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Opportunities to be active in retirement villages and factors associated with physical activity in residents

Aoi Yoshihara[A], Katherine Bloomfield[A,B,C,*], Zhenqiang Wu[A], Annie Tatton[B], Joanna Hikaka[A], Michal Boyd[A], Kathy Peri[A] and Martin J. Connolly[A,B]

For full list of author affiliations and declarations see end of paper

*Correspondence to:
Katherine Bloomfield
Waitematā Clinical Campus, North Shore Hospital, PO Box 93503, Takapuna, Auckland 0740, New Zealand
Email:
Katherine.bloomfield@waitematadhb.govt.nz

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ABSTRACT

Introduction. Physical activity (PA) in older people is associated with improved morbidity and mortality outcomes. Increasing numbers of older people are choosing to live in retirement villages, many of which promote themselves as providing opportunities for activity. **Aim.** To explore the characteristics of PA village residents were undertaking and the associated individual and village factors. **Methods.** Health, functional and wellbeing information was collected from 577 residents recruited from 34 villages in Auckland, New Zealand, using an International Resident Assessment Instrument and customised survey tools containing items on self-reported PA. Managers from villages completed a survey on village characteristics and facilities. **Results.** The mean age (s.d.) of village residents was 82 (7) years, and 325 (56%) reporting doing one or more hours of PA in the 3 days prior to assessment. Moderate exercise was performed by 240 (42%) village residents, for a mean (s.d.) of 2.7 (3.4) h per week. The most common activities provided by villages included: bowls/petanque (22, 65%) and exercise classes (22, 65%), and walking was the most common activity undertaken (348, 60%). Factors independently associated with PA included individual factors (gender, fatigue, constipation, self-reported health, number of medications, moving to village for safety and security, utilising village fitness programme, use of the internet, and satisfaction with opportunities to be active) and village-related factors (access to unit, and ownership model). **Discussion.** PA uptake is determined by many factors at both personal (physical and psychosocial) and environmental levels. Clinicians should focus on individualised PA promotion in those with identified risk factors for low levels of PA.

Keywords: ageing exercise, facilities, housing for the elderly, independent living.

Introduction

The benefits of physical activity (PA) are myriad, with an active lifestyle associated with reduced mortality, morbidity and increased wellbeing.[1,2] Recommendations for older adult exercise include five sessions of aerobic activity, two strengthening and three sessions of balance/flexibility training per week.[3] However, only a small proportion of older adults meet recommendations.[4,5] Although multiple barriers to engaging in PA have been identified, including personal and environmental influences,[6,7] their impact on specific populations requires further exploration and validation.

Retirement villages are an attractive option for older adults, with approximately 14% of those aged ≥75 years residing in villages in New Zealand (NZ) in 2020,[8] many offering a range of on-site recreational opportunities for residents to participate in. Villages potentially address some of the documented barriers to older adults engaging in PA, such as provision of on-site facilities reducing need for transportation, security and proximity to peers to exercise with.[9]

Although there is some literature around PA uptake in Australian villages and related US communities,[10–13] as far as we are aware, there is no specific research into PA in NZ villages, and little analysis exploring the health, wellbeing and environmental factors that may influence PA in these communities, in NZ or elsewhere.

WHAT GAP THIS FILLS

What is already known: Promotion of physical activity (PA) is essential for primary and secondary prevention of multiple health conditions across the life span. Multiple factors influence physical activity uptake in older people living in the general community. In the retirement village setting, opportunities for activity are present, potentially reducing some barriers to activity.

What this study adds: Despite many opportunities to be active, many New Zealand retirement village residents are likely not meeting recommended activity levels. Several individual health and psychological factors were associated with activity, not all consistent with prior studies of community-dwelling older people. Retirement village structural factors and ownership models were associated with activity levels in residents. Clinicians should target individualised PA discussions to older adults with risk factors identified in this study such as female gender, fatigue and poor self-reported health.

We wished to investigate what opportunities to be active were available to older adults residing in NZ villages, hypothesising that there would be ample. Based on this hypothesis, and the assumption that these opportunities would reduce some barriers to PA uptake, we wished to explore the characteristics of PA village residents were undertaking and the associated individual and village factors.

