

People living in residential aged care need to BE outside not just SEE outside: associations between quality of life and outdoor access: a cross-sectional study

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Research article

Keywords: nursing homes, cognitive impairment, built environment, quality of life, dementia

Posted Date: August 27th, 2019

DOI: <https://doi.org/10.21203/rs.2.13597/v1>

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Abstract

Background The value of providing access to outdoor areas for people living in residential aged care, including those living with dementia, in terms of mood, behaviour and well-being is increasingly acknowledged. This study examines associations between provision of independent access to outdoor areas and frequency of residents going outdoors with the quality of life (QoL) of nursing home residents and compares use of outdoor areas between alternative models of residential aged care. **Methods** A cross-sectional study was conducted including 541 participants from 17 residential aged care homes in four states in Australia, mean age 85 years, 84% with cognitive impairment. Associations between having independent access to outdoors and the frequency of going outdoors and QoL (EQ-5D-5L) were examined using multi-level models. The odds of going outdoors in a small-scale home-like model of care compared to standard Australian models of care were examined. **Results** After adjustment for potential confounders (including comorbidities and facility level variables), living in an aged care home with independent access to the outdoors was not significantly associated with QoL ($\beta=-0.01$, 95% Confidence Interval (CI) -0.09 to 0.07, $P=0.80$). However, going outdoors daily ($\beta=0.13$ 95%CI 0.06 to 0.21), but not multiple times a week ($\beta=0.03$, 95%CI -0.03 to 0.09), was associated with a better QoL. Residents living in a home-like model of care had greater odds of going outdoors daily (odds ratio 15.1, 95%CI 6.3 to 36.2). **Conclusions** Going outdoors frequently is associated with higher QoL for residents of aged care homes and residents are more likely to get outside daily if they live in a small-scale home-like model of care. However, provision of independent access to outdoor areas alone may be insufficient to achieve these benefits. Increased availability of models of residential aged care with staffing structures, training and design which increases support for residents to venture outdoors frequently is needed to maximise resident quality of life.

Background

The benefits of being outdoors to improve the health and well-being of older people, including those living with dementia, is increasingly acknowledged [1-4]. However, upon admission to residential aged care, the opportunity to venture outdoors is often limited for many residents [5, 6]. Residents with dementia, in particular, may be unable to venture outdoors unaccompanied and doors to outdoor areas may be locked [4, 7, 8]. For people living with dementia, agitation, mood and behaviour may be improved by increased access to outdoor spaces, exposure to nature and use of garden spaces [2, 3, 9]. It has been suggested that it may be enough to take in the light, smells and view of a garden [3, 10, 11].

Newer models of nursing home care, such as the Green House model and the Eden Alternative, place increased emphasis on providing person-centered care, encouraging independence in residents and in principles of enablement [12]. Thus, the provision of independent access to the outdoors within modern aged care homes is increasingly acknowledged as important in maximising resident quality of life (QoL) and function [1, 3, 13-15]. However, the degree to which providing independent access to outdoor areas within residential aged care homes translates to practical increases in use of outdoor areas or is associated with improvements in resident QoL has received relatively little attention [3, 16].

The aim of this analysis is to examine the association between provision of independent access to outdoor areas at the facility level and actual use of outdoor areas by the residents with QoL in a population of residents of Australian aged care homes with a high prevalence of dementia. In addition, the association between living in a small-scale, home-like (normalised) model of care and frequency of going outdoors was examined. It was hypothesised that providing independent access to and use of outdoor areas would be associated with better QoL and that there would be increased use of outdoor areas for residents living in a small-scale, home-like model of care.

Methods

This analysis examines the QoL of participants from the INSPIRED (Investigating Services Provided in the Residential Care Environment for Dementia) study, a cross-sectional study of 541 participants residing in 17 aged care homes in four Australian states. Homes with a high proportion of residents with dementia and/or offering an alternative model of care were purposefully approached for recruitment. The study methods have been described previously [17]. Briefly, individuals living in the nursing home for 12 months or longer, having a proxy willing to participate on their behalf if required and not being in immediate palliative care were included. Data was collected between January 2015 and February 2016. Consent for the study was obtained from the residents (24%) or their proxies (76%).

