Residential Aged Care Accommodation Framework

Final report on the development of the draft National Aged Care Design Principles and Guidelines

Evidence Review

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australian health services research institute



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Acknowledgement of Country

We acknowledge that Country for Aboriginal peoples is an interconnected set of ancient and sophisticated relationships.

The University of Wollongong spreads across many interrelated Aboriginal Countries that are bound by this sacred landscape, and intimate relationship with that landscape since creation.

From Sydney to the Southern Highlands, to the South Coast.

From fresh water to bitter water to salt. From City to Urban to Rural.

The University of Wollongong acknowledges the custodianship of the Aboriginal peoples of this place and space that has kept alive the relationships between all living things.

The University acknowledges the devastating impact of colonisation on our campuses' footprint and commit ourselves to truth-telling, healing and education.

Artwork by Samantha Hill, Dharawal / Wandandian woman

Consortium

The development of the National **Design Principles and Guidelines** has been undertaken by a consortium comprising: the Centre for Health Service Development (CHSD), Australian Health Services Research Institute (AHSRI), University of Wollongong; Dementia Training Australia's architectural consultants (Constructive Dialogue Architects); Dementia Training Australia; Dementia Australia; and the Sustainable Buildings Research Centre (SBRC), University of Wollongong.

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A comment about language

Through this report we have endeavoured to use language that is accurate, respectful, inclusive, empowering and non-stigmatising in line with recommendations from Dementia Australia and in consideration of other commentary on language. We regret any use of language that does not meet this standard or causes offence, whether written by the authors, captured through interview quotes, or included in evidence review citations.

Suggested citation

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Australian Government Department of Health and Aged Care



constructive

dialogue

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Introduction

This document provides a comprehensive overview of the peer-reviewed academic literature that was used to support the *Final report on the development of the draft National Aged Care Design Principles and Guidelines*. The National Aged Care Design Principles and Guidelines will underpin the Australian Government's new Residential Aged Care Accommodation Framework (expected to be implemented from 1 July 2024).

The objective of the evidence review was to develop a robust and rigorous evidence base to support the draft National Aged Care Design Principles and Guidelines by identifying and consolidating peer-reviewed academic research publications. This document describes the method undertaken between August 2022 and January 2023, and presents a summary of the articles referenced in the *Final report on the development of the draft National Aged Care Design Principles and Guidelines*.

In conjunction with this evidence review, a rigorous consultation process was conducted with key stakeholders in Australia. Insights, perspectives and experiences of these stakeholders also constitute valuable evidence that have informed development of the draft National Aged Care Design Principles and Guidelines. Findings from stakeholder consultation are reported separately.¹ Together, these documents present the evidence-base underpinning the draft National Aged Care Design Principles and Guidelines.

Methodology

As stated by Younas and Ali, "the aim of developing...literature summary tables is to provide the reader with the information at one glance".² The following literature summary table presents each article's purpose, methods, key findings and recommendations.

To consolidate the available evidence, a focused and robust search methodology was adopted. The authors aimed to be flexible enough to adapt to emerging issues and requirements as they arose from the stakeholder consultation process and ongoing development of the draft National Aged Care Design Principles and Guidelines. The evidence review is not intended to present a detailed analysis of the totality of literature available, as might be the case with a literature review. Rather, an overview of key research is provided.

For each of the principles and associated guidelines, common search parameters were established with appropriate limits and exclusions. Initially, peer-reviewed research articles published between 2012 to 2022 were targeted. Subsequently, foundational studies from earlier years were incorporated as appropriate. The search was focused on studies undertaken in Australia, the United Kingdom, Ireland, the United States of America, Canada and New Zealand. These countries were selected as their experiences in residential aged care accommodation were more likely to be generalisable to the Australian context. However, where relevant articles were identified from other countries, they were also included. Finally, expert commentaries and special articles by leading researchers in the field were included, as well as population prevalence studies by Australian statistical agencies, to ensure the evidence collated was robust and timely.

Scopus (which includes MEDLINE), CINAHL and PsycINFO were searched using combinations of the search term "residential aged care facility" (and synonyms including nursing home, aged care home, assisted living facility, retirement facility and long-term care facility) along with sets of terms relevant to each respective principle and guideline (e.g. flooring, lighting, access to outdoors, etc.). Database searching was supplemented

 ¹ Morris D, Thompson C, Rowe R, Westera A, Loggie C, Grootemaat P, Fildes D, Seemann N, Fuggle L and Gordon R (2023) Final report on the development of the draft National Aged Care Design Principles and Guidelines: Stakeholder Consultation Report. Wollongong, NSW: Centre for Health Service Development, Australian Health Services Research Institute, University of Wollongong.
 ² Younas A and Ali P (2021) Five tips for developing useful literature summary tables for writing review articles. Evidence-Based Nursing. Vol. 24, No.2, pp.32-34.



with snowball and citation searching, searching by key authors, searching performed via Google Scholar, and reviewing seminal texts identified in stakeholder consultation.

The resulting database included 439 citations of which the full texts of 238 articles were retrieved. Articles were excluded, first by title and then by abstract, based on factors including methodological rigour, setting and context. Existing guidelines, reports, practice resources and industry magazine articles were excluded, except for rare cases that documented a novel study protocol and corresponding findings. Literature reviews were identified and examined for additional key primary studies. In total, 158 articles contribute to the evidence underpinning the *Final report on the development of the draft National Aged Care Design Principles and Guidelines* and are included in the following literature summary table.



Literature summary table

Reference	Study purpose and design	Key findings	Recommendations
Abrams H, Loomer L, Gandhi A, et al. (2020) Characteristics of U.S. nursing homes with COVID-19 cases. Journal of the American Geriatrics Society, Vol.68, pp.1653-6.	Understanding the relationship between RACF characteristics and COVID-19 incidence among residents was the objective of this US study. A linked dataset was created, and regression analyses conducted to assess the relative links between variables.	 Greater likelihood of having a COVID-19 case was associated with RACF size (larger being more likely), urban location, greater percentage of African American residents, and being a single site facility (i.e. not part of a chain). 	 Improve infection control with smaller-scale RACFs. [2.1]
Ahmed A, Ormandy P and Seekles M (2019) An examination of how the 'household model' of care can contribute to positive ageing for residents in the 'Fourth Age'. OBM Geriatrics, Vol.3, No.1, pp.24.	The question explored in this study was how Belong Ltd.'s household model contributes to positive aging for residents. Qualitative interviews were conducted with a purposive sample of residents (n=14) and three family members from two of Belong's RACFs in the UK.	 In their feedback on Belong's household model, residents reported feeling control and autonomy over their daily activities. The domestic scale environment appeared to facilitate opportunities for social interaction. 	 Design with a domestic scale to cultivate 'home'. [2]
Allan LM, Ballard CG, Rowan EN, et al. (2009) Incidence and prediction of falls in dementia: a prospective study in older people. PLoS One, Vol.4, No.5, pp.e5521.	Aiming to identify modifiable risk factors associated with incidence of falls, this prospective UK-based study involved 179 people with dementia. Baseline clinical and autonomic assessments were conducted, and falls data diarised by participants was analysed. Different kinds of dementia were assessed for their correlation with likelihood of falling.	 People with dementia experienced 8-times more falls than people without dementia. Having Lewy Body dementias plus having had a fall within the past 12 months was associated with greater likelihood of further falls. Physical activity protected against falls. 	 Encourage physical activity among RACF residents. [3] Monitor residents with dementia carefully to pick up any side- effects, depression or changes to their gait.
Amini-Behbahani P, Meng L and Gu N (2020) Walking distances from services and destinations for residential aged-care centres in Australian cities. Journal of Transport Geography, Vol.85, pp.102707.	Walking distances from RACFs to services and transport in six large Australian cities are examined in this study. The method cross-examined 2017 data held by the Australian Institute of Health and Wellbeing (2017) on aged-care centres and Google Map API services.	 Of the 6 Australian RACFs in this study, most were located a walkable distance from services that only healthier residents could achieve. Less healthy residents struggled to access services, such as pharmacies, on foot. Most RACFs were located within a walking distance to points of public transport. 	 Consider proximity to local services and public transport when planning RACF locations. [4.1]



Reference	Study purpose and design	Key findings	Recommendations
		 There are a considerable number of RACFs in Australia where residents are disincentivised from walking to local services because they are too far. 	
Ancoli-Israel S, Gehrman P, Martin JL, et al. (2003) Increased light exposure consolidates sleep and strengthens circadian rhythms in severe Alzheimer's disease patients. Behavioral Sleep Medicine, Vol.1, No.1, pp.22-36.	US study investigating the association between light, sleep and circadian activity rhythms among 92 people with suspected Alzheimer's disease.	 Exposing people with dementia to bright light, at any time of day, has a positive impact on their quality of sleep during the night by lengthening sleep bouts. Bright light was not found to lengthen the amount of time asleep. Bright light exposure was not found to modify bedtimes or wake times. 	 Increase bright light in rooms to improve quality of sleep. [1.5]
Anderson DC, Grey T, Kennelly S, et al. (2020) Nursing home design and COVID-19: Balancing infection control, quality of life, and resilience. Journal of the American Medical Directors Association, Vol.21, No.11, pp.1519-24.	Special article by US and Ireland-based researchers discussing the links between architectural features of RACFs and infection control, quality of life and resilience.	 Design interventions for infection control may also improve quality of life among RACF residents. Private bedrooms and ensuites support isolating suspected and confirmed COVID-19 cases. Quality of bedroom environments is likely to support better quality of life for residents during outbreak control measures. Designing "intermediate spaces" that have views of outdoor or streetscape views may increase feelings of social connection and proximity to the wider community. Spaces that can be converted to host staff testing facilities and outbreak response activities should be considered. American Institute of Architect's Re-Occupancy Assessment Tool recommends one-way traffic circulation; removing clutter from corridors to increase space for social distancing; allocating separate entrances and exits; using separate entrances / exits for staff, residents and visitors. 	 Locate and integrate RACFs within the wider community and existing community services. [4.1] Domestic-scale design with dedicated staff and resident entrances and exits. [2.2] Private bedrooms with ensuites. [2.6, 2.7] Decentralised care stations, which allow smaller groups of staff to support smaller groups of residents. [2.9] Provide safe, secure and easily monitor-able outdoor areas with outdoor seating and social areas for residents and visitors. [3] Increase airflow through natural and mechanical ventilation. [1.4] Contactless, motion sensor doors are also recommended. [1.7]



Reference	Study purpose and design	Key findings	Recommendations
Ausserhofer D, Deschodt M, De Geest S, et al. (2016) "There's No Place Like Home": A scoping review on the impact of homelike residential care models on resident-, family-, and staff- related outcomes. Journal of the American Medical Directors Association, Vol.17, No.8, pp.685- 93.	The study aimed to identify homelike residential care models and explore the impact of these on residents, families and staff-related outcomes. A scoping review and comprehensive literature search were conducted.	 Evidence of improved physical functioning among residents was observed with the domestic-scale dementia-sensitive house model. Resident satisfaction was also greater in the domestic-scale model compared with the traditional model. However, evidence of improved physical and psychosocial outcomes among residents, families and staff was inconclusive. 	 Use a standard set of outcome measures for homelike residential care models. [2]
Australian Institute of Health and Welfare (2022) Falls in older Australians 2019–20: hospitalisations and deaths among people aged 65 and over. Canberra: AIHW.	Report presents information on the 133,000 injury cases due to falls that resulted in hospitalisation and the 5,000 cases due to falls that resulted in death among those aged 65 and over during the period 1 July 2019 to 30 June 2020.	 One in 5 falls that resulted in hospitalisation occurred in a residential aged care facility. In 2019–20, there were 27,900 hospitalisations due to falls that occurred in a RACF. 	 Population statistics, no recommendations are made.
Australian Institute of Health and Welfare (2016) Australia's Health 2016. Australia's health series no. 15. Cat. no. AUS 199. Canberra: AIHW.	Findings from the 2014-15 National Health Survey are reported. The National Health Survey involves self-reported responses from a representative sample of the Australian population.	 Of the Australian population aged 55 and over, 93% of people had a long-term vision disorder. Almost half of people aged 75 and over had a long-term hearing disorder (49%). The population prevalence of vision and hearing disorders increases with age. 	 Population statistics, no recommendations are made.
Barnett ML and Grabowski DC (2020) Nursing homes are ground zero for COVID-19 pandemic. JAMA Health Forum, Vol.1, No.3, pp.e200369.	Commentary on an early outbreak of COVID-19 at a Washington State nursing home.	 Descriptive account of how infections spread within the environments of RACFs. 	 Ensure testing and infection control are RACF priorities. [2.9]
Batsch N, Mittler P and Kingston D (2017) Brief for Alzheimer Associations: Access to the United Nations Convention on the Rights of Persons with Disabilities by People Living with	Report provides information from the UN Convention of the Rights of Disabled Persons and was created in collaboration with Dementia Alliance International (DAI), the international organisation of people living with dementia.	 People with dementia are often denied their human rights and can experience social isolation and poor-quality support. The Brief enables Alzheimer associations to monitor the protection of the rights of persons with dementia under the United Nations 	 Address social isolation among residents with dementia. [4.2]



