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Evaluating the effects of a physical activity on agitation and wandering (PAAW) experienced by individuals living with a dementia in care homes

Victoria Traynor

University of Wollongong, vtraynor@uow.edu.au

Nadine S. Veerhuis

University of Wollongong, nadinev@uow.edu.au

Keryn M. Johnson

University of Wollongong, kerynj@uow.edu.au

Jessica Hazelton

University of Wollongong, jesshaz@uow.edu.au

Shiva Gopalan

Warrigal Care

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Abstract

Aim and Methods: The aim was to evaluate the implementation of a structured physical activity (PA) programme for individuals living with a dementia in care homes. More specifically, the study aimed to test the effects on the behavioural and psychological symptoms of dementia (BPSD) using the Cohen-Mansfield Agitation Inventory and Algate Wandering Scale. The study was undertaken over 16 weeks using a quasi-experimental design. Registered nurses, physiotherapists, assistants in nursing and physiotherapy aids from one aged care organisation in NSW, Australia, undertook the study with academics.

Results: A total of 72 individuals living with a dementia from four care homes participated. Implementation of the structured PA programme generated statistically significant findings with reductions in agitation ($p < 0.001$) and eloping ($p = 0.001$) achieved for individuals living with a dementia in care homes.

Conclusions: Physiotherapists and exercise physiologists can complement nursing-focused care teams and contribute to a holistic model of care for individuals living with dementia in care homes. The study demonstrated how a structured PA programme positively affected the levels of agitation and wandering experienced by individuals living with a dementia. Individuals living with a dementia in care homes who participated in a structured PA experienced positive outcomes from the programme. The findings demonstrated that they benefited from the programme and PA should be promoted for this group just as it is for other population groups, including general populations of older people.

Disciplines

Medicine and Health Sciences | Social and Behavioral Sciences

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**Evaluating the Effects of a Physical Activity on Agitation and Wandering (PAAW)
Experienced by Individuals Living with a Dementia in Care Homes**

Authors

Victoria Traynor¹ PhD BSc (Nursing Studies) Hons Registered General Nurse

Keryn Johnson¹ PhD Master in Public Health Registered Physiotherapist

Nadine Veerhuis¹ Bachelor of Public Health

Jessica Hazelton¹ Bachelor of Psychology (Honours)

Shiva Gopalan² Bachelor of Applied Science (Physiotherapy) Registered Physiotherapist

¹ School of Nursing, University of Wollongong, NSW, Australia.

² Lifestyle and Wellness Management, Warrigal, NSW, Australia.

Dr Victoria Traynor, Associate Professor with 25 years of experience working aged and dementia care. Victoria is the founding Director of the Aged and Dementia Health Education and Research (ADHERE) centre which leads inter-disciplinary research generating evidence in gerontological studies with a focus on transforming the lives of older people and family carers through the implementation of evidence based care. Highlights from the outputs of ADHERE are developing a Dementia and Driving Decision Aid (DDDA) for consumers and family carers and developing interactive online and face-to-face workshops on a range of person centred care topics for aged care nursing. Victoria also developed the first national Delirium Care Pathways in Australia.

Dr Keryn Johnson is Lecturer and a physiotherapist with over 35 years of experience working. Keryn works in aged care and her focus is on enabling older people living in retirement villages and care homes to adopt healthy lifestyles. Keryn adopts health behaviour change theory to develop effective strategies to improve the lives of older people. Keryn's passion is translating evidence based practice in policy and practice.

Nadine Veerhuis has a public health background and brings a crucial and complementary perspective to the Aged and Dementia Health Education and Research (ADHERE) team. Nadine continually challenges stereotyping about ageing and the stigma associated with

living with a dementia for consumers and family carers. Most recently, Nadine was the project manager for developing the Dementia and Driving Decision Aid (DDDA) for consumers and family carers. Nadine's passion is for developing health education and promotion resources for older people, in particular and individuals living with a dementia which are relevant, accessible and usable. Nadine also develops health education and health promotion plans which can be implemented across services acknowledging the interconnectedness of healthcare disciplines and services.

Jessica Hazelton has a background in psychology, with a keen interest in neuropsychology. In particular, Jessica's passion is in investigating the impact of frontotemporal dementia on social cognition, and the effect these changes have on those affected and their families. Jessica is regular Blog contributor to raise awareness about new ways of thinking about the impact of dementia on individuals.