The main outcome measure of QoL was assessed with the EuroQol EQ-5D-5L instrument, the most commonly used QoL measure in residential aged care research [18, 19]. The EQ-5D-5L measures five dimensions influencing health-related quality of life: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Health state utility values were generated using the preference-weighted scoring algorithm based on a UK general population sample [20]. Utility scores are bounded from -0.281 to 1 where health states with a score of less than 0 are considered worse than death. QoL questionnaires were completed by the residents where possible this was encouraged for those with a Psychogeriatric Assessment Scale Cognitive Impairment Scale (PAS-Cog) score of 11 or less, or a proxy family member completed the questionnaires where necessary.

The main variables of interest were: 1) independent access to outdoor spaces (facility-level variable) and 2) frequency of use of outdoor spaces (resident-level variable). Independent access was defined as the residents having access to outdoor areas (e.g. a garden, terrace or balcony) and being able to use this without supervision. Lack of independent access was defined as residents having no access to an outdoor area from the living unit or only access under supervision. Data on access to and use of outdoor areas was obtained from resident and nursing home level surveys adapted from Palm et al (2013) (see Supplementary Table S1) [21]. The resident questionnaire obtained information on frequency of venturing outdoors during the previous week. Frequency of going outdoors was analysed as three categories: once or more per day (several times a day or daily), multiple times per week but not daily (1-3 times/week or 4-6 times/week), or not at all, as the frequency of responses to individual categories were prohibitively low.

Cognitive impairment was measured using the Psychogeriatric Assessment Scale Cognitive Impairment Scale (PAS-Cog), on a scale of 0 to 21. The PAS-Cog is routinely used in Australia during assessments of eligibility for admission to residential care [22]. Higher scores indicate greater impairment and a score of five or greater is considered indicative of cognitive impairment. Data on vitamin D prescription was obtained from pharmacy records. Frequency of social interactions was defined as weekly interaction with family or friends. Nursing home level variables were geographic location (major cities or regional) or size (total number of beds).

The model of care provided in the residential aged care homes was examined as an exposure variable. Homes defined as providing a home-like (normalised) model of care were those that met at least five of the six following criteria: independent access to outdoors, 15 or fewer residents per living unit, allocation of staff to the units, residents having the opportunity to participate in meal preparation, self-service of meals or meals cooked within the units [17].

The associations between going outdoors and quality of life were examined using multi-level regression models. Analyses were adjusted for individual and nursing home level characteristics including age, gender, function (modified Barthel Index), cognition (PAS-Cog score), marital status, number of comorbidities, vitamin D (cholecalciferol) administration, social interactions, geographic location and nursing home size. Associations between the main variables and the main outcome of quality of life were also adjusted for the model of care. There were no missing data on access to outdoors from the nursing home level surveys. At the resident level there were few missing values for the ED-5D-5L (n=3) or frequency of outdoor access (n=6), no special treatments were performed on these missing values. Adjusted means with confidence intervals and model generated p-values are presented. The odds of going outdoors between the different models of care was determined using multinomial logistic regression, adjusted for the factors listed above. Study size was determined based on power required to detect a difference in QoL between the models of care as reported previously [17]. Statistical significance was considered at p-value <0.025 as hypotheses were directional.

Results

Participants had a mean age of 85 (SD 8.5) years, 75% were female, 84% had cognitive impairment and 63% a formal diagnosis of dementia (Table 1). Approximately three quarters of the population (72%) lived in a nursing home with independent access to the outdoors and one fifth of the population did not go outdoors in the week before data collection (Table 1).

Table 1. Participant characteristics.