Reference	Study purpose and design	Key findings	Recommendations
Dementia. Ankeny: Dementia Alliance International and Alzheimer's Disease International.		Convention on the Rights of Persons with Disabilities (CRPD).	
Beauchemin KM and Hays P (1996) Sunny hospital rooms expedite recovery from severe and refractory depressions. Journal of Affective Disorders, Vol.40, No.1-2, pp.49-51.	Study examines the relationship between seasonal affective disorder in adults and exposure to ambient bright light. Participants (n=174) were recruited from a psychiatric inpatient unit in the US. A natural experiment was conducted, observing the lighting in patients' rooms.	 Patients in this study were receiving bright light therapy to treat seasonal affective disorder. However, the researchers found that patients who lived in sunny rooms experienced shorter periods of depression than those who lived in low-light rooms. 	 Design bedrooms to have natural ambient lighting. [1.5]
Benbow W (2013) Lighting and noise design in dementia care facilities: An evidence-based checklist. Canadian Nursing Home, Vol.24, No.3, pp.4-10.	Description of current research on lighting (and noise) design in dementia care facilities. A checklist and rating guide are also presented.	 Provides 24 elements in a lighting and noise evidence-based checklist which rates 12 design features of lighting and 12 design features of noise. Identifies inadequate lighting as a problem in nursing homes (citing two US studies and one Belgian study). Assessment of noise and light levels in the environment is the first step to providing a more person-centred and dementia-friendly environment. 	 Recommended light features include ambient lighting, task lighting, colour, contrast, natural light, natural views, transitions, day/night adjustments, light distribution, glare, individual preference and maintenance. [1.5, 1.6] Recommended noise features include ambient noise levels in common areas and bedroom, noise mitigation features and adaptations, reducing intrusive noise, night-time noise, alarms and pagers and maintenance. [1.3]
Bentayeb M, Norback D, Bednarek M, et al. (2015) Indoor air quality, ventilation and respiratory health in elderly residents living in nursing homes in Europe. European Respiratory Journal, Vol.45, No.5, pp.1228- 38.	European study investigates the respiratory effects of poor air-quality and comfort among older people. A questionnaire was conducted with 600 RACF residents across 50 sites, as well as on-site tests of air-quality.	 Only 19% of the population studied lived in adequately ventilated RACFs. Poor indoor air-quality affected the respiratory health among residents. These negative impacts were modulated by ventilation. 	 Air-quality should be monitored and meet standards. [1.4]



Reference	Study purpose and design	Key findings	Recommendations
		 Residents exposed to high levels PM₁₀ and NO₂ were more likely to have had breathlessness and cough. Residents exposed to high levels of PM₁₀ were more likely to have had wheezing chest in the past year. COPD was more likely to be observed in locations where there was a high concentration of formaldehyde. The impacts of poor ventilation on all respiratory conditions in this study were more acutely experienced by people aged over 80 years. 	
Bergland A and Kirkevold M (2006) Thriving in nursing homes in Norway: contributing aspects described by residents. International Journal of Nursing Studies, Vol.43, No.6, pp.681-91.	Residents' perceptions of factors contributing to their wellbeing are the focus of this qualitative study, which involved 26 RACF residents.	 Two key influences upon residents' capacities to "thrive" in their housing environment: residents' frame of mind towards their living circumstances and their perspectives on the quality of care they received from RACF staff. 	 Support positive mental attitudes among residents.
Black A and Wood J (2005) Vision and falls. Clinical and Experimental Optometry, Vol.88, No.4, pp.212-22.	Literature review to explore the link between vision and falls, and to highlight intervention strategies.	 Visual impairments are associated with higher prevalence of falls. Falls tend to reduce following cataract surgery. 	 Involve optometrists in falls prevention strategies.
Blackler A, Brophy C, O'Reilly M, et al. (2018) Seating in aged care: Physical fit, independence and comfort. SAGE Open Medicine, Vol. 6, pp.2050312117744925.	Conducted in Brisbane, Australia, this study involved an audit of the types of seating in two facilities. Researchers elicited interviews with residents, experts and carers.	 Residents, carers and experts all reported a preference for chairs that are above the recommended height for older people. Higher chairs are easier for elderly people to get out of. Armrests are essential for ease of lowering into and rising out of chairs. When residents' feet could not touch the floor or they could not sit comfortably, they were forced into a slouched position. Frequent use of cushions and pillows to improve comfort while seated was reported. 	 Offer a range of chairs with different heights in each common space. [1.9] Seat depth should be reduced in most chairs. Armrests should be easy to grip.



Reference	Study purpose and design	Key findings	Recommendations
Bonomo RA (2000) Multiple antibiotic-resistant bacteria in long-term-care facilities: An emerging problem in the practice of infectious diseases. Clinical Infectious Diseases, Vol.31, No.6, pp.1414-22.	Expert paper outlining the types of antibiotic resistance common in RACFs and strategies for infection control and antibiotic use.	 Findings from several earlier studies are discussed. 	 Employ a range of unobtrusive clinical supports to reduce infections. [2.9] Education, infection and antimicrobial resistance screening when residents are admitted is recommended. Treatment algorithms should be deployed to identify appropriate antibiotics for each person.
Boyce J and Pittet D (2002) Guideline for hand hygiene in health-care settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Infection Control and Hospital Epidemiology, Vol.23, No.S12, pp.S3-S40.	Report reviews the published research since the CDC's 1985 Guidelines on handwashing and hospital environmental control. Guidelines for hand hygiene in healthcare settings are provided.	 Strategies to increase hand hygiene practices are reviewed. These include engineering controls that make hand hygiene possible, easy and convenient, as well as making soaps and rubs readily available. Improving individual and institutional self-efficacy and avoiding overcrowding of facilities has also been shown to increase hand hygiene practices. 	 Provide easy access to handwashing facilities and hand rub. For example, hand rub stations at every resident's bedroom door and in each room, as well as pocket-sized containers. [2.9] Store alcohol-based hand rubs in cabinets or areas approved for the storage of flammable materials. Design interventions need to be supported with behavioural interventions to ensure proper use of handwashing devices.
Brush JA, Meehan RA and Calkins MP (2002) Using the environment to improve intake for people with dementia. Alzheimer's Care Today, Vol.3, No.4, pp.330-8.	Pilot study examining the effect of improved lighting and table setting contrast on residents' oral intake and behaviours during meals. The sample involved 25 residents with dementia at two long-term care facilities.	 Improving light and table setting contrasts was perceived to improve residents' food and drink intake, and functional abilities at the dining table. Higher overall light levels were associated with improved function. 	 Improve overall light levels. [1.5]
Burke RL and Veliz-Reyes A (2021) Socio-spatial relationships in design of residential care homes for people living with	Study exploring the connections between physical environment and resident social and personal fulfilment. Method involved interviews with 21 residents and	 Often there is an abrupt division between the private bedroom and the common areas, with an uninhabitable and transitory space in- 	 Design personalised transitional spaces between the two extremes of private and public rooms. [2.4]



Reference	Study purpose and design	Key findings	Recommendations
dementia diagnoses: A grounded theory approach. Architectural Science Review, doi:10.1080/00038628.2021.194 1749.	ethnographic observation at two aged- care facilities in the UK.	 between. This limits residents' feelings of ownership over their home. The spatial layout of rooms can facilitate or impede residents' abilities to freely practice hobbies or to enjoy other forms of recreation. Where private bedrooms are narrow and clustered along a corridor there is limited capacity to accommodate alternative socio- spatial configurations. Spaces for different forms of social and recreational occupation, and sensory connections with spaces outside the wall boundaries of the room are needed. 	 Accommodate various social- spatial configurations. Provide smaller, semi-private spaces for activities with another or other residents, care staff and family members. [2.4]
Burton JK, Bayne G, Evans C, et al. (2020) Evolution and effects of COVID-19 outbreaks in care homes: a population analysis in 189 care homes in one geographical region of the UK. The Lancet Healthy Longevity, Vol.1, No.1, pp.e21-e31.	COVID-19 testing and mortality data from between March and August 2020 for residents at 189 UK-located RACFs are analysed in this study to determine associations with RACF type and characteristics, number of beds, number of residents, confirmed case numbers. Excess deaths associated with COVID-19 outbreaks are also reported.	 Larger RACFs were strongly associated COVID-19 outbreaks. 74 excess non-COVID related deaths were recorded at the 69 care homes that had COVID-19 outbreaks. 	 "Future research should consider the built environment and organisation of care as other potentially modifiable factors to support infection control" (p22). Small-scale RACFs are recommended as part of infection control strategies. [2.1]
Calkins M and Cassella C (2007) Exploring the cost and value of private versus shared bedrooms in nursing homes. Gerontologist, Vol.47, No.2, pp.169-83.	Comparative study of the benefits and costs associated with shared, enhanced shared and private bedrooms in aged-care facilities in the United States. Literature review, interviews and focus groups were conducted, including a review and cost estimation of 24 design firms' bedroom plans.	 Strong supporting evidence for private rooms over shared rooms. Psychosocial benefits of private bedrooms included increased satisfaction, reduced conflict with other residents, sense of privacy and sense of control. Clinical benefits of private rooms include reduced risk of infectious disease transmission for several key infections. Some evidence of improved sleep was reported by aged-care workers in focus groups. 	 Prioritise private bedroom design. [2.6] Design special purpose rooms to accommodate family and other visitors. [2.4, 4.2]



Reference	Study purpose and design	Key findings	Recommendations
		 No evidence was found to support the claim that shared rooms reduce risk of falls. Regarding comparative costs, the researchers concluded that private rooms do cost more the construct, however the difference may be marginal and would be outweighed by the benefits. Focus groups noted family members would like to stay with family members in their final days but are discouraged by crowded environments. RACF staff observed that shared rooms diminished length and quality of family visits. 	
Capezuti E (2004) Minimizing the use of restrictive devices in dementia patients at risk for falling. Nursing Clinics of North America, Vol.39, No.3, pp.625-47.	Expert paper reviewing the evidence on the use of restraints in nursing homes.	 Side rails have been shown to be ineffective at reducing falls and related clinical problems. Evidence suggests restraints and side rails can be removed generally without negative consequences. In hospital settings, supervised exercise activities significantly reduced the rate of falling. 	 Avoid use of side rails and restraints. [2.5]
Carnemolla P, Debono D, Hourihan F, et al. (2021) The influence of the built environment in enacting a household model of residential aged care for people living with a mental health condition: A qualitative post-occupancy evaluation. Health and Place, Vol.71, pp.102624.	Australian qualitative study comparing traditional and household design models for RACFs. Research involved four focus groups with aged care staff (n=16).	 The researchers present a layered conceptualisation of the different spaces within RACFs. The first layer is personal spaces at the centre, the second layer is shared social spaces, and the final layer is the outside neighbourhood. Individual apartments are the most important aspect of design in aged care. Complex navigation in aged care facilities can lead to isolation. Domestic-scale amenities offered residents independence and flexibility in food and eating, with increased agency in food selection and dining choice resulting in increased consumption of food and beverages. 	 Domestic-scale amenities and private bedrooms are preferable. [2] Provide various kinds of communal facilities that enable different kinds of activities and different sized groups to participate. Make navigation to the household and within the RACF as easy as possible. [4.3, 4.4]



Reference	Study purpose and design	Key findings	Recommendations
		 Household model increased autonomy, flexibility and privacy with sleep and showering. Design of several shared open spaces, such as an on-site café, changed how residents connected socially with friends and families. A smaller domestic scale model appears to enhance person-focused care and improve staff- resident relationships. 	
Caspi E (2014) Wayfinding difficulties among elders with dementia in an assisted living residence. Dementia, Vol.13, No.4, pp.429-50.	Qualitative study of spatial disorientation and wayfinding difficulties among 29 older people with dementia in assisted living residences in the US. Data collection included interviews with 13 aged care staff and observation of residents.	 Communal space and kitchen located at the centre of the household was beneficial for residents. Wayfinding difficulties were most pronounced when staff were not present. Small-scale layout facilitates staff supervision. Inability to navigate one's surroundings and find one's way can promote a range of negative emotions and behaviours. Difficulties navigating space can undermine the confidence of people with dementia, lead to negative consequences that further reduce mobility and independence. The main locations residents had difficulty finding were their apartment/room, bathrooms, activity and dining rooms, and allocated dining room table and chair. 	 Small scale homes with no long corridors are recommended. [2.4, 2.5]
Chalfont G (2006) Connection to nature at the building edge: Towards a therapeutic architecture for dementia care Environments. University of Sheffield.	Dissertation involving a mixed methods study with interviews and a photographic study of architectural components and building surveys.	 Edge spaces are habitable spaces between indoors and outdoors. The use of 'edge space' by residents gave meaning and self-identity and is an important part of therapeutic design for aged care homes. They facilitated sensory simulation, social interaction and creative expression. 	 Edge spaces are an important design feature, improving connection to nature, and include seating areas, entrance porches, balconies, roof gardens, covered walkways with seating. [3]