Methods

Study design

This is a cross-sectional analysis of participants from the baseline assessment of the multi-phased 'Older People in Retirement Village Study', which included a randomised controlled trial (RCT). Detailed methodology and baseline findings are described elsewhere,[13,14] and briefly below. NZ Health and Disability ethical approval was obtained (Ref 16/CEN/34).

Setting and participants

Overall, 65 retirement villages were in operation in Waitematā and Auckland District Health Boards during the study period (July 2016–September 2018) and were eligible to participate. Gerontology Nurse Specialists (GNS) recruited individual village managers who completed a village characteristics survey. Recruitment occurred by random sampling and volunteers.[13,15] Sampled residents were approached by door knocking of randomly selected units/apartments. Volunteers were recruited by meetings, village notices, door-knocks and word-of-mouth. Residents were excluded if they were unable to give written informed consent or thought to lack capacity to consent (Addenbrookes Cognitive Assessment Revised <65,[16] or to possibly lack capacity to consent as per GNS, general practitioner or village manager), in keeping with NZ legislation. All participants gave written, informed consent.

Variables, data sources/measurement

Village managers completed a customised questionnaire assessing size, ownership, structure and facilities of the village, including opportunities for PA. GNSs facilitated an international Resident Assessment Instrument (interRAI)-Community Health Assessment (CHA) with participating residents. InterRAI consists of a series of standardised tools containing multiple items assessing an individual's health, functional, social and psychological needs.[17] The interRAI tools are used in different healthcare settings in NZ and internationally. In NZ, the interRAI assessment is mandatory for all community-dwelling older people requiring government-funded supports and those residing in aged residential care, and are increasingly used across other aspects of the health system, allowing for standardisation across health and functional assessments. The interRAI-CHA tool is designed for use in community-dwelling individuals.[18] Participants also completed a customised survey assessing other demographic items, factors considered important when moving into a village and satisfaction with, and participation in, aspects of village life.

PA was documented in these two assessment tools in several ways. An interRAI-CHA item documented self-reported PA performed within the 3 days before assessment (exercise that involved at least moderate activity, such as walking outdoors, swimming, exercise with machines; categorised as none, <1 h, 1–2 h, 3–4 h, >4 h). There are no other PA items within the interRAI-CHA tool. For purpose of analysis, researchers dichotomised residents into those less active (0–<1 h PA in last 3 days) and those more active (≥ 1 h PA in last 3 days). Within the customised survey, participants indicated how many hours per week they performed moderate intensity activity (defined as 'activities that cause a small increase in breathing or heart rate such as brisk walking, swimming, cycling for at least 10 min continuously') or high intensity activity (defined as 'activities that cause large increases in breathing or heart rate, like running or football for at least 10 min continuously'). Participants indicated which PA they usually performed from a range of options.

Study size

Sample size of the study population was determined as per power requirements of the RCT phase of study,[13] indicating a total of 575 residents would be required in the baseline survey phase.

Quantitative variables and statistical analyses

Continuous and categorical variables were documented as mean (standard deviation, s.d.) and *n* (%), respectively. The residents' socio-demographics, health status and retirement village environment characteristics (Supplementary Table S1) between the less active (0–<1 h in last 3 days) and active (≥1 h in last 3 days) groups were compared using Student's *t*-tests or Chi-squared tests. Multivariable logistic regression analysis with odds ratios (ORs) and 95% confidence intervals (CIs) were used to identify covariables that were independently associated with PA. The pre-specified covariables (Supplementary Table S2) included demographics, those found to be significant in prior studies,[6,7,19] and those considered important by the research team and found to be significant on univariate analyses.[6,7,19] Variables were excluded from analyses if >5% was missing to improve internal validity. A two-sided $P < 0.05$ was considered statistically significant. All analyses were performed with SAS 9.4 software (SAS Institute Inc., Cary, NC, USA).