Participant characteristics	INSPIRED population (n=541)
Age, mean (SD)	85.5 (8.5)
Female, n (%)	403 (74.5)
Married, n (%)	137 (25.3)
Modified Barthel Index, median (IQR)	35 (9-71)
NPI, median (IQR)	7 (3-12)
Co-morbidities (Cohen-Mansfield Index), mean (SD)	3.7 (1.4)
Social interactions with family and friends \geq once per week, n (%)	378 (70%)
Location in major city, n (%)	420 (78%)
Residing in a large nursing home (\geq 100 beds), mean (SD)	162 (30%)
Direct care hours, mean (SD)	0.52 (0.5)
Residing in nursing home providing allied health staffing, n (%)	363 (67%)
Care staff*: resident ratios, mean (SD)	0.48 (0.35-0.65)
Residing in nursing home providing a clustered domestic model of care	120 (22%)
Vitamin D (colecalfiferol) administration, n (%)	169 (31%)
PAS-Cog, median (IQR)	15 (6-21)
Dementia diagnosis, n (%)	348 (64.3)
Dementia diagnosis or PAS-Cog \geq 5, n (%)	453 (83.7)
Quality of life (EQ-5D-5L), median (IQR)	0.54 (0.28, 0.78)
Resident-completed EQ-5D-5L, n (%)	150 (27.7)
Proxy-completed EQ-5D-5L, n (%)	388 (71.7)
Resided in a nursing home with independent access to outdoors, n (%)	390 (72.1)
Outdoor use frequency, n (%)	
One or more times everyday	171 (31.6)
Multiple times per week, but not everyday	250 (46.2)
Not at all	114 (21.1)
Participated in walking activities, n (%)	214 (39.6)
Number of physical activities offered, mean (SD)	3.2 (1.0)

Care staff = registered nurses, enrolled nurses or personal care attendants

After adjustment for potential confounders, including the model of care, living in a nursing home with independent access to the outdoors was not associated with a better QoL (EQ-5D-5L β =-0.01, 95%CI -0.09 to 0.07, P =0.80; Table 2). Going outdoors daily in comparison to not at all was significantly associated with a better QoL (β =0.13 95%CI 0.06 to 0.21, P <0.001). However, going outdoors multiple times (1-6 times) per week but not daily was not significantly associated with a better quality of life in comparison to not going out at all (β =0.03, 95%CI -0.03 to 0.09, P =0.305).

Unadjusted analyses were consistent with adjusted results. There was no association of provision of independent access to outdoors with QoL but significantly better QoL was observed for individuals venturing outdoors daily or multiple times per week (Table 2).

Table 2. Associations of outdoor access and use with quality of life in the INSPIRED study population (n = 536)

	Unadjusted EQ-5D-5L mean difference (95%CI)	Adjusted EQ-5D-5L mean difference (95%CI) ^a	P value ^a
Nursing home level provision of outdoor access			
Resident independent access to outdoors vs no independent access	-0.040 (-0.172, 0.093)	-0.010(-0.089, 0.068)	0.7975
Resident use of outdoor spaces over one week			
Going outdoors one or more times every day ^b	0.315 (0.244, 0.386)	0.134 (0.057, 0.210)	0.0006
Going outdoors multiple times per week but not every day ^b	0.097 (0.035, 0.159)	0.031 (-0.029, 0.091)	0.3048

NOTE: EQ-5D-5L utility scores are bounded from -0.281 to 1 where health states with a score less than 0 are considered worse than death.

^a Adjusted for age, gender, cognition (PAS-Cog (Jorm et al., 1995)), function (Modified Barthel Index), frequency of external social interactions (interaction with family and friends), number of co-morbidities (Cohen-Mansfield index), vitamin D prescription, regional location, nursing home size (total number of beds), home-like model of care.

^b vs not at all in the previous week

The odds of people going outdoors daily for residents living in a home-like model of care, in comparison to a standard model of care, were significantly greater, after adjustments (OR 15.1, 95%CI 6.3 to 36.2; P <0.0001; Table 3).

Table 3. Frequency of residents going outdoors over previous week for residents living in a home-like model of care (n=416) in comparison to an Australian standard model of care (n=119).