Reference	Study purpose and design	Key findings	Recommendations
		 Edge spaces include porches, balconies, entrances, mudrooms, window seats and conservatories. 	
Charras K, Bebin C, Laulier V, et al. (2020) Designing dementia- friendly gardens: A workshop for landscape architects: Innovative Practice. Dementia, Vol.19, No.7, pp.2504-12.	Case study of dementia friendly garden design. A literature review of landscape design models and a conceptual framework are included. The framework includes primary (e.g. social uses) and secondary dimensions (e.g. interaction and communication) with landscape design examples (e.g. discussion spaces). Participants were architects and designers who were provided training. Two projects were developed in the training workshops, which involved older people and families in the design process.	 Carers and staff emphasised the safety and security of people with dementia while carers of people who were physically mobile spoke about having open spaces for their loved ones to roam around in. Two designs were developed during the workshop, one that paid attention to the historical paths and users of the garden, particularly the mobile users of the garden. The other design paid attention to the emotional benefits of the garden and gardening activities. 	 Residents, families, professionals should be consulted about the garden design process. [3] Garden designs should pay attention to residents' safety and security. [3.5]
Chaudhury H, Cooke HA, Cowie H, et al. (2018) The influence of the physical environment on residents with dementia in long- term care settings: A review of the empirical literature. Gerontologist, Vol.58, No.5, pp.e325-e337.	Literature review on the influence of the physical environment on therapeutic goals for RACF residents who have dementia. Review includes 103 articles (94 empirical studies and 9 reviews).	 There is strong evidence that smaller unit size, spatial layout and homelike environment positively impact on residents' functional abilities, social interactions, privacy, autonomy and control, as well as the regulation and quality of stimulation. Visible spatial layouts facilitate wayfinding. Multiple studies have found small dining rooms with homelike design are associated with greater food and liquid intake, increased social interaction and calmer, less agitated residents. Domestic scale environments assist staff to engage residents in activities. Higher gradation of space (i.e. a range of private, semi-private and public spaces) improves residents' behaviour and wellbeing. 	 Design resident households, including dining rooms, with a domestic scale and homelike design. [2] Regulate the sensory environment by providing adequate exposure to light and by reducing noise. [1.3, 1.5] Facilitate outdoor activities by designing gardens and other outdoor spaces. [3]



Reference	Study purpose and design	Key findings	Recommendations
		 Windows and use of side/end entry bathtubs are associated with reduced agitation. Studies report that exposure to higher lighting levels is associated with improved circadian rhythm quality, mood, quality of sleep and daytime alertness and function. This may reduce the need to use hypnotic drugs (Sloane et al. 2007). Well-designed outdoor areas are associated with multiple positive therapeutic outcomes. 	
Chaudhury H, Hung L, Rust T, et al. (2017) Do physical environmental changes make a difference? Supporting person- centered care at mealtimes in nursing homes. Dementia, Vol.16, No.7, pp.878-96.	Ethnographic study examines the impact of environmental renovations in dining spaces of a long-term care facility on residents' mealtime experience and staff practice in two care units in Canada. The research used pre- and post-renovation observations of 10 residents, assessment of the physical environmental features, and a post-renovation staff survey involving 17 care-aids and nurses.	 Physical environmental interventions, such as an open kitchenette and creating a more homelike dining atmosphere, can enhance the quality of residents' dining experience and create a positive work environment for staff to deliver person-centred care (inclusive of kitchen staff). Appropriate furniture and homelike lighting fostered residents' functional abilities and provided comfort. 	 Consider universal design principles, including wheelchair accessibility. [1, 3.5] Residents and frontline staff should be included in planning design modifications. Organisational and staff culture changes are required in conjunction with physical design changes.
Chen Q, Liang M, Li Y, et al. (2020) Mental health care for medical staff in China during the COVID-19 outbreak. Lancet Psychiatry, Vol.7, No.4, pp.e15- e16.	Describes the psychological interventions made at the largest hospital in Hunan province during the first months of 2020. Thirteen medical staff were interviewed to analyse existing and novel interventions.	 Mental health workers attended the hospital regularly to offer services to staff, training was provided on how to respond to COVID-19 patients experiencing psychological problems. Obstacles to implementation of mental health support included healthcare workers refusing to group and individual psychology sessions. Staff listed other primary concerns regarding access to protective equipment and places to rest where they would not put their family members at risk of transmission. 	 Support the mental health of staff by planning context-specific interventions and gathering feedback from staff. [2.10]



Reference	Study purpose and design	Key findings	Recommendations
Clark A, Campbell S, Keady J, et al. (2020) Neighbourhoods as relational places for people living with dementia. Social Science and Medicine, Vol.252, pp.112927.	Qualitative, mixed methods study to identify supportive neighbourhoods for people with dementia. Participants included 67 people with dementia and 62 care-partners across three countries (Scotland, England and Sweden). Methods included interviews, filmed home tours and a participatory network mapping technique.	 Neighbourhoods and relational support networks provide opportunities for engagement and connection for people with dementia. For people with dementia, regularity and routine are very important bases of connection to the wider community. Connection to regular public transport that allows for visitation to friends, family, supermarkets etc. gives a sense of independence but also a sense of belonging. Connection across distance is an integral part of a dementia friendly environment. Digital communications technologies are important. Frequent, repeated activities and interaction with 'familiar strangers' improves social connectivity and can create an additional safety net for residents. 	 Support residents to use communications technologies and to physically access spaces outside the home. [4] Promote regularity and routine in activities. Support residents' use of public transport, where possible.
Cleary TA, Clamon C, Price M, et al. (1988) A reduced stimulation unit: effects on patients with Alzheimer's disease and related disorders. Gerontologist, Vol.28, No.4, pp.511-4.	Case study of a special care unit designed for dementia patients. The "reduced stimulation unit" was designed to minimise reliance on memory. Pre-test and 3-month post-test measures were analysed.	 Compared with the original facility, people with dementia living in the special care unit showed several benefits. These included: substantially reduced agitation, less use of restraints, and improved ability to perform daily activities (Haycox Scale). Families reported being able to communicate better with their family member, and improved relationships between residents were observed. The change to the special dementia care unit did not negatively impact staff knowledge or satisfaction. 	 Design lower stimulation environments which allow for wandering. [1, 1.7, 4.3]
Cleeve H (2020) Mundane mattering: How materialities come to matter in everyday life in dementia care units and in end of	Doctoral thesis examining the importance of mundane, familiar objects in dementia care.	 Ordinary things can take on more importance for people as they age and/or experience illness. 	 Interior designers should pay attention to seemingly mundane objects, their placement and how they are represented. [1.1, 1.2]



Reference	Study purpose and design	Key findings	Recommendations
life care. Sweden: Karolinska Institutet.			
Coates L, van Leeuwen J, Browning S, et al. (2022) Heatwave fatalities in Australia, 2001–2018: An analysis of coronial records. International Journal of Disaster Risk Reduction, Vol.67, pp.102671.	Data on fatalities during or associated with heatwaves in Australia between 2001 and 2018 are analysed.	 "Heatwaves still pose a greater threat to Australian mortality than any other natural hazard." Heatwave fatalities were associated with age, socio-economic disadvantage, social isolation, and geographical remoteness, the presence of disabilities and/or use of medications. Features of the built environment were also associated with increased risk of death in a heatwave. This included living in an older building or without heat-protection or air- conditioning. 	 Collaborative risk management should consider the built environment and other modifications to reduce heat risk. [1.11]
Cohen-Mansfield J and Werner P (1995) Environmental influences on agitation: An integrative summary of an observational study. American Journal of Alzheimer's Care and Related Disorders and Research, Vol.10, No.1, pp.32-9.	Observational study looking at environmental conditions associated with agitated behaviours among residents in a large, 550-bed RACF in the United States.	 Agitated behaviours increased when room temperatures were felt to be too cold. Ambient noise was associated with decreased behaviours. However, when noise increased beyond a certain threshold requests for attention would also increase. Moreover, in the night when there were high levels of noise, aggressive behaviours increased. Agitated behaviours decreased when participants were involved in or in the presence of activities of daily living. 	 Set room temperatures to a standard. [1.11] Allow for ambient noise, but limit loud noises. [1.3]
Cohen-Mansfield J and Werner P (1999) Outdoor wandering parks for persons with dementia: A survey of characteristics and use. Alzheimer Disease and Associated Disorders, Vol.13, No.2, pp.109-17.	Twenty-four RACF residents were observed to assess the relationship between different environments and their behaviours. The analysis categorised behaviours as verbal agitation, pacing, requesting attention, picking at things, repetitious mannerisms, and "strange	 Structured activities, background music, visitors and increased staffing each tended to reduce the prevalence of the behaviours of concern. 	 Recreation therapy and social programs should be offered. [4.2] Special purpose rooms to host visitors and undertake structured activities should feature in RACF design.



Reference	Study purpose and design	Key findings	Recommendations
	movements". Findings were not assessed for statistical significance.		
Cox H, Burns I and Savage S (2004) Multisensory environments for leisure: promoting well-being in nursing home residents with dementia. Journal of Gerontological Nursing, Vol.30, No.2, pp.37-45.	Study compared two multisensory environment types for people with dementia. Twenty-four residents were observed, face to face interviews were also conducted with 6 caregivers.	 Both the Snoezelen room and the garden environment increased the pleasure or well- being of participants. Participants were observed to experience more pleasure when using the garden environment. 	 Provide access to outdoor spaces. [3]
Csikszentmihalyi M and Halton E (1981) The Meaning of Things: Domestic Symbols and the Self. Cambridge: Cambridge University Press.	Research based on a survey of eighty families in Chicago, with the objective of analysing the significance of material possessions.	 Develops a model of personhood in relation to household objects. Meaning and goals are discussed in relationship to object and what they signify. Argues that to address environmental limitations, creative and meaning-making capacities among humans need to be redirected. 	 Understand that material objects are a significant basis of meaning- making. [1.1]
Cunningham C, Macfarlane S and Brodaty H (2019) Language paradigms when behaviour changes with dementia: #BanBPSD. International Journal of Geriatric Psychiatry, Vol.34, No.8, pp.1109-13.	Article documents the development of "behavioural and psychological symptoms of dementia" or "BPSD" by the International Psychogeriatric Association in 1996.	 The term, BPSD, emerged through a detailed review and categorisation process. BPSD nomenclature seeks to centre on the experience of the person with dementia, and better understand dementia symptoms. The shift towards non-pharmacological treatments for dementia is discussed. 	 Language used to describe dementia related symptoms should focus on changes in behaviours, responses to stimuli or unmet needs. A range of stigmatising terms such as "challenging behaviours" and "concerning behaviours" and names for people with dementia diagnoses such as "wander" or "screamer" should not be used. Dementia Australia maintains support for BPSD as a term used in clinical contexts.



Reference	Study purpose and design	Key findings	Recommendations
Cutler LJ and Kane RA (2009) Post-occupancy evaluation of a transformed nursing home: The first four Green House® settings. Journal of Housing for the Elderly, Vol.23, No.4, pp.304-34.	Longitudinal mixed-methods evaluation of four Green House care homes. Methods included behavioural mapping, checklist ratings, place centred time scans, environmental tracers, questionnaires and interviews.	 Green Houses are staffed by dedicated nursing assistant staff and personal carers. Location of offices and staff spaces was not optimal, with nurse administrators working in offices in the main nursing home away from the Green Houses. Clinical support team nurses tended to work out of their cars or in the Green House offices, although when they did the latter, space for frontline staff was not optimal. The dining room table became the nerve centre for staff activity, giving rise to privacy problems. Lack of storage space caused difficulties for staff regarding storage of medical equipment and supplies. A lack of staff mailboxes also led to staff being allocated a shoe storage bag hung on the back of the office door. 	 Ensure there are adequate staff spaces located in proximity to resident areas. [2.10] Ensure there is enough storage space, such as for medical equipment and stall mail. [2.9].
Danes S (2012) Design for dementia care: A retrospective look at the Woodside Place model. Journal of Housing for the Elderly, Vol.26, No.1-3, pp.221- 50.	Retrospective study of the development of the Woodside Place model. This model is a resident centred, residential-style care model for people with dementia. Post- occupancy evaluations were conducted at three US nursing homes that were designed using the model. Methods involved interviews and observations to understand how the Woodside Place model had been adapted for different contexts and to document improvements.	 Group household size of 10-12 residents supports personal relationships among residents, families and direct care staff and facilitates resident-centred care. Central kitchens are a focal point of each household. These facilitate the work of staff as well as engagement in domestic duties by residents. Private rooms opening onto private hallways were seen to preserve privacy. Short hallways are recommended to assist staff supervision. Unanimous agreement that private rooms with ensuites are beneficial. Having several smaller special activity rooms is more effective/useful than one large room. 	 Design with a domestic scale. [2] Design kitchens with bench space and height that residents can also use. [2.3] Include multipurpose rooms for different activities or to provide outreach services such as day care. [2.4] Activity rooms should have a vantage point onto other spaces, so residents can see what is going on. [2.4] Provide safe and accessible access to outdoor spaces. [3]



