, I am enjoying myself, I feel happy and fulfilled when I am gardening. I like to dig the soil, re-energise the ground and put a good vibe in it. I feel positively recharged just being in the garden and I do whatever needs to be done."* (Female, Māori)
>
> *"I enjoy moving plants around the garden, tasting, putting my hands in the dirt, getting lots of sun, vitamin D, visualising the beauty of plants, communicating to the plants and trees, surrounding the garden, animals, bird song. I love learning from others about gardening secrets and new natural way of pest control."* (Female, Māori/NZ European)

We did not receive comments that the gardening activities, whether indoor or outdoor activities were a chore. However, participants did find completing the gardening diary to be challenging.

Overall, the findings from this study suggest that the AWinOG programme creates a feedback loop between intrinsic and extrinsic motivation catalysed by whakawhanaungatanga, manaakitanga, and kotahitanga.

Summary

This research aims to explore the feasibility of recruiting those who are lonely/socially isolated and to explore the impact of outdoor gardening on physical and psychosocial functioning in older adults.

The study recruited a high proportion of lonely older adults in this research project. This is likely attributed to the engagement with local communities in identifying those at risk of loneliness. The research team observed a mixed impact of gardening activities on physical and psychosocial functioning, with a larger impact on the psychosocial aspect than physical functioning. The open-question interview on gardening experience offered insights into these findings. The concepts of whakawhanaungatanga, kotahitanga, and manaakitanga seem to drive physical and cognitive functioning.

The small sample size that completed the 12 months assessment preclude the study from inferring the impact of outdoor gardening on physical and cognitive functioning from a statistical approach. However, this study provides trends on selected measurable health functions that might look like over 12 months. The study eligibility criteria are broad, i.e. everyone aged 50 years and over, with no restrictions on health status, physical ability, or gardening experience. The heterogeneity of the study sample reflects a real-world community,

with success in reaching out to those who are lonely/socially isolated. Further research is warranted to corroborate evidence on the impact of gardening in mitigating adverse physical and cognitive health outcomes.

We found the interview and physical assessments were acceptable to this age group, and attendance to the programme was reasonable with wide variation. This is not unexpected considering the nature of the weather-dependent programme and the precautionary measures older persons are practising during the COVID-19 pandemic.

Conclusions

The AWinOG programme, in partnership with local community networks, could help mitigate health risks and optimise vitality in older adults. The psychosocial aspect of health, underpinned by whakawhanaungatanga, kotahitanga, and manaakitanga, is a pathway to maintain physical and cognitive functions in older Māori and nonMāori.

Our findings add to existing evidence that the local networks have insights into local needs, especially older adults at risk of loneliness. In addition to the known disparities in accessing health care that persist into old age, the primary healthcare sector is currently overwhelmed by a low GP-to-patient ratio and faces more complex health conditions. This calls for a more all-encompassing healthcare system with meaningful partnerships with local communities.

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