Activity	OR ^a Home-like vs standard	95% CI	P
Going outdoors daily vs not at all	15.1	6.3 to 36.2	<0.0001
Going outdoors 2-6 times/week vs not at all	2.5	1.2 to 5.2	0.0137

Abbreviations: CI, confidence interval; OR, odds ratio

^a Adjusted for age, gender, function, cognition, comorbidities, administration, social interactions, geographic location, nursing home size.

Discussion

This analysis suggests that simply providing independent access to outdoor areas is insufficient to achieve QoL benefits for residents in residential aged care; there is a need to enable and support regular use of outdoor spaces. Going outdoors daily was associated with better QoL of residents; however, living in a nursing home with independent access to outdoors was not. To the authors' knowledge this is the first study to examine associations of QoL with both the resident's frequency of going outdoors and provision of independent access at a facility/design level.

Frequently going outdoors may increase the QoL of residents through interaction with nature, the activities undertaken whilst outside, such as walking or other physical activities, or possibly by elevating vitamin D [2, 23-26]. For people living with dementia in residential aged care in the UK, restricted access to outdoor areas has been associated with depressive symptoms [7], but only a relatively short duration of outdoor exposure may be needed to show an association with improved mood [9]. Residents of care facilities frequently have low serum vitamin D which has been associated with depression, so increased time spent outdoors may improve mood by increasing vitamin D [23, 27]. In this study 31% of participants were receiving vitamin D supplementation so adjustments were made in analyses for vitamin D prescription [28]. Given existing recommendations for prescription of vitamin D in adults residing in aged care homes, this rate appears low [29, 30]. Increasing time outdoors could further increase vitamin D levels for residents which may have benefits in terms of falls prevention [30]. Increased time outdoors has also been demonstrated to improve sleep in this population [31, 32].

Even if facilities offer independent access to outdoor spaces there may be barriers to the residents using these areas, explaining the lack of benefit on quality of life. Whilst dependencies due to physical health

and mobility issues are possible barriers [5, 7], this analysis has adjusted for differences in function and cognition between the residents. A recent systematic review has found that key barriers and enablers relate to the design of outdoor areas and the main building in terms of providing doors that are easy to open and close access points, weather (which can be addressed in part by providing adequate and appropriate shade, shelter and clothing), staffing factors and provision of social activities outdoors [33]. Perceptions of the safety of residents accessing outdoor areas independently can also pose a significant barrier. Decline in cognitive function for people with dementia means they may be less likely to initiate going outdoors themselves. Staff need to provide incentives and support for residents to utilise outdoor areas; planning and providing structured and scheduled activities outdoors is recommended [5, 8, 33].

In an Australian discrete choice experiment, residents valued having outdoor access whenever they wanted as more important than did proxies (family members) answering on behalf of residents [34]. This discrepancy may be due to safety concerns of family members, so strategies to increase resident use of outdoor areas must also consider potential family as well as staff concerns regarding safety. Culture change within the organization and regular conversations about the benefits as well as potential harms of residents going outside should take place between staff, residents and family members [33].

In the current study, the odds of going outdoors daily in the previous week were greater for those living in a home-like (normalised) model of care, after adjustments for potential confounding factors. As well as having design differences, including housing for smaller groups of residents and independent access to outdoors, the home-like model of care incorporates a different staffing structure, with higher direct care hours and investment in staff training [35]. Dutch studies have also indicated that small-scale living environments have the potential to benefit residents and that factors other than just the physical design, in particular staffing factors, have a role in optimal use of outdoor areas [16]. These studies however did not directly measure resident quality of life. Fewer residents living together has also been shown to be associated with increased activity involvement for residents living with dementia in Dutch residential aged care homes [36].

This observational study has a number of limitations. The use of outdoor areas was analysed as either daily, one to six times per week, or not at all. The number of categories considered are not enough to accurately inform the 'dose' or frequency of outdoor use required to achieve a quality of life benefit and it is also limited by being based on activity over a single week. Nevertheless, these findings emphasise the value of residents getting outdoors on quality of life, rather than just being provided access to outdoor spaces at a design level.