Reference	Study purpose and design	Key findings	Recommendations
		 The model recognises that staff need to build close, caring relationships with residents, the environment should facilitate their engagement with residents by distributing rather than centralising workspace and supplies. A tension arises when staff are asked to be accessible to residents, but their administrative and privacy policy requirements require them to do record keeping from private offices. Some facilities introduced handheld devices, so that staff could do some of their reporting from the residents' space. Computers for residents and staff should be integrated into room design. Mobile stations were frequently moved and got in the way. 	 Provide varied, sheltered options outdoors. [3.3, 3.4] Design bedrooms with ensuites that open onto short, visible corridors (not common spaces). [2.4] To encourage resident walking, design should prioritise continuous routes. [1.7] To improve effective clinical and other support, position supplies and services closer to where residents spend their time. [2.9] Computer stations for staff and residents and carts storing medical and cleaning supplies should not get in the way. [2.9] Provide a dedicated staff space that is integrated into the design of the home. [2.10]
Davis H (2006) The Culture of Building. Oxford University Press.	To analyse the complex factors that constitute "the culture of building", this monograph employs a range of historic and contemporary examples.	 The systems, institutions and procedures that oversee building projects are fragmented. Construction is not a solitary act, but a collaborative one. Rules define building cultures 	 A collaborative approach to building design is needed in order to produce buildings that support the dignity and flourishing of those who construct them and inhabit them.
Day K, Carreon D and Stump C (2000) The therapeutic design of environments for people with dementia: a review of the empirical research. Gerontologist, Vol.40, No.4, pp.397-416.	Review of 70 empirical research reports.	 Residents face difficulties with sensory overstimulation, which may increase the distraction, agitation, and confusion associated with dementia. 	 Appropriate levels of sensory stimulation, striking a careful balance between environmental overstimulation and deprivation. Remove unnecessary clutter [1.2], providing tactile stimulation in surfaces and wall hangings, and



Reference	Study purpose and design	Key findings	Recommendations
			 eliminating overstimulation from televisions and alarms. [1.3] Use of partitions increases the ability to focus on a task among residents in all stages of dementia by eliminating some visual and especially auditory distractions (e.g. noise, talking).
de Boer B, Beerens HC, Katterbach MA, et al. (2018) The physical environment of nursing homes for people with dementia: Traditional nursing homes, small- scale living facilities, and Green Care Farms. Healthcare, Vol.6, No.4, pp.137.	Two observational studies were carried out to compare traditional nursing homes to small-scale living and green care farms. The study observed the uses of physical environment in relation to location, engagement and social interaction of residents.	 While the physical environment of small-scale living facilities had the potential to benefit people with dementia, this did not automatically lead to optimal use of this environment (e.g. outdoor areas were not utilised). Green care farms were especially able to adopt a positive physical environment for people with dementia. Nursing staff were the most important factor as to whether outdoor areas were used. 	 Small scale, sustainable living environments are more effective than traditional nursing homes for people with dementia. [2, 4.5] Adapting the physical environment of aged care may assist nursing staff to encourage residents' use of outdoor areas. [3]
De Veer AJE and Kerkstra A (2001) Feeling at home in nursing homes. Journal of Advanced Nursing, Vol.35, No.3, pp.427-34.	Large quantitative study to assess the association between number of beds in a room and feeling at home. Individual interviews with 686 residents and family members, across 36 nursing homes in Denmark were conducted. A multi-level analysis to test the reliability of findings from logistic regression was undertaken.	 No relationship between residents' perceptions of privacy and the number of beds in a room was found. However, residents who reported not feeling at home were more likely to feel that they had insufficient opportunity to be alone. Disturbance from other residents contributed to not feeling at home. 	 Design to allow residents more time to be alone, including having private space to make phone calls. [2, 2.6]
Dosa D, Jump RL, LaPlante K, et al. (2020) Long-term care facilities and the coronavirus epidemic: practical guidelines for a population at highest risk. Journal of the American Medical	Editorial presenting best-practice recommendations for infection control and prevention. A case study of a RACF in Washington State, USA, is referred to.	 A range of practical steps to reduce risk of transmission are outlined. Protecting healthcare and other RACF workers from infection is important. 	 Maintain healthcare infrastructure. [2.9]



Reference	Study purpose and design	Key findings	Recommendations
Directors Association, Vol.21, No.5, pp.569-71.			
Drinka PJ, Krause P, Nest L, et al. (2003) Risk of acquiring influenza A in a nursing home from a culture-positive roommate. Infection Control & Hospital Epidemiology, Vol.24, No.11, pp.872-4.	Study aimed to determine relative risk of influenza infection among residents who shared a room with someone infected, by comparison to residents who lived in single private rooms. A longitudinal cohort study was conducted in a US-based aged- care facility with 86 double rooms and 549 single rooms.	 Residents sharing a room with a person infected with influenza A were over 3-times more likely to become infected. Vaccination status did not appear to affect the findings. 	 Private rooms may reduce influenza infection and therefore excess mortality. [2.6]
Dyer SM, Liu E, Gnanamanickam ES, et al. (2018) Clustered domestic residential aged care in Australia: fewer hospitalisations and better quality of life. Medical Journal of Australia, Vol.208, No.10, pp.433-8.	The Investigating Services Provided in the Residential Care environment for Dementia (INSPIRED) study was a cross- sectional investigation of various design factors associated with RACF residents' quality of life. Participants were recruited from 17 RACFs, comprising a total sample of 541 residents. Health service data from four Australian states was also analysed.	 The clustered, domestic model RACF was associated with fewer hospitalisations, fewer emergency department presentations, and lower use of inappropriate medications compared with standard care. Residents living in clustered, domestic-scale RACFs reported high quality of life compared with standard RACFs. Domestic-scale RACFs produced a lower overall cost of care compared with the standard model. 	 Design clustered, domestic-scale RACFs. [2]
Dyer SM, van den Berg MEL, Barnett K, et al. (2019) Review of innovative models of aged care. Adelaide, South Australia: Flinders University.	Review of international models of aged care undertaken to inform the Royal Commission into Aged Care Quality and Safety. Key innovative models of care are identified.	 Six approaches to providing care for older people were identified. Those related to RACFs included dyadic interventions for people with dementia, support workers or care coordinators, small-scale domestic models of residential care, respite care and activities, and the Bidyadanga dementia support pilot program that focuses on aging on traditional country, particularly in remote communities. 	 Alternative building models for residential care should be considered. [2.1]
Edwards H, Courtney M and O'Reilly M (2003) Involving older people in research to examine quality of life in residential aged	Qualitative study exploring older people's views on what contributes to their wellbeing. Eight focus groups were	 Choice and autonomy were valued by residents of RACFs. There was strong support for implementing strategies to preserve autonomy 	 Provide private bedrooms and ensuites. [2.6, 2.7]



Reference	Study purpose and design	Key findings	Recommendations
care. Quality in Ageing and Older Adults, Vol.4, No.4, pp.38-44.	conducted in Brisbane. These focused on key aspects of residential life.	 in the context of limited or declining functional capacity. Access to private bathrooms was strongly emphasised as an important factor associated with the preservation of personal dignity and hygiene. Most participants expressed a desire to have a private bedroom, with only one participant preferring a shared room. 	
Edwards NE and Beck AM (2002) Animal-assisted therapy and nutrition in Alzheimer's disease. Western Journal of Nursing Research, Vol.24, No.6, pp.697- 712.	Prospective cohort study studying the effect of animal-assisted therapy, specifically fish aquariums, on nutritional intake among people with Alzheimer's disease. The study was conducted over 16 weeks in participating specialised care units.	 Sixty-two residents with Alzheimer's disease diagnoses participated in the study. A significant improvement in nutritional intake was observed when aquariums were introduced. A sustained positive effect was recorded during six weeks of observation. Participants' weight increased subsequently over the full 16 weeks of observation. 	 Consider aquariums and access to other pets and/or animals to improve resident wellbeing.
Edvardsson D and Nay R (2009) Acute care and older people: Challenges and ways forward. Australian Journal of Advanced Nursing, Vol.27, No.2, pp.63-9.	Article suggests modifications to hospital environments that care for older people.	 Eight dimensions of person-centred care are outlined. Alternatives to hospital admission are also considered. These include geriatric expert outreach to RACFs. 	 Environmental adjustments for older people should be made. These include staff education and skills development and accessing geriatric experts.
Edvardsson D, Petersson L, Sjogren K, et al. (2014) Everyday activities for people with dementia in residential aged care: associations with person- centredness and quality of life. International Journal of Older People Nursing, Vol.9, No.4, pp.269-76.	A cross-sectional design was used to collect valid and reliable questionnaire data on activity participation, person- centredness and quality of life in a sample of residents in residential aged care in Sweden (n = 1,266). Also, staff in 159 residential aged care units provided self- report data on the person-centredness of their unit and ratings of resident health status.	 Residents participating in everyday activities had significantly higher quality of life as compared to those residents who had not. Involving residents in commonly occurring tasks and procedures is a way of providing person- centred care. 	 Involve residents in everyday activities. [1.1] Design spaces that facilitate a range of varied, daily activities. [1.1, 4]



Reference	Study purpose and design	Key findings	Recommendations
Eijkelenboom A, Verbeek H, Felix E, et al. (2017) Architectural factors influencing the sense of home in nursing homes: An operationalization for practice. Frontiers of Architectural Research, Vol.6, No.2, pp.111-22.	Dutch study examined architectural factors that contribute to a sense of home. A systematic review of existing studies, and secondary analyses of 78 interviews with RACF residents, relatives and staff were conducted.	 Residents valued being able to personalise their private rooms. Furniture and photographs were identified as holding great emotional value to participants. Smaller resident density and family-style dining appear to increase feelings of belonging. Communal spaces can feel like waiting rooms, where their purpose is unclear or there are many unwelcome distractions. Personal effects such as tablecloths and photos can help make communal areas feel more homely. RACFs located in neighbourhoods that residents were familiar with were preferred. Inaccessibility and loss of familiar places that provided memories of experiences were negative factors for developing a sense of home. Outdoor spaces were important for sensory stimulation and activity. These included connection with chickens (e.g. pets or other animals). Balconies with views of green spaces, parks, children's playgrounds, streets or other buildings were desirable. Neutralised single-hue interiors without contrasting colours were undesirable. Sliding doors were preferred as they provide better access for people who use wheelchairs and can be shut or opened part-way. 	 All personalisation of spaces. [1.1] Interior design should preference contrasting colours. [1.6] Signal different rooms with different colours. Offer private rooms in small household settings. [2] Design communal spaces to look like homely living rooms. [2.8] Provide continuous walking routes. [1.7, 3.5] Provide access to green outdoor areas. [3] Provide uninhibited views of gardens and/or balconies. [3.2] Facilitate access to shops and stores in the neighbourhood. [4.1] Provide environments with low sensory stimulation.
Elmståhl S, Annerstedt L and Ahlund O (1997) How should a group living unit for demented elderly be designed to decrease psychiatric symptoms? Alzheimer	Research on the relationship between group home design and psychiatric symptoms in people with dementia. Participants included 105 people with dementia, average age 83 years who lived	 Residents in group B had less disorientation than group A and C at 6-month follow-up. At 12-month follow-up, group A residents (long straight corridors) had more dyspraxia, lack of vitality and disorientation of identity. 	 RACF design should avoid long straight corridors. [2.5] Wider corridors may help to reduce disorientation.



Reference	Study purpose and design	Key findings	Recommendations
Disease and Associated Disorders, Vol.11, No.1, pp.47-52.	at one of 18 homes. Of the RACF sites, 14 had a corridor-like design (group A), one had an L-shaped design (group B) and the others had a square or H-shaped design (group C).	 Homes that have a smaller proportion of communication area (size of hallways, includes alcoves etc.) had higher disorientation and lack of vitality. Thus, wider corridors might facilitate better orientation. Homelike environments did not appear to influence disorientation. 	
Etnier JL, Nowell PM, Landers DM, et al. (2006) A metaregression to examine the relationship between aerobic fitness and cognitive performance. Brain Research Reviews, Vol.52, No.1, pp.119-30.	Study sought to understand the underlying mediators of the relationship between aerobic fitness and cognitive performance by conducting a meta- analytic review.	 Gains in cardiovascular fitness have been shown to be associated with cognitive performance. However, this study did not find strong evidence to confirm this claim. Factors other than aerobic fitness may better support cognitive performance. 	 General physical activity should be encouraged to support cognitive function, however aerobic fitness specifically should not be prioritised. [3]
Fleming R and Bowless J (1987) Units for the confused and disturbed elderly: Development, design, programming and evaluation. Australian Journal on Ageing, Vol.6, No.4, pp.25-8.	Reviews the context underpinning the Richmond Report and 'new' Mental Health Act in NSW in the late 1980s and reviews the three developmental stages of the 27 special purpose units that were being built at the time to replace large institutions.	 Principles of the purpose-built units were small residences for up to eight people, domestic facilities, located within local communities to include residents within everyday life, low- stimulation interior design, single colour scheme rooms to support recognition and memory, simple layouts with visual access to all spaces, access to gardens, furniture and furnishings styled to reflect earlier decades. 	 Design with a domestic scale. [2]
Fleming R and Purandare N (2010) Long-term care for people with dementia: Environmental design guidelines. International Psychogeriatrics, Vol.22, No.7, pp.1084-96.	Review of academic literature that supports Marshall's schema for the design of supportive environments for people with dementia. Fifty-seven articles, published between 1980 and 2010 are included in the analysis.	 Several studies have not found evidence to support the link between small facilities and reduced incidence of behavioural disturbances. Evidence on the positive effects of controlling noise and overstimulation is strong. Common causes of overstimulation include busy doors or thoroughfares, clutter, loud noises including alarms, televisions and PA systems. Design features can reduce exit-seeking behaviour in people with dementia, while supporting feelings of choice and autonomy. 	 There is sufficient evidence to use Marshall's guiding principles for the design of long-term environments for people with dementia. Helpful stimulation for residents should be identified and included in design. [1] Visual access to facilities [2.4] and activities should be promoted.