Results

Thirty-four villages and 578 resident participants were recruited (Fig. 1). interRAI data were available for 577 participants. Mean (s.d.) age was 81 (7) years at baseline, 419 (73%) were female and 557 (97%) were European, 8 Asian (1%), 7 Māori (1%), 1 Pasifika (0.2%) and 4 (0.7%) other ethnicities. Other health and demographic information is found elsewhere[14] and summarised in Supplementary Table S1.

The most common outdoor opportunities offered by villages included bowls or petanque (65%) and walking groups (59%). Common indoor activities included exercise classes (65%), and fitness gym classes (59%) (Table 1).

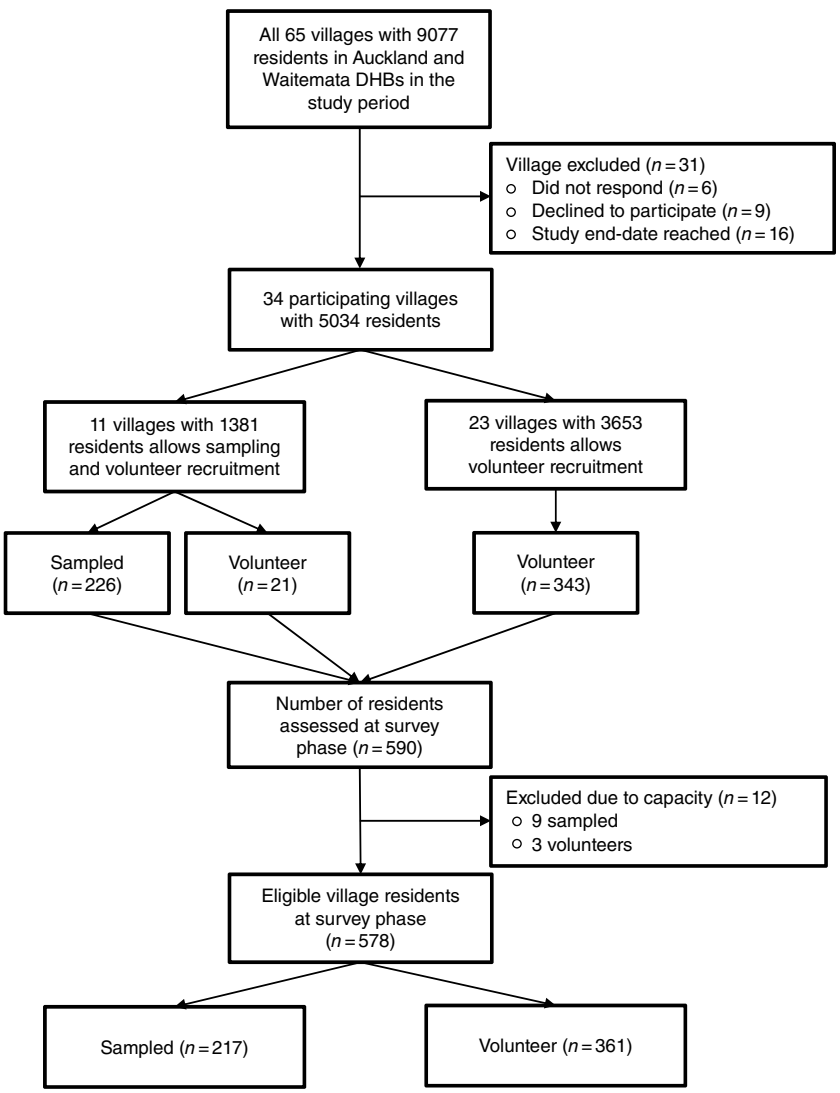

Fig. 1. Flow diagram of retirement village and participant recruitment.

Table 1. Opportunities for activity within participating retirement villages.