Shiva Gopalan is a physiotherapist with 10 years of experience specialising in aged care. Shiva is the manager of the wellness and lifestyle services for a regional aged care provider across. Shiva's focus is on developing services which promote healthy lifestyles for the clients who live in the retirement villages and care homes. What drives Shiva is designing innovative ways to deliver age care services. He especially emphasizes how to enable individuals living with a dementia from culturally and linguistically diverse communities to fully participate in the communities they live.

Acknowledgments and funding

The clients and staff who participated in this study were crucial to its success. The clients were willing to 'have a go' at a new exercise intervention in their care home and the commitment of staff to the project on top of their usual duties ensured the researchers were able to deliver the intervention in the timeframe required and within the allocated resources. University of Wollongong and Warrigal funded this study.

Evaluating the Effects of a Physical Activity on Agitation and Wandering (PAAW) Experienced by Individuals Living with a Dementia in Care Homes

Abstract

Aims

To evaluate the implementation of a structured physical activity (PA) program for individuals living with a dementia in care homes. More specifically, test the effects on the behavioural and psychological symptoms of dementia (BPSD) using the Cohen-Mansfield Agitation Inventory and Algase Wandering Scale. The study was undertaken over 16-weeks using a quasi-experimental design. Registered nurses, physiotherapists, assistants in nursing and physiotherapy aids from one aged care organisation in NSW, Australia undertook the study with academics.

Major findings

A total of 72 individuals living with a dementia from four care homes participated. Implementation of the structured PA program generated statistically significant findings with reductions in agitation ($p < .001$) and eloping ($p = .001$) achieved for individuals living with a dementia in care homes.

Conclusions

Physiotherapists and exercise physiologists can complement nursing focused care teams and contribute to an holistic model of care for individuals living with dementia in care homes. The study demonstrated how a structured PA program positively effected the levels of agitation and wandering experienced by individuals living with a dementia. Individuals living with a dementia in care homes who participated in a structured PA experienced positive outcomes from the program. The findings demonstrated that they benefited from the program and PA should be promoted for this group just as it is for other population groups, including general populations of older people.

Keywords

Psychosocial factors, Dementia, Exercise, Interdisciplinary health team, Nursing homes.

Introduction

Dementia poses a serious global public health challenge, with an estimated 35.6 million individuals estimated to be living with a dementia in 2010, and numbers expected to double every 20 years (Prince et al., 2013). The incidence and prevalence of dementia in Australia is similar to that experienced in other Western countries. In 2011, 9% of Australians over 65 (one in every 11) were estimated to be living with a form of dementia (Australian Institute of Health and Welfare, 2012; Cognitive Decline Partnership Centre, 2016). Approximately 63% of individuals living with a dementia in Australia are living in care homes, with this trend expected to increase (Australian Institute of Health and Welfare, 2012).

Aims

The aims of the study were to: (1) pilot a structured physical activity (PA) program using 'in house' resources, consisting of the physiotherapists, physiotherapy aides and diversional therapists already employed by the host care home, to deliver the structured PA program to individuals living with a dementia and (2) evaluate the effects of the structured PA program on agitation, wandering, quality of life and mobility of individuals living with a dementia in the care homes. In this paper, the outcomes on agitation and wandering are reported.

Literature review

This study built on audits of physical activity levels in which it was demonstrated that wholly unsatisfactory levels physical activity are experienced by older people in care homes, with 79 per cent of their time spent sedentary (Barber, Forster & Birch, 2015). For individuals living with a dementia it is worse with them experiencing an average of only 1-2 physical activity events per day, for example, walking to the dining room or to an outside area of the care home where they live (Devries & Traynor, 2012). When the evidence is indubitable about the benefits of PA for all population groups, this lack of PA for individuals living with dementia in care homes is unacceptable. Also, we can assume from these findings that individuals living with a dementia in care homes never or rarely participate in a structured PA program. An intervention study was designed to address this issue and evaluate the effects of providing individuals living with a dementia in care homes participating in a structured PA program.

Regular physical activity (PA) is increasingly recognised as beneficial for managing and preventing, or slowing the progression of symptoms and complications of chronic health conditions, including dementia. Systematic reviews investigating the use of structured PA programs for individuals living with dementia have shown positive associations with improvements in cognition (Brett, Traynor & Stapley, 2015) and performance of activities of daily living (Forbes, Forbes, Blake, Theisen & Forbes, 2015). However, there is little evidence specifically how exercise reduces the expression of unmet needs, such as agitation, anxiety, depression, and wandering by individuals living with a dementia (Brett et al., 2015; Forbes et al., 2015). For these interventions to be sustainable, it is important that they are practical and can be delivered within current constraints and resources of care home systems. Successful interventions become sustainable if they are feasible without additional staff or resources (Yost, Gannon, Thompson, et al., 2015). This study contributed to these goals by implementing and evaluating an intervention using the usual staff and outcome measures already accepted as clinical assessment tools in the participating care homes.