Reference	Study purpose and design	Key findings	Recommendations
		 It is difficult to disentangle design features of RACFs from staff use of these features. For example, domestic-scale kitchens become more helpful if staff interact with residents in them. 	 Unobtrusive security features are recommended. [4.4]
Fleming R, Kelly F and Stillfried G (2015) 'I want to feel at home': Establishing what aspects of environmental design are important to people with dementia nearing the end of life. BMC Palliative Care, Vol.14, pp.26.	Australian study exploring the needs and wishes of people with dementia, their families, and those caring for them, regarding optimal environmental design. Research involved three focus group discussions informed by literature review, involving 18 people with direct experience of palliative dementia care. Thematic analysis of outcomes incorporated into a Delphi survey involving 21 dementia experts.	 Fifteen core environmental design features are identified. These included private spaces, spaces to host family and friends, and opportunities spiritual practice. Buildings with long corridors and 'nooks and crannies' were found to be unsafe as these features encouraged wandering. Wide corridors and wide doorways were vital for wheelchair accessibility. Design that enabled visual monitoring by staff was deemed important. Corridors should be used as circulation areas, not as places to gain privacy when there is none in rooms or other places. 	 Enable the person by facilitating movement, monitoring room temperature, and making toilets accessible. [1] Promote a sense of familiarity and homeliness. [1.1] Enable visual monitoring by staff – via human contact and not through the person being placed in a public area. [1.7] Corridors should be short and wide, with wide doorways, no alcoves or nooks and with easy visual monitoring. [1.7, 2.5] Provide a homelike environment. [2] Design should provide access to the outdoors/natural environment. [3] Indoor areas should also provide access to nature, for example, through plants, natural light, fresh air. [3.6] Provide opportunities for spiritual practice and social engagement. [4.2] Support staff, residents and visitors to find their way around. [4.3] Support safety and security. [4.4]



Reference	Study purpose and design	Key findings	Recommendations
Fleming R, Goodenough B, Low L- F, et al. (2016) The relationship between the quality of the built environment and the quality of life of people with dementia in residential care. Dementia, Vol.15, No.4, pp.663-80.	Australian study of environmental and personal characteristics associated with quality of life in people with dementia who live in RACFs. Data were obtained from 275 participants at 35 RACFs and analysed using linear regression. A secondary analysis was undertaken with data extracted from the Sydney Multisite Intervention of LaughterBosses and ElderClowns (SMILE) study.	 Residents at RACFs that participated in inside and outside activities were found to have higher quality of life, compared with facilities with limited activities. Characteristics that significantly contributed to self-reported quality of life were: provision of alternatives to wandering, familiarity, provision of spaces for engagement in domestic activities. 	 Provide a homely environment with familiar features. [2] Design walking routes that are easy to navigate. [1.7, 3.5] Domestic kitchens should encourage residents to engage in domestic duties should they wish. [2.3]
Garre-Olmo J, López -Pousa S, Turon-Estrada A, et al. (2012) Environmental determinants of quality of life in nursing home residents with severe dementia. Journal of the American Geriatrics Society, Vol.60, No.7, pp.1230-6.	Cross-sectional study on the impact of environmental factors on RACF residents' quality of life. The study was conducted in eight Spanish RACFs, with a random sample of 160 residents who had severe symptoms of dementia. Adjusted multivariate logistic regression analyses were conducted to examine associations.	 Quality of life scores were associated with the relationship between temperature in bedroom and number of hours spent there. The main types of noise identified were alarms, intercoms, ringing phones, loud television and crowds. Noise levels were associated with social interaction. However, high noise levels were associated with reduced social interaction. Low light levels in bedrooms as well as longer hours spent in bedrooms were associated with negative moods among residents. 	 Monitor lighting and temperature to ensure standards are met. [1.5] Minimise noise in common areas. [1.3]
Gitlin LN, Winter L, Burke J, et al. (2008) Tailored activities to manage neuropsychiatric behaviours in persons with dementia and reduce caregiver burden: A randomised pilot study. American Journal of Geriatric Psychiatry, Vol.16, No.3, pp.229-39.	Prospective randomised control study examining the impact of a tailored activity program on outcomes among people with dementia and their caregivers. Participants (n=60) were studied over 4- months living in the community as well as living in RACFs.	 The activity program was linked with reduced frequency of negative behavioural occurrences. People who accessed the activity program were reported to be more engaged, be able to keep busy and showed a trend to improved quality of life compared with people who did not access the program. The activity program did not appear to impact upon depressed moods. 	 Design tailored activities to maintain and build upon the existing capacities of RACF residents. [2, 3, 4]
Goring S and Loshak H (2021) Homelike models of long-term	Review of recent publications that address the comparative clinical effectiveness of	 Among the six studies reviewed, inconsistent associations between psychosocial outcomes 	 Homelike models of care should be prioritised, however there is an



Reference	Study purpose and design	Key findings	Recommendations
care: A 2021 update. Canadian Journal of Health Technologies, Vol.1, No.11.	homelike care models compared with traditional RACFs, cost effectiveness and evidence-based guidelines. Six research studies published between May 2019 and October 2021 met inclusion criteria. No studies on cost effectiveness or guidelines were identified.	 and homelike models of care were noted. Researchers explained these variations in relation to heterogeneous or poorly documented models of care, differing staffing and implementation levels and other disruptions to care. Evidence of increased social interaction in homelike care models was mixed. Evidence of reduced psychotropic drug use in homelike care models was mixed. COVID-19 transmission was considerably less common in homelike care models, compared with traditional larger-scale RACFs. Researchers explained this as pertaining not only to small size of facilities, but features such as ensuites, smaller care teams, and fewer admissions. Some evidence of reduced falls risk among residents with cognitive impairments was reported by Zimmerman et al. (2019), however generalisability of this finding was limited as the model of homelike care in the German nursing 	 apparent need for more evidence of their specific benefits. [2] Different models of homelike care need to be clarified to better identify the specific strengths and weaknesses of models.
Guo J, Yanai S and Kodama T (2022) Factors influencing the use of and attitude toward community gardens in aged care facilities: The managers' perspective. Urban Forestry and Urban Greening, Vol.70, pp.127524.	Cross sectional survey-based study involving 44 managers of elderly housing care services across Tokyo about community gardens.	 Garden use was positively associated with garden area, the number of garden equipment types, barrier free design, interaction, community aesthetic and enough garden members. High frequency use of gardens was also associated with younger age of the building and improved education about food and agriculture. Managers tended to have more negative attitudes about gardens in RACFs where residents managed the garden. 	 Community gardens should be well-maintained. [3] Various types of garden equipment should be available. Smooth, wide pathways, shaded areas and adequate lighting should be prioritised. [3.5]



Reference	Study purpose and design	Key findings	Recommendations
Hadjri K, Faith V and McManus M (2012) Designing dementia nursing and residential care homes. Journal of Integrated Care, Vol.20, No.5, pp.322-40.	Study involving a postal survey of 53 RACF and nursing home managers in Northern Ireland to assess their perceptions of facility alignment with the Dementia Services Development Centre's dementia- friendly design essential criteria.	 Design of ensuite toilets and bathrooms was found to be one of the five main design flaws in aged-care facilities. Of nursing homes and RACFs in this study, 85% used toilet seat colours that contrasted with the toilet bowl and 65% used colours that contrasted with the floor. In RACFs, approximately 65% used visual signage for display items (such as toothpaste, shampoo etc.) to signal the function of the room. 	 Contrast toilet seat and floor colours to improve toilet visibility. [1.6, 1.10, 2.7] Use visual signage for toilet, bathroom and bathroom items. [1.10]
Harrison SL, Bradley C, Milte R, et al. (2018) Psychotropic medications in older people in residential care facilities and associations with quality of life: a cross-sectional study. BMC Geriatrics, Vol.18, No.1, pp.60.	This study investigated quality of life, use of medical services and care costs. Cross- sectional national retrospective study of residents in 17 aged care homes. Four clustered domestic models of care were compared with 13 standard Australian models of residential aged care.	 Comparatively less ad hoc psychotropic medications were administered in the small- group, home-like model. Living in clustered models of care was associated with higher quality of life and lower hospitalisations and emergency department presentations compared to standards models of care - with no additional care costs. 	 Design with a domestic scale. [2]
Hauge S and Kristin H (2008) The nursing home as a home: a field study of residents' daily life in the common living rooms. Journal of Clinical Nursing, Vol.17, No.4, pp.460-7.	Field study of the nursing home "as a home" concept. Data were collected in 1999 through observation and interviews with 24 residents in two long-term units in a traditional nursing home, in Norway.	 Home-like environments have clear distinctions between private and public spaces. Having an ambiguous boundary between public and private spheres resulted in forced relationships. In this context, residents who were mobile tended to withdraw from the common living area. A living room with no home-like signals, such as personal photographs, can lead to it being experienced as neither public nor private space. Living rooms with 12 or more residents all together were not conductive to communication between residents. 	 Residents should have private living areas that they have control over. [2] "Define the living room as a clear public area and to give the residents a chance to develop a more private lifestyle by alternating between their private rooms and a public common living room." Generate a home-like environment by displaying the symbols of private living spaces, such as flowers, candlesticks, personal



Reference	Study purpose and design	Key findings	Recommendations
			 photos, cushions and knick-knacks. [1.1] Provide residents with spaces suited to small group activities. [4.2]
Hayne MJ and Fleming R (2014) Acoustic design guidelines for dementia care facilities. Proceedings of 43rd International Congress on Noise Control Engineering, Australian Acoustical Society.	Explores the role that noise plays in influencing how people with dementia interpret their surroundings. Authors provide guidelines for the acoustic design of dementia care facilities.	 Hearing impairment is very common among RACF residents. There is strong evidence that problematic behaviours and agitation among people with dementia is caused or exacerbated by too much or too little stimulation. 	 Manage noise from external and internal sources, including for e.g. when testing alarms. [1.3] Acoustic design can support the following Environmental Audit Tool design principles: reducing unnecessary stimulation, highlighting helpful stimuli, providing for planned wandering, providing a familiar environment, offering opportunities for a range of social interactions, and encourage links with the wider community.
Heath Y (2004) Evaluating the effect of therapeutic gardens. American Journal of Alzheimer's Disease and Other Dementias, Vol.19, No.4, pp.239-42.	Identifying the intended use of and actual use of therapeutic gardens by their visitors is this study's objective. A post occupancy evaluation elicited the opinions of 67 residents at a care home with eight gardens in Canada. Staff and volunteers and family members engaged with the RACF filled out questionnaires (n=173, return rate 25.5%). Seventeen residents were also interviewed.	 Of respondents, 83% had visited at least one of the gardens and 97% liked the gardens. Respondents desired space to participate in gardening activities. Safety aspects (wheelchair access and handrails) were met. However, difficulty of wheelchair access and no automatic doors were a barrier. Inadequate handrails and water features were often viewed as safety issues. Shade was inadequate. Visitors were more likely to use gardens than residents or volunteers. 	 Accessibility to gardens and greenery is important. Signage, maps and automatic doors can assist. [3] Staff training and improving awareness of the gardens was also important. A simple open space with softer surfaces (lawn) may be more effective than more landscaped structures.