Activity	Villages (*n* = 34)
Outdoor facilities, *n* (%)	
Bowling green/petanque	20 (59)
Mini-golf/putting green	5 (15)
Tennis court	1 (3)
Vegetable gardens	15 (44)
Other facilities	8 (24)
Indoor facilities, *n* (%)	
Community function room	27 (79)
Gym/fitness centre	21 (62)
Swimming pool/spa pool	18 (53)
Other indoor facility	13 (38)
Organised outdoor exercise opportunities/groups available, *n* (%)	
Walking group	20 (59)
Bowls/petanque	22 (65)
Mini-golf	4 (12)
Nordic walking	1 (3)
Other outdoor exercise	17 (50)
Organised indoor exercise opportunities/groups available, *n* (%)	
Exercise classes	22 (65)
Tai chi sessions	19 (56)
Yoga sessions	8 (24)
Fitness gym classes	20 (59)
Dancing	13 (38)
Swimming club	8 (24)
Aquarobics sessions	10 (29)
Other indoor exercise	16 (47)

Table 2. Type of physical activity and total hours of exercise performed by village residents.

Physical activity	Residents (*n* = 577)
Type of physical activity, *n* (%)	
Walking	348 (6)
Village fitness programme or similar	192 (3)
Sport (golf, bowls, croquet, swimming)	176 (29)
Relaxation exercise (yoga, tai chi)	98 (17)
Gardening	119 (21)
Other	81 (14)
Total hours of exercise in the last 3 days, *n* (%)	
None	87 (15)
<1	164 (28)
1–2	166 (29)
3–4	118 (20)
>4h	42 (7)

In the 3 days prior to assessment, 252 (44%) performed less than 1 h of activity and 325 (56%) performed ≥1 h. Types and hours of PA performed are shown in Table 2. In a typical week, 240 (42%) residents reported performing a mean (s.d.) of 2.7 (3.4) h of moderate exercise and 30 (5%) reported performing a mean (s.d.) of 3.0 (3.9) h of high-intensity activity per week. The demographic, health, psychosocial and environmental characteristics between the less and more active groups are shown in Supplementary Table S1, with multiple health, psychosocial and village characteristics significantly different between groups in univariate analysis. The following factors were independently associated with being less likely to perform >1 h of PA in the last 3 days in multivariable logistic regression analysis (Table 3): female gender, minimal–severe fatigue, access to residence from outdoors only, residents not taking part in village fitness programs, number of medications and those residing in villages owned by private individuals or partnerships. Factors independently associated with being more likely to do >1 h PA in the last 3 days (Table 3) include: previous but not active constipation, excellent self-rated health, security and safety a factor in originally moving to the village, finding 'satisfaction with opportunities to be active' not relevant to them, and using the internet with some help (Table 3, Supplementary Table S2).

Discussion

This report adds to the literature on PA in NZ older adults and is the first NZ study analysing PA in retirement village residents, with corresponding detailed health and social information in the context of the village environment. Most villages provide a variety of opportunities for PA, with most residents regularly walking and just over half reporting ≥1 h of activity in the 3 days prior to assessment. For many of these individuals, the village environment is one that likely meets their needs in maintaining PA. In the context of an environment relatively rich in opportunities, a combination of person-specific health and wellbeing factors and factors associated with the village environment were associated with PA participation. This finding of seemingly disparate significant factors illustrates the complexity and multifaceted influences at play in PA uptake in older adults.

Over 40% of residents reported participating in regular moderate-intensity exercise at a mean of 2.7 h per week, *suggesting* at least half of these residents are likely achieving recommended PA levels. However, given 60% did not report moderate-intensity exercise at all, and 15% reported doing

Table 3. Multivariable analysis of factors significantly associated with ≥1-h physical activity in the last 3 days.