The expression of unmet needs in dementia care (sometimes referred to as Behavioural and Psychological Symptoms of Dementia (BPSD)) are common among individuals living with a dementia in care homes (Brodaty, Draper, Saab et al., 2011). Expressions of unmet needs are also associated with poor quality of life in the individuals living with a dementia (Beerens, Zwakhalen, Verbeek, Ruwaard, Hamers, 2013), family carer burden (Pinquart & Sorenson 2003) and staff stress (Brodaty, Draper & Low, 2003). Interventions aimed at reducing these distressing experiences in care homes can contribute towards improving the health and well-being of individuals living with a dementia, family carers and staff.

Research design

The aim of this study was to evaluate the effects of implementing a structured physical activity (PA) program on agitation, wandering, quality of life and physical outcomes for individuals living with a dementia. A quasi-experimental pre-test and post-test design was used to objectively measure quantifiable changes. In this paper, the focus is on evaluating the effects of the structured PA program on the expression of unmet needs, specifically whether agitation and wandering changes after participating in a structured PA program for

individuals living with a dementia living in care homes. No control group was allocated because the potential sample size was too small and the study had limited resources to expand the research sites. Ethical approval to undertake this study was provided by the University of Wollongong Human Research Ethics Committee.

Setting and sample

The study was undertaken in four care homes ran by one not-for-profit aged care organisation in four suburbs in regional NSW, Australia. All individuals living with a dementia able to participate in a standing or seated structured PA program were invited to participate in this study. All potential participants were identified by staff working at the care homes. These individuals, along with their family carers, were invited by staff to attend open information sessions about the study. Specifically, explanation of the proposed structured PA program and the proposed outcomes measures used to evaluate the effects of the structured PA program on individuals living with a dementia in a care home was provided.

Written consent was sought from individuals able to read the participant information sheet and provide written consent. Verbal consent was recorded using the process consent method when an individual was unable to read the participant information sheet and provide written consent (Dewing, 2007). This process assesses the willingness of individuals to participate in research by monitoring assent through ongoing observation of verbal and non-verbal cues. In addition, a courtesy letter and information sheet was posted to all family carers of those individuals who provided written consent, verbal and non-verbal consent to participate in the study. During implementation of the PA program by the physiotherapists, physiotherapy aides and diversional therapists, they continually used process consent to monitor verbal and non-verbal cues about the willingness of individuals to participate. Individuals who demonstrated their dissent through signs of agitation or distress during the PA session were sensitively assisted to withdraw and leave the activity.

Intervention

Importantly, an investigator in this study (Author 5) was a physiotherapist and the manager of the physiotherapist services within the organisation where the study was undertaken. To start with, literature review evidence was sourced to ensure the new PA program

reflected evidence based practice (Blankevoort, Heuvelen, Boersma, Luning, De Jong, & Schreder, 2010; Brett et al., 2015). Next, the physiotherapist manager and the host university investigators undertook an extensive consultation activity in which registered nurses, assistants in nursing, physiotherapists, physiotherapy aids and diversional therapy staff participated. Workshops were held during which staff generated suggestions about which activities to include within the structured PA program and also ways to create opportunities for increasing incidental PA for individuals living with a dementia living in the care homes where they worked. It was crucial for the sustainability of the PA program that all ideas could be delivered within existing resources for this organisation. During the consultation activity, the physiotherapist manager sensitively managed the discussions to ensure only suggestions which could be implemented within existing resources, including staffing profiles and equipment already available, were recorded as suggestions to include in the structured PA program. Thus, an evidence based PA program, which could be delivered within existing staff profiles with no additional resources, was developed by the physiotherapist manager from extensive consultation with staff as the intervention for this study.

The structured PA program was implemented by physiotherapists, physiotherapy aides and diversional therapy staff. The structured PA program was tailored for each care home which participated in the study. This was necessary to ensure the structured PA program could be delivered within existing staff profiles and resources. It was also important to ensure a tailor made program was implemented to ensure the structured PA program reflected the needs of individuals living with dementia in each care home. The physiotherapist manager who led the design of the structured PA program was able to integrate training of staff who delivered the program into his usual work activities. This was possible because the physiotherapist manager already provided leadership and direction to the staff who were responsible for delivering PA programs to individuals living with a dementia in the care homes where they worked. The physiotherapist manager simply introduced the intervention structured PA program in the same way that he normally introduced new initiatives for his team to deliver. The physiotherapist manager also monitored the implementation of the intervention as he usually monitored the work of the team he managed with regular phone calls and face-to-face visits to the care homes

were the physiotherapists, physio aids and diversional therapy staff worked. He also reviewed the electronic records used by the staff to record the progress of individuals living with a dementia, specifically their uptake of and outcomes from participating in PA.