Reference	Study purpose and design	Key findings	Recommendations
Hermer L, Bryant NS, Pucciarello M, et al. (2017) Does comprehensive culture change adoption via the household model enhance nursing home residents' psychosocial well- being? Innovation in Aging, Vol.1, No.2, pp.igx033.	Prospective cohort study conducted at three nursing homes (one household model and two controls). Residents were matched at baseline on clinical and demographic characteristics.	 Residents in the household model home displayed a positive affect and active engagement in the dining room. 	 Make dining areas intimate, familiar spaces. [1.3, 2.4] Provide appetising food at all times of day.
Hrybyk G, Rubinstein R, Eckert K, et al. (2012) The Dark Side: Stigma in purpose-built senior environments. Journal of Housing for the Elderly, Vol.1, No.26 (1-3), pp.275-89.	Five-year ethnographic study contrasting two design profiles: a purpose-built campus which opened in 1997 in the States, and an older setting that grew by accretion over decades. Data were collected through observation, interviews and field notes.	 A purpose-built assisted living campus was referred to as "the dark side" by the neighbouring independent living units. Design features can mitigate or aggravate stigma. 	 Consider how design influences RACF culture. Understanding how stigma manifests in various physical environments may lead to changes that improve the lives of current and future residents in collective living settings.
Hung L, Chaudhury H and Rust T (2016) The effect of dining room physical environmental renovations on person-centered care practice and residents' dining experiences in long-term care facilities. Journal of Applied Gerontology, Vol.35, No.12, pp.1279-301.	Canadian study examining changes to care practice corresponding with the renovations of kitchen and dining areas in two RACFs. Methods were focus groups with staff (nurses, care aids and food service workers) and interviews with unit managers from two care units (a dementia special care unit and a non-special care unit) of a large long-term facility.	 Open kitchen design, including accessible coffee machine and fridge, were important in promoting resident autonomy and food choice. Residents spent more time dining and ate more post renovation. There was a tension between safety concerns and allowing risk taking to support resident autonomy. 	 Domestic-scale kitchens are preferable as they enhance resident autonomy and choice. [2.3] Domestic-homelike atmospheres can enhance familiarity and social engagement. [2]
Igarashi M, Song C, Ikei H, et al. (2015) Effect of stimulation by foliage plant display images on prefrontal cortex activity: a comparison with stimulation using actual foliage plants. Journal of Neuroimaging, Vol.25, No.1, pp.127-30.	Eighteen female Japanese university students participated in an experiment where Oxy-haemoglobin concentrations in the prefrontal cortex were measured using infrared spectroscopy while the subjects viewed real plants or a projected image of the same plants.	 Viewing foliage and plants significantly increased oxy-haemoglobin concentrations in the prefrontal cortex. Access to plants may have psychological benefit. Plants provide stress relief in homes and offices. 	 Access to gardens and garden vistas are likely to have physical and mental health benefits. [3]



Reference	Study purpose and design	Key findings	Recommendations
Innes A, Kelly F and Dincarslan O (2011) Care home design for people with dementia: What do people with dementia and their family carers value? Aging and Mental Health, Vol.15, No.5, pp.548-56.	Aspects of care home design were studied through a method involving six focus groups with RACF residents and family/carers. A total of 40 people participated, including 29 people with dementia and 11 family/carers.	 Residents commented favourably on the presence of children and animals (dogs) in the building. The presence of children was perceived as positive. One resident suggested that the grounds should have a playground where residents could help participate in childcare. 	 Provide community contact and normal things to do, such as interaction with pets and other animals. [4]
Innes A, Page SJ and Cutler C (2016) Barriers to leisure participation for people with dementia and their carers: An exploratory analysis of carer and people with dementia's experiences. Dementia, Vol.15, No.6, pp.1643-65.	Qualitative study to explore barriers to leisure activities for people with dementia. Focus groups included a total of 48 people, of which 16 were people with dementia and the remainder were carers.	 Lack of transportation, particularly public transport, is a key barrier to accessing the wider community. Transport interconnects with various barriers and enablers (e.g. time constraints, navigation). When public transport was available, some people with dementia were able to make their way home even after becoming lost. A facility with its own minibus could also facilitate travel. Availability of public transport is important to reduce social isolation for people with dementia. 	 Offer various transport options to access the neighbourhood. [4.1]
Isaksson U, Astrom S, Sandman PO, et al. (2009) Factors associated with the prevalence of violent behaviour among residents living in nursing homes. Journal of Clinical Nursing, Vol.18, No.7, pp.972-80.	Research investigated the association between environmental, organisational, resident and caregiver factors and resident violent behaviour in nursing home wards. A cross-sectional survey design was used, studying 10 nursing homes with 33 wards.	 Wards with higher prevalence of violent behaviour had less experienced workers on staff. These staff tended to report less job satisfaction, had more residents, lower caregiver to resident ratios and longer corridors. Caregivers in larger wards also experienced more difficulty in supervising residents. 	 Domestic scale with shorter corridor layouts is recommended. [2]
Ittelson WH, Proshansky HM and Rivlin LG (1970) Bedroom size and social interaction of the psychiatric ward. Environment and Behavior, Vol.2, No.3, pp.255-70.	A study in three psychiatric wards in the private, city and state in the US. An observational study recording location, participants, time and activity at 15- minute intervals during the day (9 hours of observation). The overall aim was to	 Number of patients using their bedrooms increased proportionately to the number assigned to the rooms. Smaller rooms encouraged more social activity. Patients in larger rooms were far more likely to be engaged in isolated passive behaviour. 	 Design with a domestic scale to provide more autonomy and freedom of choice. [2]



Reference	Study purpose and design	Key findings	Recommendations
	provide insight into the planning and design of psychiatric facilities.	 Large, multiple-occupancy rooms (not private rooms) can result in patient's withdrawal. 	
Jonsson O, Östlund B, Warell A, et al. (2014) Furniture in Swedish nursing homes: A design perspective on perceived meanings within the physical environment. Journal of Interior Design, Vol.39, No.2, pp.17-35.	Study explored how people interact with RACF furniture. Thematic interviews were carried out at three Swedish nursing homes with residents and personnel (n=21).	 Residents emphasised the need and preference for physical comfort. Chairs with dimensions that did not fit the body shape where a major problem. Staff and resident perspectives on "good" furniture differed. 	 Involve elderly people in design processes and allow choice of furniture. [2.8] Consider evidence when purchasing furniture for RACFs. [1.9]
Joosse LL (2012) Do sound levels and space contribute to agitation in nursing home residents with dementia? Research in Gerontological Nursing, Vol.5, No.3, pp.174-84.	Observational study examined the relationship between sound levels, personal space and agitation in people with dementia. Fifty-three residents from nursing homes in the United States were observed.	 Noise is associated with increased agitation among people with dementia. Expressions of agitation may be a way for residents to express that their environment is too loud. 	 Staff rooms should be designed to reduce associated noise from impacting residents. [1.3] Nursing staff need to increase their awareness of how the sounds they create may have an impact on the levels of agitation in those they care for.
Kane RL, Bershadsky B, Kane RA, et al. (2004) Using resident reports of quality of life to distinguish among nursing homes. Gerontologist, Vol.44, No.5, pp.624-32.	Study correlated facility characteristics with QOL scores. The sample involved 40 RACFs from five US states.	 "Having a higher percentage [≥70%] of private rooms is associated with better average scores on comfort and privacy [out of 10 QOL domains]". 	 Design RACFs with private bedrooms to improve comfort and privacy. [2.6]
Keady J, Campbell S, Barnes H, et al. (2012) Neighbourhoods and dementia in the health and social care context: a realist review of the literature and implications for UK policy development. Reviews in Clinical Gerontology, Vol.22, No.2, pp.150-63.	Review of articles that link experiences of living with dementia to the environmental characteristics of neighbourhoods. Fourteen articles originating in the UK were included in the review.	 We need to think beyond the physical attributes of outdoor spaces. Instead, the researchers propose thinking of them as social spaces and sources of weak and strong ties that are meaningful and valued by people with dementia. 	 Further research is needed to build an evidence base for the role that neighbourhoods play in the lives of people with dementia.
Kearney AR and Winterbottom D (2006) Nearby nature and long-	Qualitative study on benefits derived from green spaces and barriers to using the	 Vegetation and landscaping (e.g. raised planters) can be used as natural boundaries, 	 Provide easy access to green outdoor spaces. Avoid landscaping



Reference	Study purpose and design	Key findings	Recommendations
term care facility residents. Journal of Housing for the Elderly. Vol. 19, No.3-4, pp.7-28.	spaces. Forty residents from three different urban long-term care facilities were recruited. Interviews with residents sought to understand the importance of outdoor green spaces and experiences within the facility, residents' use and perceptions of outdoor spaces.	 however, high fences may reduce residents' ability to have a view across the landscape, leaving such areas unused. Mobility issues, design and limited staffing prevent residents from accessing outdoor spaces. The average resident spends a 'moderate' amount of time looking out a window each day. Views of nature were highly valued, including views of gardens/plants, followed by birds, views of people, landscape/scenery, weather, animals and sky. 	 (e.g. high fences) that reduce visual access. [3] Improve legibility of circulation, i.e. visual access. Avoid high pattern pavers that can be confusing to residents. Orient windows towards views of nature. Provide adequate shelter outdoors.
Keefe J, Dill D, Ogilvie R, et al. (2017) Examining a "Household" model of residential long-term care in Nova Scotia. Health Reform Observer, Vol.5, No.1, pp.1-10.	Investigation of the impacts of the 'household' model of care implemented in Nova Scotia (9-16 residents with a kitchen/dining area and living room space, staffing approach). A resident survey measuring quality of life was conducted across 23 sites, including 'new full-scope', new-augmented, and 'traditional' nursing homes (residents=319, families=397, staff=862).	 Residents, family and staff rated resident quality of life more positively in the household model sites. Measures of 'home-likeness' and 'relationships' were significant predictors of resident quality of life. 	 Design with a domestic scale. [2]
Konis K (2018) Field evaluation of the circadian stimulus potential of daylit and non-daylit spaces in dementia care facilities. Building and Environment, Vol.135, pp.112-23.	To analyse the relationship between light exposure and circadian rhythms, researchers measured morning light exposures in daylit and non-daylit spaces in biologically meaningful units at 8 dementia units over 13 weeks. A measurement protocol for light exposure and the "circadian efficacy" of various indoor lighting conditions was developed.	 Significant improvements to circadian stimulus potential and efficiency were associated with daylit spaces. Distance from windows has a significant impact on biological and alerting effects of daylight. View orientation is generally not measured in standard daylight performance measures such as Useful Daylight Illuminance or Spatial Daylight Autonomy. However, this study found that view orientation significantly impacted circadian stimulus potential. 	 Distance from windows and orientation of view should be factored into daylight exposure. [1.5, 3.6] Provide regular access to daylit spaces in the morning, specifically within 3m from windows.



Reference	Study purpose and design	Key findings	Recommendations
Kunasekaran M, Quigley A, Rahman B, et al. (2022) Factors associated with SARS-CoV-2 attack rates in aged care: A meta- analysis. Open Forum Infectious Diseases, Vol.9, No.3, pp.ofac033.	Meta-analysis of the relationship between COVID-19 cases in residents and staff and the physical layout of aged care facilities - including 41 articles across 11 countries.	 Single-site facilities have higher COVID-19 case numbers than sites with multiple, detached units. 	 Infection control policies should consider appropriate modifications to institution-like single-building facilities with multiple occupancy rooms. [2]
Kwok T, Bai X, Chui MY, et al. (2012) Effect of physical restraint reduction on older patients' hospital length of stay. Journal of the American Medical Directors Association, Vol.13, No.7, pp.645- 50.	Researchers examined 2,000 patient records to assess the use of physical restraint and length of hospital stay with clinical outcomes.	 Physical restraint reduction is associated with significant reduction in average length of stay in convalescent medical wards. After implementation of the restraint reduction scheme, the rate of physical restraint use declined significantly from 13.3% in 2007 to 4.1% in 2009 for all patients. Reduction in length of hospital stay was significant in the cognitively impaired patients but not in the cognitively normal patients. 	 Employ alternatives to physical restraints.
Lawton MP (2001) The physical environment of the person with Alzheimer's disease. Aging and Mental Health, Vol.5, Sup.1, pp.S56-64.	Paper critically appraises a range of methods used in the research about environmental design for RACFs.	 Researchers have sought to generate data on the association of RACF designs and residents' health, behaviours and satisfaction through a variety of methods. Various features and utilities are outlined for the following methods: consumer surveys, direct behaviour observation, expert judgments, experimental design and randomised trial studies. 	 Use systematic qualitative observational methods to generate evidence of best practice dementia-friendly design.
Lawton MP, Fulcomer M and Kleban MH (1984) Architecture for the mentally impaired elderly. Environment and Behavior, Vol.16, No.6, pp.730-57.	Observational study of RACF residents with significant impairments, to develop a model for post-occupancy evaluation. Comparisons were sought between traditional nursing home environment and a new building, where bedrooms surrounded a large common living room. RACF staff and residents' families were	 In the new building with clustered rooms visitor numbers doubled. Researchers hypothesised that this was on account of more privacy in the new building and a more pleasant environment. Reductions in patient care activities were observed in the new building. This was explained by the new ability of staff to oversee residents from a single vantage point. 	 Design with a domestic scale. [2]



Reference	Study purpose and design	Key findings	Recommendations
	also invited to complete a short questionnaire.	 Staff were critical of the following design features that they felt made communication more challenging: hard terrazzo floors, common public-address system, open rooms that diffuse noise. In the new setting, residents appeared more independently stimulated as they were observed to look around more. 	
Lee S, Chaudhury H and Lee S (2014) Effect of physical environment on the behaviors of residents with dementia: A comparison between a small- group unit and a traditional care unit. Journal of Civil Engineering and Architecture, Vol.8, No.11, pp.1353-63.	Two dementia care units in Vancouver, Canada (one traditional with 30 residents and one small scale with 12 residents) were compared using physical environment assessments. Resident behaviours were measured using three different assessment tools. These behaviours were then correlated with features of the RACF built environments.	 Residents living in a domestic-scale environment were more engaged in activities and more likely to socialise with other residents. Observations of large and domestic-scale facilities noted that residents in the latter appear more content. The familiarity of the homelike small-scale environment could help reduce withdrawn and apathetic behaviours among residents. Differences in nutrition outcomes were observed between a large RACF and a RACF designed with smaller, domestic-scale environment. Domestic-scale environments may make dining more enjoyable. 	 Design with a domestic scale. [2]
Leung M, Wang C and Famakin IO (2021) Integrated model for indoor built environment and cognitive functional ability of older residents with dementia in care and attention homes. Building and Environment, Vol.195, pp.107734.	Study investigates how the indoor built environment influences cognitive functional ability of older people with dementia. Interviews with 96 residents from eight homes in Hong Kong were conducted.	 Building temperature positively influenced the self-care and mobility of older residents with dementia. It is beneficial for residents to be able to regulate their body temperature and feel comfortable completing everyday tasks, such as toileting, dressing, grooming, eating, and moving about. Temperature should be controlled more strictly and at a higher level than would be necessary for the needs of young adults to properly satisfy 	 Temperature in RACFs should be high enough to enable residents to wear lightweight clothes, to lessen the difficulty of taking care of themselves. [1.11] Use air-conditioning with automatic temperature adjustment during the summer period.