Variable	Odds ratio (95% CI), *P*	*P* for overall effect
Gender		0.007
Female	0.46 (0.26, 0.81), 0.007	
Male	1.00 (ref)	
Constipation		0.046
Not present	1.00 (ref)	
Present but not exhibited in the last 3 days	2.13 (1.02, 4.45), 0.04	
Exhibited on 1, 2 or 3 of the last 3 days	0.55 (0.20, 1.51), 0.24	
Fatigue: inability to complete normal daily activities		<0.001
None	1.00 (ref)	
Minimal	0.34 (0.21, 0.55), <0.001	
Moderate to severe	0.11 (0.04, 0.27), <0.001	
Self-reported health		0.006
Poor or fair	1.00 (ref)	
Good	1.43 (0.78, 2.62), 0.25	
Excellent	8.39 (2.26, 31.10), 0.008	
Access to residence		0.008
From outdoors (only)	0.51 (0.31, 0.84), 0.008	
Includes internal access; for example, from atrium or corridor	1.00 (ref)	
Security and safety was a factor in moving to village		0.03
Yes	1.63 (1.05, 2.54), 0.03	
No	1.00 (ref)	
Satisfaction with opportunities to be active		0.04
Very dissatisfied/dissatisfied/neutral	2.02 (0.86, 4.78), 0.11	
Satisfied	1.02 (0.60, 1.74), 0.93	
Very satisfied	1.00 (ref)	
Not relevant	5.13 (1.34, 19.60), 0.02	
Take part in village fitness programme or similar		0.007
No	0.51 (0.32, 0.84), 0.007	
Yes	1.00 (ref)	
Number of regular medications (interRAI)	0.89 (0.81, 0.97), 0.01	0.01
Use of internet		0.02
Use the internet without help	1.00 (ref)	
Use the internet with some help	2.77 (1.15, 6.69), 0.02	
Do not use the internet	0.76 (0.43, 1.35), 0.35	
Village owner/operator		0.007
A private company	1.00 (ref)	
A registered charitable, not-for-profit, trust	1.06 (0.57, 1.95), 0.86	
Owned by a private individual/partnership	0.19 (0.07, 0.54), 0.002	

95% CI, 95% confidence interval; interRAI, international Resident Assessment Instrument; ref, reference. The full results of the multivariable regression analysis are reported in Supplementary Table S2.

no activities in the 3 days prior to assessment, it is likely that many residents are not meeting recommendations despite opportunities for activity present within villages. This is consistent with reports of low levels of both measured and self-reported activity levels in village residents in Australia, which is similar to findings from retirement facilities in the United States (US) and community-dwellers elsewhere.[4,5,20,21] In the general community-dwelling older adult NZ population (aged ≥60 years), 46% reported performing minimum PA recommendations; one-fifth were found to be physically inactive, defined as engaging in <30 min of physical activity per week.[5] Although we cannot directly compare to this latter study due to the different measurements used, it appears that despite residing close to PA opportunities, fewer residents in our study are reaching guideline recommendations. This may not be surprising given the older median age in our population.

Our earlier work found almost 20% of residents were moderate–severely frail.[22] Guidelines state that for those living with frailty, recommendations be adjusted to the individual, advising limiting sedentary behaviour as much as possible,[3] so although many residents may not be meeting quantified activity targets, some residents may still be reaching their individualised targets. Further specific study would be required to confirm this; that is, investigating overall sedentary/non-sedentary time, including other daily task-based activities (known to be an important provision of activity with ageing) and considering the individual's PA targets based on function and frailty. Daily task activity was not measured in our study; however, 34% of our participants received home supports, which would include options such as housework provision.[14] A US study in a similar residential setting found that the provision of greater resident assistance potentially increased sedentary time.[23] The age and functional range of residents potentially presents a challenge to villages in terms of delivering programmes that meet the needs of all residents.

Older adult engagement in PA is complicated by multiple synergistically interacting personal, interpersonal, and environmental barriers and enablers in the community setting, as shown in previous studies, in addition to that reported here.[6,7,12,20,24–27] However, in our study with proximity to PA opportunities, potential to engage in PA with peers, and potentially less security concerns within a village, one might assume that there would be fewer or differing barriers for those residing in villages. Within this context, a range of individual, symptom-related and village-related factors were found to be significantly associated with PA in our study. Some of these findings were consistent with prior publications in other populations (female gender, number of medications, self-rated health), whereas others are new findings (eg village ownership/unit access).