The structured PA program was offered to participants 3 times per week for a combined time of 30 minutes (in one or more sessions per week) over 16-weeks. The structured PA program delivered was determined during each session by the physical and cognitive abilities of the participants. The type and amount of PA undertaken by the participants was recorded over 16-weeks during the delivery of the intervention. The structured PA program included walking, range of movement exercises, weights/ strength exercises, and balloons/ ball games. Data were recorded at baseline immediately prior to commencement of the intervention at pre-intervention (T0) and 16 weeks after commencement of the intervention at post-intervention (T1).

Measures

Agitation is one of the hallmark symptoms of dementia and is characterised by inappropriate verbal, vocal, or motor activity not judged by an outside observer to result directly from perceptible needs or confusion of an individual experiencing agitation (Cohen-Mansfield & Billig, 1986). Agitation was measured using the Cohen Mansfield Agitation Inventory (CMAI) (Figure 1) (Cohen-Mansfield, 1991; Werner, Cohen-Mansfield, Koroknay, & Braun, 1994). Wandering is a syndrome characterised by dementia-related locomotion behaviour of a frequent, repetitive, temporally disordered and/ or spatially-disoriented nature. The individual who wanders experiences lapping, random and/ or pacing patterns, some of which are associated with eloping, eloping attempts or getting lost unless accompanied (Algase, Moore, Vandeweerd et al., 2007). Wandering was measured using the Algase Wandering Scale (AWS) (Figure 2) (Algase, Beattie, Song et al., 2004; Supporting Health care workers in understanding New approaches in Evidence based Training (SHINE) in Dementia, 2017).

Cohen-Mansfield Agitation Inventory (CMAI)

Instructions: For each of the behaviors below, check the rating that indicates the average frequency of occurrence over the last 2 weeks.

Behavior	Never 1	Less Than Once a Week 2	Once or Twice a Week 3	Several Times a Week 4	Once or Twice a Day 5	Several Times a Day 6	Several Times an Hour 7
1. Hitting (including self)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Kicking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Grabbing onto people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Pushing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Throwing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Biting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Scratching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Spitting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Hurt self or others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Tearing things or destroying property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Making physical sexual advances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Paces, aimless wandering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Inappropriate dress or disrobing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Trying to get to a different place. .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Intentional falling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Eating/drinking inappropriate substances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Handling things inappropriately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Hiding things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Hoarding things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Performing repetitious mannerisms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. General restlessness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Screaming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Making verbal sexual advances ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Cursing or verbal aggression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Repetitive sentences or questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Strange noises (weird laughter or crying)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Complaining	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Negativism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Constant unwarranted request for attention or help	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Name of Rater: _____

Name of Primary Caregiver/Informant: _____

Note: This is the nursing-home, long version of the Cohen-Mansfield Agitation Inventory. For definitions of the behaviors, administration, scoring information, and other versions, please consult the manual.

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Figure 1: Cohen-Mansfield Agitation Inventory

Adapted from Dementia KT (nd)

Resident Name:

Revised Algate Wandering Scale (RAWS) – Long-term Care Version

Please put a check beside the statement that best describes this resident.

PERSISTENT WALKING	
1. Resident has a reduced amount of spontaneous walking	walks the same or more as others of the same age and ability
	walks less than other of same age, ability
	walks only minimally, e.g. to go to bathroom
	does not walk spontaneously unless prompted
2. Resident has an increased amount of spontaneous walking	walks about the same as other of same age and ability
	walks distinctly more than average, but will sit for periods
	walks distinctly more than average, rarely sits
3. Resident walks about on own	walks distinctly more than average, never sits
	only if prompted
	occasionally during the day
	frequently during the day
4. Resident walks around restlessly	almost constantly during the day
	never
	on a few occasions
	regularly but not daily
5. Resident paces up and down	on a daily basis
	never
	on a few occasions
	regularly but not daily
6. Resident walks around after awakening but before breakfast	on a daily basis
	never
	less than others of same age and ability
	the same as others of the same age and ability
7. Residents walks around between breakfast and lunch	more than others of same age and ability
	never
	less than others of same age and ability
	the same as others of the same age and ability
8. Resident walks around between lunch and dinner	more than others of same age and ability
	never
	less than others of same age and ability
	the same as others of the same age and ability
9. Resident walks around after dinner but before bedtime	more than others of same age and ability
	never
	less than others of same age and ability
	the same as others of the same age and ability
ELOPING BEHAVIOUR	
10. Resident attempts to leave their authorised area	never
	on a few occasions
	regularly but not daily
	on a daily basis

Figure 2: Algate Wandering Scale

Adapted from Algate et al. (2004) (the authors of this paper would replace the term ‘resident’ with ‘individual’ or ‘client’).