Reference	Study purpose and design	Key findings	Recommendations
		the needs of older people with deteriorated thermoregulatory functions and low physical activity levels.	
Liao M-L, Ou S-J, Heng Hsieh C, et al. (2020) Effects of garden visits on people with dementia: A pilot study. Dementia, Vol.19, No.4, pp.1009-28.	Mixed methods pilot study of the benefits of a natural environment, such as gardens, for people with dementia. Forty-two staff in nine dementia care facilities with gardens/outdoor areas answer a semi- structured questionnaire. Questionnaire items included Likert scale and open text answers. Two RACFs permitted free garden use while seven forbade independent movement into and out of the garden.	 Facility staff associated garden access with improvements in mood, less depression, higher social interaction and less agitation. The garden and its natural features were often a topic that initiated conversation. Characteristics of the natural environment enhance cognitive abilities. Positive effects were observed among residents with free garden use facilities compared to those with unfree garden use. 	 Gardens are crucial for residents in dementia care communities, improving mood, social interaction and reducing behavioural problems. [3] Allows residents independent garden use.
Low L-F, Draper B and Brodaty H (2004) The relationship between self-destructive behaviour and nursing home environment. Aging and Mental Health, Vol.8, No.1, pp.29-33.	The relationship between environmental factors in nursing homes and residents' self-destructive behaviours was explored in this cross-sectional study conducted in 11 nursing homes in Sydney with 647 residents.	 Uncooperativeness among residents was associated with environments in which residents were more dependent on staff for care and more likely to live in a shared room. Predictors of overall levels of behavioural disturbance appear to correlate with predictors of self-destructive behaviours. 	 Design features that support independence and cognition among residents with dementia should be adopted. [2.2] Staff training and relevant policies are also important in managing residents with dementia.
Low L-F, McGrath M, Swaffer K, et al. (2019) Communicating a diagnosis of dementia: A systematic mixed studies review of attitudes and practices of health practitioners. Dementia, Vol.18, No.7-8, pp.2856-905.	Qualitative study of practitioners' practices and attitudes in relation to dementia diagnosis. Empirical data was collected through interviews with 25 practitioners, and existing qualitative literature on the subject was also analysed.	 Practitioners were found to be guided by their own beliefs, patient circumstances, features of the health and social care system, and cultural norms when deciding to diagnose dementia. 34% of general practitioners and 48% of specialists routinely tell persons with dementia of their diagnosis. In over half of cases, practitioners do not tell patients their diagnosis. Practitioners were discouraged from sharing dementia diagnoses by the perceived absence of therapeutic interventions for early and mid- stage dementia. 	 Guidelines and practitioner training on how to deliver dementia diagnoses should be developed. Promotion of therapeutic interventions and allocation of appropriate resources for patients and practitioners is important. Improve the evidence base for interventions for early and mid- stage dementia.



Reference	Study purpose and design	Key findings	Recommendations
Lowndes R, Armstrong P and Daly T (2015) The meaning of 'dining': The social organization of food in long-term care. Food Studies, Vol.4, No.1, pp.19-34.	Ethnographic study on food provision and the dining experience in two public long- term care facilities in Canada.	 Low funding for food and for staffing limited the quality of resident dining experiences. Standardising regulations were also seen to impede quality dining experiences because they encouraged focus on monitoring intake, rather than making meal-times enjoyable. Fixed seating positions reduced resident autonomy. The absence of appliances, and locked cabinets and refrigerators encouraged resident dependence. 	 Facilitate social and cultural aspects of eating by offering flexibility and independence in the dining experience. [2] Staffing levels should allow residents to eat at their own pace.
Lu Z (2010) Investigating walking environments in and around assisted living facilities: A facility visit study. HERD, Vol.3, No.4, pp.58-74.	Study exploring factors that enhance residents walking behaviours. Twenty-six Texas-based assisted living facilities with over 10 beds each participated. Research involved on-site observation, a survey and interviews with administrators.	 Residents' walking behaviours may be assisted by handrails, staggered seating and signage. Outdoor seating along walking paths provides options for resting, affords a sense of confidence for those who are unsure how far they can walk, and encourages social interaction. Relatively few facilities had covered walkways and attractive outdoor features such as gazebos, pools and fountains. 	 Looped corridors, comfortable seating and continuous handrails are recommended ways to encourage indoor walking. [1.7] Place seating along outdoor paths and corridors. [2.5, 3.5] Provide features such as adequate shelters outdoors that may encourage walking. [3]
Ma N, Chau H-w, Zhou J, et al. (2017) Structuring the environmental experience design research framework through selected aged care facility data analyses in Victoria. Sustainability, Vol.9, No.12, pp.2172.	Case study exploring the relationship between experience design and environmental psychology in an aged care home in Victoria. The authors developed an environmental experience design (EXD) research framework matrix.	 Promoting friendly, comfortable and welcoming living conditions for residents included having the nurse's station situated away from resident's areas. Staff also have a break room that is separate from the nurse's workstation. Residents benefit from access to outdoor areas in a range of ways including visual access, free air, natural fragrances and sounds. 	 Nurse's stations should be separate from residents' general living areas. [2.9, 2.10] A dedicated staff room for rest breaks should be provided. Outdoor areas should be accessible. [3.2] Provide communal spaces in gardens. [3.1]



Reference	Study purpose and design	Key findings	Recommendations
Marquardt G and Schmieg P (2009) Dementia-friendly architecture: Environments that facilitate wayfinding in nursing homes. American Journal of Alzheimer's Disease and Other Dementias, Vol.24, No.4, pp.333- 40.	Observational study of nursing home layouts (straight, square, L shaped, intermediate elements and corridor ending) and their impact on wayfinding scores were analysed. Study sites included 30 German nursing homes, with 450 residents. Nurses rated the ability of people with dementia to find their way.	 Number of residents and the size of the living area had the most significant impact on resident's navigation. Residents were able to find their way better in a straight circulation system than in one that had a change in direction. Residents' ability to find their way increased if the whole corridor could be overseen from any point in the living unit. Eliminating unnecessary alcoves and recesses also improved navigation. People with severe symptoms of dementia are reliant on features of their lived environment to assist navigation. One kitchen area, as opposed to more than one, served as an anchor point for wayfinding. A straight layout was also found to be supportive of finding bedrooms. Smaller facilities appeared to enhance resident ability to locate gardens and balconies. Residents' ability to locate the outdoor space appeared to increase if it was close to or in view from the living area, however this finding was not statistically significant. 	 Straight corridors are recommended and changes in direction should be minimised. [1.7] Design should involve a central living/dining/kitchen area. [2] Smaller number of residents per living area makes navigation easier. [2] Architectural features should be distinct, memorable and make the purpose of the room legible by its size, proportion, materials and furnishings. [2.8] Corridors should be straight circulation systems with no directional changes or alcoves. [2.5] Bedrooms and toilets should be marked with signage and door markings. Balconies and siting areas should be on terraces to allow staff to supervise residents. [3] Design should hide features that residents should not find. [4.4]
Marquardt G (2011) Wayfinding for people with dementia: A review of the role of architectural design. HERD, Vol.4, No.2, pp.75- 90.	Review of architectural wayfinding design literature for people with dementia living in RACFs. Two features of architectural design are explored: design of floor plan typology and environmental cues.	 A range of building and environmental features that support orientation were identified. For buildings, these include direct visual access, reference points and cues, places with clearly different functions, spatial proximity of different rooms. For environments, these include signage and the positioning of personal items. 	 Floor planning should consider desirable influences on residents' spatial orientation and limit undesirable ones. [1.7] Simple and clear floor plans are recommended. [2]



Reference	Study purpose and design	Key findings	Recommendations
		 Long corridors, changes in the direction of circulation, repetitive elements and cluttered information were listed among the features detrimental to residents' orientation. 	 Reduce clutter and repetitive visual elements. [1.2] Use visual cues, for example, visually distinguish between rooms with different functions, and position items to signal functions of rooms. [2.8, 4.3, 4.4] Reduce reliance on written signage.
Marquardt G, Bueter K and Motzek T (2014) Impact of the design of the built environment on people with dementia: an evidence-based review. HERD, Vol.8, No.1, pp.127-57.	Systematic literature review on the impact of domestic-scale RACF environments on people with dementia. The review included 169 studies.	 Of thirty studies on resident behaviour, the majority documented associations with reduced behavioural disturbances among residents. However, four studies did not find this association and one found to the contrary. Of eleven studies on cognition, six documented an association between domestic-scale environments and improvement or maintenance of cognition. Others showed primarily inconclusive results. Eleven studies examined function, with nine reporting beneficial impacts on the performance of everyday activities associated with domestic-scale RACFs. Wellbeing was examined in 12 studies, the majority showed evidence of improved mood and a decline in depressive symptoms. Fourteen considered social abilities, and 12 of these studies provided evidence of improved mood social abilities among residents as associated with their domestic scale living environment. Relatively few studies reviewed considered navigation and care outcomes. Evidence of positive association between light therapy and reductions in behavioural 	 Residential household and domestic-scale environments are recommended. [2] Environments with regulated noise and other stimulation are preferable. [1.3] Regulated light exposure should be considered. [1.5]



Reference	Study purpose and design	Key findings	Recommendations
		 disturbances; cognition; wellbeing; and care outcomes such as sleep was substantiated in several studies. Minimising noise was associated with reduced aggressive and disruptive behaviour in most studies. Studies found inconclusive evidence on the impact of noise on wellbeing, social abilities and care outcomes such as food intake. 	
Marsden JP, Meehan RA and Calkins MP (2001) Therapeutic kitchens for residents with dementia. American Journal of Alzheimer's Disease and Other Dementias, Vol.16, No.5, pp.303- 11.	Exploratory investigation of the features of a therapeutic kitchen. Case studies of three assisted living facilities and 85 short questionnaires completed by nursing home and assisted living facility staff are analysed.	 Universal design and accessibility of the kitchen to resident rooms was the best reported feature of therapeutic kitchens. Counter areas and kitchen cabinets should be wheelchair accessible. The 'best' feature of kitchens was most reported to be their 'homelike' appearance. Homeliness was linked to the kinds of appliances and the décor, cabinetry, furnishings, greenery and views from windows. Protective devices can be used to ensure stoves, ovens and cook-tops are safe, and dangerous chemicals, medicines and utensils are separated from accessible kitchen elements. Residents were more likely to participate in recreational activities such as baking, than they are to participate in chores such as washing dishes. Therefore, household chores may be a less effective element in therapeutic programs. 	 Reinforce homelike imagery and enhance safety. [1.1] Kitchens should not only be linked to food service but can also be the focus of activities for residents. [2.3] Prioritise recreational and fun activities using the domestic-scale kitchens.
Marshall M (2011) Designing balconies, roof terraces, and roof gardens for people with dementia. Journal of Care Services Management, Vol.5, No.3, pp.156-9.	Expert commentary discusses the importance of being able to access outdoor spaces, especially for people with dementia. It looks at risks and benefits.	 The benefits of being outside include fresh air, vitamin D, human rights, bright light, quiet, nature, behaviour and mental health and something to do. There is tension between the benefits of access to outside and the risks of falling. 	 Features for the design of balconies, roof terraces, and roof gardens are recommended. [3.3]



Reference	Study purpose and design	Key findings	Recommendations
Matsumoto H, Igarashi A, Suzuki M, et al. (2019) Association between neighbourhood convenience stores and independent living in older people in Japan. Australasian Journal on Ageing, Vol.38, No.2, pp.116-23.	Study explores the association between the number and location of convenience stores and shopping independence among older people. Long-term care insurance data for 7,703 older adults in Japan and location data of shops in their neighbourhoods were examined with multilevel regression analyses.	 Geographical accessibility of convenience stores may be beneficial for maintaining shopping independence. Access to convenience stores and supermarkets appears to be more important for supporting resident independence compared with access to other kinds of shops. 	 Prioritise access to local convenience stores and supermarkets. [4.1] Tailor supermarkets and convenience stores to be more age friendly to assist older people, e.g. downsize and expand the range of services provided. [4.2]
Melin L and Götestam KG (1981) The effects of rearranging ward routines on communication and eating behaviors of psychogeriatric patients. Journal of Applied Behavior Analysis, Vol.14, No.1, pp.47-51.	Experimental study of RACF residents in different environmental conditions. Patients were divided into experiment and control groups. Both groups were observed under the same baseline conditions for two weeks, before the experimental group was exposed to different furniture arrangements (after one week), longer mealtimes and choices of food and drinks, and more access to physical surrounds (after two weeks). Frequency of touch, communication and eating behaviours were counted across both groups.	 Minor changes in physical environments can impact upon behaviours. Considerable increases in communication were observed in the experimental group for whom mealtimes, seating and choice of food were more flexible. Giving residents more choice also appears to encourage communication with each other and with staff. 	 Provide small table setting arrangements and offer residents choices of food, drinks and mealtimes. [2]
Mitchell L and Burton E (2006) Neighbourhoods for life: Designing dementia friendly outdoor environments. Quality in Ageing, Vol.7, No.1, pp.26-33.	Dementia-friendly outdoor environments were the focus of this research. The study examined how people with dementia interact with outdoor environments, how they understand and feel about outdoor environments. Researchers conducted structured interviews with participants and participant observation which involved walking with participants in their neighbourhoods.	 Familiarity plays an important role in orienting people with dementia. Clarity of the functions of spaces assisted people with dementia more than the style (i.e. traditional or modern). Participants preferred small-scale, mixed use neighbourhood settings. 	 Familiarity, legibility, distinctiveness, access, comfort and safety should underpin outdoor environment design.