With PA being integral to primary and secondary prevention of multiple conditions and symptoms, including falls and frailty in the older adult population, it is an essential part of clinical recommendations and management. Despite this, evidence from NZ suggests older adults are less likely to have been advised on PA than other adults.[28] Having an understanding of the complex factors at play is important when encouraging older adults to engage in PA. Clinicians should target PA discussions to those with these known risk factors, such as female gender. Clinical symptoms are also known to have a relationship to PA uptake. Unlike some studies, although we found no relationship with cardiac symptoms or pain, we did find a relationship with fatigue. Although the direction of these relationships is unclear, this should highlight to clinicians the importance of addressing specific symptoms, intervening on them where possible, and discussing the pros and cons of PA in the context of the overall medical health of the individual patient.

The retirement village industry could also take note of these results, including the potential influence of ownership models, structure of units and facilitation of fitness programme participation. For example, what is it about partnership/individually owned facilities that mean residents here are less likely to engage in >1 h of activity per week? Environmental factors thought to be important include proximity to resources and public transport, neighbourhood security, diversity in environment and the presence of green space.[12,20,24,26,27] Some of these environmental barriers can be eliminated or at least reduced in the retirement village setting. Although these village factors are seemingly specific to the village industry, they also indicate the importance of wider environmental and cultural factors in our general population.

Limitations

The cross-sectional nature of this study means we cannot establish causality in relationships. This study was not originally designed specifically to assess PA in detail and the items used to measure PA in this study make it difficult to compare to other studies. Activity is self-reported and some data are based on the last 3 days of activity only; therefore, is not necessarily representative of usual weekly activity. However, it is likely to be a relatively accurate representation of recent activity, with fewer issues of reporting/recall bias. We used those reporting zero or less than 0 h PA in the previous 3 days to identify the less active, based on clinical expertise, and presume these participants are less likely to be meeting recommended PA levels in general; however, this may not be an accurate assumption. PA in the context of use of public transport, proximity of the village to public transport, and other neighbourhood facilities could not be meaningfully analysed as many of these items were omitted by village managers completing the village survey. Other potentially relevant information including the physical size of the village, structure of units (eg apartment blocks or freestanding ground-level units), availability of open/green space or physical space in the surrounding neighbourhood

was not collected. We had issues recruiting a random sample of residents,[16] and residents with cognitive impairment were excluded.

Our results highlight where further research is required. As above, this includes the collection of detailed activity/sedentary time in relation to an individual's functional ability or frailty, and further exploring this subpopulation's views on barriers/facilitators and perceived risks and benefits of PA. Investigating wider social and cultural influences of PA engagement in this way could inform potential interventions and policy in promoting an active lifestyle. Investigating whether retirement villages meet the needs of the more frail/functionally impaired in terms of types of PA would be beneficial here. Villages themselves maybe an ideal environment in which to develop multi-faceted interventions targeted at older people.

Conclusion

Despite residents living in environments enriched with opportunities for PA, many residents are likely not meeting PA recommendations. A combination of individual factors and village-related factors were associated with PA of residents, illustrating the complexity of potential barriers and facilitators to the uptake of PA. In terms of the facility-level factors identified here, these results are important for individuals exploring village options, the village industry and groups active in housing for older people. Although clinicians should encourage PA in all patients, these results suggest focusing efforts on encouraging PA in older adults with identified risk factors, such as female gender, active symptoms, and poor self-rated health. Those living with frailty and functional impairment should not be forgotten; PA should still be encouraged with individualised recommendations.

Supplementary material

Supplementary material is available online.

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Data availability. The data that support this study cannot be publicly shared due to ethical or privacy reasons and may be shared upon reasonable request to the corresponding author if appropriate.

Conflicts of interest. AT was employed by Waitematā District Health Board (WDHB) for the duration of this project. KB and MC work, or have worked, clinically for WDHB; however, they are not employed directly by WDHB. The authors have no other conflicts of interest to declare. The study funders had no role in the design, data collection, analysis/interpretation or writing of this manuscript nor influenced the decision to submit the final manuscript.

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Author affiliations
[A]Faculty of Medicine and Health Sciences, University of Auckland, Auckland, New Zealand.
[B]Older Adult Services, Waitematā District Health Board, Auckland, New Zealand.
[C]Waitematā Clinical Campus, North Shore Hospital, PO Box 93503, Takapuna, Auckland 0740, New Zealand.