Statistical analysis

Measurement of agitation and wandering, using the CMAI and AWS respectively, were completed by staff (registered nurses and assistants in nursing) after training from a researcher in the use of the measurement tools to increase the reliability of recording of the data. Intention to treat principle was applied, with pre-intervention outcome measures carried forward for missing data (Polit & Gillespie, 2009). Contingency table and chi-square analyses were conducted for categorical data to establish whether there were significant relationships between gender, care homes, and CMAI and AWS. Non-parametric analyses using Wilcoxon signed rank tests were used to analyse pre-intervention and post-intervention scores for CMAI and AWS, as data were not normally distributed.

Results

Participants

There was a 60% participation rate from individuals living with a dementia across the participating care homes (n = 72). There was a comparable gender distribution among the participants, with only a slightly higher rate of women (51%) than men (49%), an unusual distribution for this population where the overall majority are women. The mean age was 84 ± 18.5 , ranging from 66 to 103 years. Just over half of the participants were born in Australia and just under one quarter spoke a language other than English as their first language (Figure 1). As is common in care homes across the globe, all participants were receiving what is classified in Australia a 'high care' care home services. All participants were able to undertake some form of physical activity but all would be described as frail older persons receiving much care to maintain their independence in their living environment. Just under 10 per cent of participants used a wheelchair to mobilise around the care home with just over 90 per cent being described as independently mobile with or without the aid of a walking aid sometimes or most of the time.

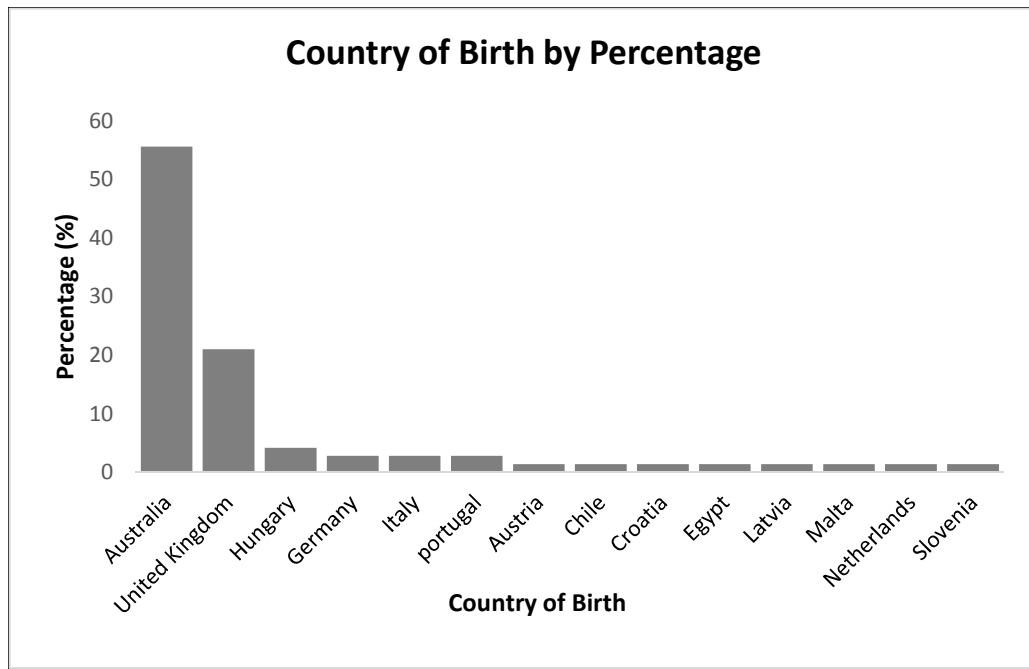


Figure 3: Country of birth for participants

Participation in the structured physical activity (PA) program

Twenty-eight participants (39%) completed the structured PA program 3 times a week for at least one continuous 6-week period and 47 (65%) completed the structured PA program at least once per week for a continuous 6-week period. Inadequate documentation for attendance at the structured PA program resulted in missing data about the level of involvement for participants in the structured PA program. One care home provided excellent data on participation in the structured PA program and thus full participation over a 6-week period (x3 weekly) was related to the care home where the participant lived ($\chi^2 = 25.32, p < .001$).