A strength of this study is that it includes a large number of participants with cognitive impairment (84% had a dementia diagnosis or PAS-Cog of five or more), from a range of homes across four Australian states who self-rated their QoL whenever possible (28% self-rated, 72% proxy). Although concerns with proxy ratings of QoL have been raised, including proxy ratings is an important approach to capture the QoL of participants with moderate to severe cognitive impairment who are unable to answer questionnaires on their own behalf [37, 38]. In general, proxy responses tend to give poorer rating of QoL

than the person with dementia does themselves if self-completing, although some studies have found good agreement between using the EQ-5D in people with vascular cognitive impairment and family member proxies [37, 39, 40]. Excluding proxy ratings in this study would result in the findings no longer being applicable to a population of people living with dementia in residential aged care.

In addition, there are limitations inherent to the study design. The cross-sectional design means that only association and not causation can be determined, that is those with a better quality of life may go outdoors more frequently, or those that prefer venturing outdoors may choose a more home-like model of care. However, in Australia the choice of nursing home is generally driven by immediate availability of places within the locality, often precipitated by a crisis and free choice across types of residential aged care homes is generally limited [41]. Also, whilst analyses have been conducted using multi-level regression models adjusting for many potential confounding factors at both the resident and facility level, the possibility of residual confounding remains.

Some existing studies have demonstrated associations of higher quality of life with going outdoors in residents of aged care homes, although the evidence is both contradictory and sparse [3, 16]. However, to the authors' knowledge this is the first study to examine associations with both residents' going outdoors and the provision of access to outdoor areas at the organisational level within the same population, plus a comparison of resident outdoor use between different models of residential care.

Conclusions

Provision of independent access to outdoor areas in residential aged care homes may be insufficient to achieve QoL benefits in residents, including those with dementia. Living in a small-scale, home-like model of care may enable greater access to outdoor areas for residents. However, designs, staffing structures and attitudes as well as the organisation of suitable activities that enable and encourage residents to venture outdoors frequently are required to maximise use of outdoor areas and achieve the greatest impact on resident wellbeing.

List Of Abbreviations

INSPIRED - Investigating Services Provided in the Residential Care Environment for Dementia study

QoL – quality of life

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the Flinders University Social and Behavioural Research Ethics Committee (references, 6594, 6732, 6753). Self-consent by residents to participate was obtained when

possible; for residents with more severe cognitive impairment, proxy consent for participation was provided (usually by a close family member).

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due the strict ethical conditions with which study investigators are obliged to comply. Access to the project data was and is restricted to nominated investigators approved by the Flinders University Social and Behavioural Research Ethics Committee but are available from the corresponding author on reasonable request upon approval from the Flinders University Social and Behavioural Research Ethics Committee.

Competing Interests and Funding

This work was supported by the National Health and Medical Research Council (NHMRC) Partnership Centre on Dealing with Cognitive and Related Functional Decline in Older People (CDPC) (Grant No. GNT9100000). The CDPC includes Australian aged care residential service providers Hammond Care, Brightwater Care Group and Helping Hand. Although these industry partners did not provide funding to this study they did provide information regarding organizational structures of residential care and access to their facilities but no role in the analysis or reporting of this study. None of the authors have any financial competing interests.

Authors' contributions

Study concept and design: all authors; acquisition of data: RM and MC; MC is the lead investigator of the INSPIRED study; analysis and interpretation of data: all authors; drafting of the manuscript: SMD; critical revision of the manuscript: all authors.

Acknowledgements

The authors sincerely thank the INSPIRED study participants and their family members for their participation and interest in the study. The assistance of nursing home staff, care worker researchers, nursing home pharmacists and data collectors in each state is gratefully acknowledged for their efforts and advice. Members of the study team Anne Whitehouse, Angela Basso, Keren McKenna, Lua Perimal-Lewis, Wendy Shulver and Rebecca Bilton are thanked for their input into the study management, data collection and data coordination.

The contents of the published materials are solely the responsibility of the Administering Institution, Flinders University, and the individual authors identified, and do not reflect the views of the NHMRC or the Funding Partners.

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Supplementary Files

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