Agitation

Agitation was measured by the CMAI (Table 1 and Table 2). Overall, there was a statistically significant decrease in agitated behaviours following the structured PA program, $z = -3.88$ (corrected for ties), $p < .001$. In particular, there were statistically significant decreases in the aggressive behaviours, $z = -2.52$ (corrected for ties), $p = .012$ and physically non-aggressive behaviours, $z = -2.68$ (corrected for ties), $p = .007$.

Table 1: Frequencies of CMAI scores pre- and post-intervention

	Pre-Intervention (n=71)	Post-Intervention (n = 71)
	n (%)	n (%)
Aggressive behaviour	23 (32.4)	12 (16.9)
Not aggressive behaviour	48 (67.6)	59 (83.1)
Physically aggressive	27 (38.0)	15 (21.1)
Not physically aggressive	44 (62.0)	56 (78.9)
Verbally agitated	31 (43.7)	21 (29.6)
Not verbally agitated	40 (56.3)	50 (70.4)

Note. Data was missing for 1 participant on all measures of the CMAI.

Table 2: Comparison of pre- and post-intervention CMAI scores

	Pre-intervention (n=71)	Post-Intervention (n=71)	Statistic	p
	M (SD)	M (SD)		
Physically Aggressive behaviours (15)	5.3 (2.4)	4.8 (2.0)	-2.52	.01
Physically non-aggressive behaviours (20)	8.3 (3.5)	6.6 (3.1)	-2.68	.01
Verbal Agitation (20)	9.1 (3.0)	7.8 (3.1)	-1.89	.059
Overall (55)	22.7 (7.1)	19.2 (6.5)	-3.88	<.001

Note: Total scores are listed in parentheses. Higher scores represent higher frequency of behaviours. Data were missing for 1 participant on all measures of the CMAI.

A trend for decreased verbal agitation following the structured PA program was also observed, $z = -1.89$ (corrected for ties), $p = .059$.

Wandering

Wandering was measured by the AWS (Table 3).

Table 3: Comparison of Pre- and Post-intervention AWS scores

	Pre-intervention (n=71)	Post-intervention (n=71)	Statistic	p
	Persistent Walking (36)	19.8(7.4)		
Eloping (16)	6.8(3.4)	5.6(2.4)	-3.16	.002
Spatial Disorientation (24)	12.9(4.6)	13.1(4.9)	-.17	.86

Note: Total scores are listed in parentheses. Higher scores represent higher frequency of behaviours

Following the intervention, a statistically significant reduction in eloping behaviours was found, $z = -3.261$ (corrected for ties), $p = .001$, as well as a trend for reduced persistent walking, $z = -1.83$, (corrected for ties) $p = .067$. Regarding spatial disorientation, no statistically significant changes were found following the intervention.

Relationship between behavioural changes and number of PA sessions completed

The changes in agitation and eloping behaviour scores (CMAI and AWS, respectively) were analysed against the amount of PA sessions recorded using a scatter plots and non-parametric testing (Mann-Whitney U-tests, Kruskal-Wallis tests). No association was found between the number of PA sessions completed and changes in agitation or eloping behaviours.

Discussion

The expression of unmet needs by individuals living with a dementia in care homes, including agitation and wandering, are distressing for the individual experiencing them as well as their co-residents, family carers and staff (Brodaty et al., 2003). The consequences for individuals living with a dementia is that staff manage expressions of unmet needs using pharmacological treatments. This approach continues despite health care guidelines clearly presenting evidence that non-pharmacologic avenues be the first line treatment for those expressing unmet needs. Evidence based non-pharmacological alternatives include behavioural management plans, aromatherapy, multisensory stimulation, music or dance therapy, animal therapy and massage (National Collaborating Centre for Mental Health, 2007). This study demonstrated that implementing a structured PA program is another effective strategy to reduce the expression of unmet needs, specifically agitation and wandering for individuals living with a dementia in care homes. If structured PA programs were incorporated consistently in care home services, another non-pharmacological treatment could be used to reduce the expression of unmet needs, specifically agitation and wandering, experienced by individuals living with a dementia. The distress experienced by their co-residents, family carers and staff who witness the effects of them expressing their unmet needs could also be reduced.

It is important to note that, in this study, no relationship was found between the amount of documented PA completed and the changes in levels of agitation or eloping behaviours

recorded for individuals living with a dementia who participated in this study. This finding might be due to the large variance in recording of PA completed by individuals. In one care home the physiotherapist aid who implemented the intervention was very motivated and had a nearly 100% completion record for all individuals living with a dementia who participated in the intervention at the care home where she worked. At another care home, the research team had to review the electronic care records of individuals and retrospectively record the PA completion rates because the physiotherapist aid had not consistently used the data recording sheets provided by the research team. It is not possible to know how much influence this inconsistency in data recording had on the findings of the study. Suffice is to say, the strength of the effect of completion rates of the structured PA program on agitation experienced by individuals living with a dementia in care homes was diluted by a lack of data.

Another reason why completion rates were not significant could be because by the end of the study there was an overall change in care home environment regarding PA levels and it could have been this overall change which reduced agitation among individuals. The study began with an extensive consultation activity in which workshops were held in each of the four participating care homes. The workshops were used by the researchers to consult with the care home staff to develop the content for structured PA program. An unexpected outcome during these workshops was the spontaneous development by staff of action plan for ways to increase incidental PA. The action plans developed during the workshops were recorded by the research team and presented to the care home staff who implemented their action plan during the 16-weeks delivery of the intervention period of the study. The university research team members worked with the Directors of Nursing (DoNs) to provide support and guidance on implementation of PA action plans and the DoNs worked with their staff to implement the goals recorded in their action plans.

The university research team members met with the DoNs at each of the participating care homes at least twice to provide further support and guidance to increase the likelihood that the action plans were being implemented by staff during the intervention. The development and implementation of these PA action plans was not an original objective of this study. This outcome was generated from the motivation among the staff who participated in the consultation workshops. It was clear during the workshops that staff

were motivated to identify and implement strategies to improve the levels of PA among individuals living with a dementia who lived in the care home where they worked. The staff spontaneously developed the action plans and demonstrated a commitment to implement their PA action plans during the study. This incidental outcome from the study demonstrated the commitment of the staff to improving PA levels among individuals living with a dementia in care homes.

One reason why PA was a priority for staff within the participating care homes was because prior to this intervention study an audit of PA levels across the care homes run by the aged care organisation was undertaken by the university research team (Devries & Traynor, 2012). The audit found unacceptably low levels of PA among individuals living with a dementia in care homes. The host aged care organisation made a commitment to improve PA levels among individuals living with a dementia and it became one of their strategic goals. This meant that PA levels was a corporate priority and with careful negotiation with the university research team resulted in forward planning to ensure PA was core business for a prolonged period. Employing a team of physiotherapists, including a physiotherapist manager (Author 4) is an unusual model of care in Australia where it is more common for aged care organisations to 'out-source' physiotherapy services and pay private companies to deliver physiotherapy services to individuals living in care homes. Workload was allocated by the DoNs and the physiotherapist manager to nursing, physiotherapy and diversional therapy staff to focus on implementing the structured PA programs across all participating care homes in the organization. This was crucial in making the study a success for the individuals living with a dementia who participated. It was the organizational support for this study, at the highest levels, which ensured the intervention was consistently implemented during the study and staff worked to increase incidental PA for individuals living with a dementia in various ways as they implemented their PA action plans in each participating care home.

The findings from this study suggested that even minor increases in PA positively effected expressions of unmet needs for individuals living with a dementia living in care homes, specifically reductions in agitation and wandering. What cannot be ignored in this study was the additional effects on the outcomes of increased awareness among staff about the benefits of increased PA and how to increase incidental PA. This increased awareness was

achieved from staff participating in workshops at the commencement of the study and being exposed to a larger number of individuals living with a dementia being 'treated' by physiotherapists, physiotherapy aids and diversional therapy staff when they delivered structured PA programs. Altogether, a more PA friendly active environment was created during the study. This improved awareness about the positive effects of PA is likely to have improved the stimulation for all individuals living with a dementia in the participating care homes. While this study only documented scheduled PA sessions, it is possible that establishing a more PA friendly environment encouraged all staff to promote, and thus increase, PA among individuals, for example, encouraging individuals to mobilise independently and undertake more unprompted incidental PA. To capture these changes, other systems such as accelerometers or systematic environmental scanning of the care home environment is needed to be included in future study designs evaluating PA (Jansen, Claben, Wahl & Hauer, 2015).

Some limitations to the arguments presented in this paper need to be acknowledged. The study did not implement a control group because it was a pilot intervention with limited resources. Cultural influences were not considered as a potential confound in the study, which may have influenced the results. Specifically, the sample of participants included in the study was multicultural, with just under one quarter of the participants originating from non-English speaking backgrounds and just under one half of the participants were born overseas. The participating aged care provider has a diverse cultural background among the older people receiving their services and among the staff providing care. Language barriers were not raised as a difficult challenge by staff in the participating care homes and the data collection tools relied on observations rather than verbal responses which mitigated against any potential problems with language. It would be useful to explore this issue further in future studies undertaken in such culturally diverse populations with individuals living with a dementia to expand work undertaken in the UK on this topic (Botsford, Clarke & Gibb, 2011). Our study would also benefited from a cost-benefit analysis similar to that undertaken by a dementia care educational intervention (Chenoweth, King, Jeon et al., 2009) so the financial benefits of implementing the structured PA program on agitation and wandering could be measured. In addition, this study did compare different parameters of

exercise which our future studies by the research team did (Brett, Traynor, Stapley & Meedya, 2017).

The study aimed to examine the efficacy of a program conducted in the 'real world' of busy care homes with limited resources. This study generated positive outcomes without any additional staff or resources to deliver the structured PA program. In each participating care home a physiotherapist, physiotherapy aide and/or diversional therapist nominated themselves to be a study champion for implementing the PA intervention. This role was fulfilled very successfully with enthusiasm by highly motivated staff which ensured a high attendance rate and low attrition rate among participants for the PA intervention. Registered nurses and assistants in nursing collected the CMAI and AWS data and this was completed rigorously and thoroughly. Incorporation of the outcome measures into care home e-documentation systems would reduce the time needed to complete outcome measures for future quality initiatives by care homes and for research studies completed by external collaborators. The use of graduated start times of the intervention within each of the care homes would enable pre- and post-test measures to be performed over a longer time period, thereby reducing time pressures on staff to achieve more consistent longitudinal data collection.

Physiotherapists and exercise physiologists working in care homes contribute a crucial role in promoting the health and well-being of individuals living with a dementia. However, currently much of their work is focused on assessment of mobility and falls risk, or specific treatment for pain or acute injury. The profession came from the medical model of care where patients were 'treated' for specific conditions, and still within Australia, funding instruments for care homes focus on pain management treatment by physiotherapists rather than a wellness model which aims for optimisation of physical and mental function. Physiotherapists and exercise physiologists are well placed to be the champions of structured PA programs for individuals living with dementia, as they are able to tailor exercise or functional PA for the needs and capacity of the individual, taking into account co-morbidities, and monitoring the challenges which occur following changing cognitive and physical states. The programs could be designed by registered regulated practitioners and delivered by physiotherapy aides or diversional therapists similar to the way nursing care is planned and delivered with teams of staff. This model would create a more realistic

approach to ensuring PA becomes more commonplace for individuals living with a dementia in care homes. The benefits are clear with reduced agitation and wandering of dementia and it is most likely that these improvements had a positive effect on the overall health and well-being for the individual living with dementia, family carers and staff. It is therefore important for physiotherapists to be part of a holistic care model to try to achieve optimum well-being for individuals living with dementia within care homes. The results from this study will be made available on the Aged and Dementia Health Education and Research (ADHERE) website (www.adhere.org.au) for practitioners and researchers to build on in their practice and research.

Conclusion

This study found that amending existing ad hoc sporadic PA programs to become structured PA programs delivered systematically in care homes had a positive effect on reducing agitation and wandering experienced by individuals living with a dementia. Physiotherapists can champion PA-rich environments with care homes; however, this means a move away from the Australian Government only funding treatment of pain and dysfunction towards 'treatment' for optimum well-being by physiotherapists. Our next study will be a cost-benefit analysis of a structured PA program for individuals living with a dementia in care homes.

Key points

1. This study contributed to addressing a neglected area of evidence about the value of physical activity programs for individuals living with a dementia in care homes
2. By working together nurses and allied healthcare practitioners can use structured exercise activities to reduce agitation and wandering experienced by individuals living with a dementia in care homes
3. Outcomes for physical activity programs for individuals living with a dementia in care homes can focus on measuring the effects on agitation and wandering rather than physical outcomes which are difficult to prove in this population group who are physically frail and are likely to experience ongoing physical decline over their time in a care home
4. Future research needs to focus on developing more sensitive tools to evaluate changes in agitation and wandering to enable practitioners to know what programs work for individuals living with a dementia in care homes
5. Funding models for care home care across the world need to more effectively include ways in which physiotherapists and exercise physiologists can complement nursing focused care teams

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