Reference	Study purpose and design	Key findings	Recommendations
McGilton KS, Escrig-Pinol A, Gordon A, et al. (2020) Uncovering the devaluation of nursing home staff during COVID- 19: are we fuelling the next health care crisis? Journal of the American Medical Directors Association, Vol.21, No.7, pp.962- 5.	Editorial written by 22 representatives of an international consortium of long-term care researchers. Article advocates for an international data infrastructure to monitor RACFs and aims to point out areas of improvement in the interests of residents and care worker wellbeing.	 RACFs are chronically understaffed and underfunded. The COVID-19 pandemic has highlighted the importance of RACFs' healthcare functions. Insufficient access to PPE has been widely reported during the COVID-19 pandemic. RACF staff need easy online access to up-to-date information during local outbreaks. 	 Provide clear directions and guidance during outbreaks of COVID-19. Ensure staff have up-to-date information during an outbreak. Strategies to keep staff healthy include providing daily meals and promoting stress relieving activities. [2.10]
Mmako NJ, Courtney-Pratt H and Marsh P (2020) Green spaces, dementia and a meaningful life in the community: a mixed studies review. Health and Place, Vol.63, pp.102344.	Evidence review on the impacts of green spaces among people living with dementia. Nineteen studies are included.	 Gardens and horticultural programs, green care farms, parks, urban woodlands and neighbourhood outdoor environments can impact positively in several ways. For example, they can support residents to engage in meaningful activities, foster empowerment, positive risk-taking, and reinforce identity. 	 Provide access to the outdoors. [3]
Molony SL, Evans LK, Jeon S, et al. (2011) Trajectories of at- homeness and health in usual care and small house nursing homes. Gerontologist, Vol.51, No.4, pp.504-15.	Longitudinal study to compare outcomes among residents (n=25) who moved from a traditional nursing home (100 beds) to a small house model (n=15) in the US. Various validated scales were used including Minimum Data Set and Activity of Daily Living Scale (MDS-ADL) and Experience of Home Scale.	 Resident perceptions of at-homeness changed over time. Private rooms and ensuites were valued by residents living in both traditional and smallhome RACFs. People who moved into the small house model recorded increased levels of at-homeness and maintained these over the six-month study period. Activities such as folding laundry and selfserving meals were standard practices of the small house model. Residents who moved into the small home facility showed less functional dependence by comparison with their counterparts in the traditional RACF. 	 Provide private bedrooms with ensuites. [2.6, 2.7] Design at a domestic scale that enables residents to engage in daily activities. [2] Because what 'feels like home' may differ among residents and change over time, use several strategies to support residents to feel 'at home'.



Reference	Study purpose and design	Key findings	Recommendations
		 For some residents, access to wider community is a priority that makes the RACF feel more like home. 	
Moore KJ, Hill KD, Robinson AL, et al. (2011) The state of physical environments in Australian residential aged care facilities. Australian Health Review, Vol.35, No.4, pp.412-7.	Cross-sectional study involving nine diverse RACFs in three Australian states. Environmental audits were also conducted to identify areas of the physical environment which can be addressed to improve the wellbeing and safety of residents.	 In communal areas, eight of nine RACFs provided comfortable furniture and views of natural features, such as gardens. Five of nine RACFs met criteria for contrasting colours between walls, floors and handrails. Visual supports and lighting criteria were achieved at three of nine RACFs. Issues included inconsistent lighting, glare, or poorly lit spaces. Three of nine RACFs had adequate lighting in bedrooms. Issues included inconsistent lighting criteriates the provided inconsistent lighting or absence of bedside reading lights. Five had accessible lighting controls for residents. 	 Lighting and colour contrasts are common issues requiring attention at Australian RACFs. [1.5, 1.6]
Morgan DG and Stewart NJ (1998) Multiple occupancy versus private rooms on dementia care units. Environment and Behavior, Vol.30, No.4, pp.487-503.	Prospective cohort study of the effects of single versus multi-occupancy bedrooms among 46 people with dementia living in US aged-care facilities. The study documents the behavioural transition of residents from a multi-bed to single- occupancy facility and includes a retrospective qualitative component capturing the experiences and observations of staff caregivers and families.	 After the transition to a facility with single, private bedrooms, residents with dementia spent more daytime in their rooms and appeared to sleep better at night. Evidence for the latter claim was presented in reduced need for medications and other interventions to promote sleep. The downsides of private rooms were perceived to be breaking up friendships established in cooccupancy, the sense of comfort perceived in having another person to share with, and the accommodation of married couples in semi-private double rooms. Interviews with staff and family stressed the importance of designing bathrooms so that they were visible from residents' beds. Clear view of the toilet, and not just the sink, was an important cue for toileting. 	 Provide private bedrooms with ensuites. [2.6, 2.7] Make toilet easier to see by positioning bed in clear view to/from the toilet. [1.10]



Reference	Study purpose and design	Key findings	Recommendations
Morgan DG, Stewart NJ, D'Arcy KC, et al. (2004) Evaluating rural nursing home environments: dementia special care units versus integrated facilities. Aging and Mental Health, Vol.8, No.3, pp.256-65.	An environmental assessment was conducted to compare eight rural nursing homes with special care units to eight same-sized rural nursing homes without special care units.	 Special care units had significantly shorter corridor length compared with other kinds of facilities. Long corridors in traditional large facilities averaged 117 feet in length. These corridors had a negative impact on awareness and orientation, safety and security. It was more difficult for staff to monitor residents, residents functional abilities were reduced, and personal control diminished. 	 Short corridors are preferable to longer ones. [2.5]
Morgan-Brown M, Newton R and Ormerod M (2013) Engaging life in two Irish nursing home units for people with dementia: Quantitative comparisons before and after implementing household environments. Aging and Mental Health, Vol.17, No.1, pp.57-65.	Researchers aimed to determine the effect of the small-scale homelike RACF model on activity and engagement among residents. A longitudinal cohort study was conducted involving 36 residents living with dementia before and after moving to a household model environment.	 After moving from a traditional facility into a household design, residents spent more time in communal living spaces and were more likely to be actively engaged. The household model units in this study were open plan household style units. Additional qualitative research is required to determine if reported increases in interactive occupation and social engagement create an improved quality of life and sense of wellbeing. 	 Design with a domestic scale. [2]
Naccarella L, Newton C, Pert A, et al. (2018) Workplace design for the Australian residential aged care workforce. Australasian Journal on Ageing, Vol.37, No.3, pp.194-201.	Identifying factors that influence feelings of worth, belonging, safety and connectedness among RACF staff was the focus of this qualitative study, undertaken at a large RACF in Melbourne. A photo elicitation method was used to collect staff perspectives about different spaces at the facility.	 RACF design influenced how staff felt about their work. Staff commented negatively on workspaces that were dirty, had stained carpet and were located next to toilets. Public and communal spaces were valued. Outdoor spaces, including gazebos and paths, were viewed positively. Staff valued indoor common rooms that allowed them to see everyone, had natural light, were uncluttered and with clean, new furnishings. 	 Physical, functional and psychological comfort are all important aspects of design. [2.10] Shared workspaces should be homely and safe. Provide access to open and outdoor spaces. [3] Ensure spaces are tidy and clean. [1.2]
Namazi KH, Rosner TT and Calkins MP (1989) Visual barriers to	Cohort study aiming to test various visual barriers employed to prevent exiting	 Concealing the exit was the best strategy to negate attempts to exit via the emergency door. 	 Understanding the individual characteristics of residents in



Reference	Study purpose and design	Key findings	Recommendations
prevent ambulatory Alzheimer's patients from exiting through an emergency door. Gerontologist, Vol.29, No.5, pp.699-702.	through the emergency door of a multi- level facility by residents with dementia. Research was conducted in a 30-bed dementia unit with a sample of nine people.	 For example, concealing the door with a cloth panel appeared the most successful strategy. Masking the doorknob was somewhat effective at reducing exiting. Tape grids on the emergency exit door along with other optical illusion barriers did not discourage exiting among the residents with dementia in the study. The timing of attempted exits through the emergency door was observed to be different between the two genders recorded in this study, with men more likely to attempt exit at night than women. 	 combination with concealment strategies may be the most effective way to reduce exiting behaviours. [2.2] Concealment strategies reduce the need for staff monitoring and maintain resident dignity of movement. [4.4]
Namazi KH and Johnson BD (1991) Environmental effects on incontinence problems in Alzheimer's disease patients. American Journal of Alzheimer's Care and Related Disorders and Research, Vol.6, No.6, pp.16-21.	In this randomised control trial, residents in the study group experienced an open curtain condition where the toilet was highly visible. The control group's curtains were secured so that the toilet was concealed from view. Researchers monitored use of private toilets and two public toilets for three hours each day for a total of 45 hours under each condition.	 Toilet visibility encourages utilisation and the increased use of the toilet discouraged incontinence episodes. There was an eight-fold increase in the use of toilet under the open curtain condition. A series of directional arrows on the floor with the nomenclature "toilet" produced the most instances of toilet utilisation. 	 Provide visual cues to encourage independent use of toilets. [1.10] Make toilets easier to see by using "toilet" signage as well as arrows directing to the toilet. Environmental modifications which provide supportive cues should be available to encourage independence when possible.
Namazi KH, Rosner TT and Rechlin L (1991) Long-term memory cuing to reduce visuo- spatial disorientation in Alzheimer's disease patients in a special care unit. American Journal of Alzheimer's Disease and Other Dementias, Vol.6, No.6, pp.10-5.	Cohort study exploring the hypothesis that displaying personal memorabilia of long-term significance to people with dementia serve as orientation cues. Ten participants living in a dementia facility with clustered bedrooms around a common living area participated in this research.	 Results provided weak evidence of some positive effect of displaying personal items to cue wayfinding behaviour, irrespective of dementia severity. Objects most likely to trigger familiar association were objects or photographs from residents' childhoods. 	 Display personal objects from as far back as possible (e.g. a resident's childhood years) to assist them to recall the location of their bedroom. [1.1] Use display cases that allow visibility of contents from all directions.
Namazi KH and Johnson BD (1992) Pertinent autonomy for residents with dementias:	Study of exit door behaviour among 22 RACF residents with dementia. Researchers compared residents'	 Walking paths allowed residents to walk unhindered in a continuous circulation pattern that included indoor and outdoor locations. 	 Keep doors and access routes unlocked wherever possible to



Reference	Study purpose and design	Key findings	Recommendations
Modification of the physical environment to enhance independence. American Journal of Alzheimer's Care and Related Disorders and Research, Vol.7, No.1, pp.16-21.	behaviour in locked and unlocked door/access conditions. Observations were recorded using a checklist of behaviours.	 Access to outdoor areas was controlled with three doors that could be locked. All paths circled back to the terrace and the facility. Residents showed a greater frequency of physical aggression under locked-door conditions. When doors were unlocked there was a dramatic decline in agitated behaviour, walking with purpose and wandering. When doors were locked, residents often responded with purposeful walking to another exit or wandering through the building. When residents found doors were unlocked, they simply opened the door to look, or briefly went outside. 	 support residents' independence and feelings of autonomy. [1.7] Thoroughfares should be continuous routes where possible. Design for continuous movement between indoor and outdoor spaces. [3.2]
Nelson GG (2008) Household models for nursing home environments. Architecture and Design for Ageing Household (Symposium-Paper), Nelson- Tremain Partnership.	Discussion paper presents a critical analysis of the concepts that have historically influenced the design of long - term care settings in the United States.	 Handrails are a feature of the corridor-based design model in RACFs. However, in a household design model the need for handrails is considerably reduced or eliminated. Handrails may reduce the functionality of spaces. For example, furniture placed along walls can enhance hominess while also providing places to rest, thus replacing the need for handrails. 	 Avoid handrails. Handrails should be discontinuous to allow for furniture placement and other installations that create a home environment. [2.5] Handrails are not recommended for open corridors. Alternatives to handrails, such as lean rails, should be considered.
Nelson J (1995) The influence of environmental factors in incidents of disruptive behaviour. Journal of Gerontological Nursing, Vol.21, No.5, pp.19-24.	Qualitative study describing the nature of person-environment interactions during moments of disruptive behaviour. Methods involved on-site observation at a skilled nursing care facility with 59-beds over a total of 172 hours over a five- month period. Measures were derived from the Progressively Lowered Stress	 Loud noises were almost always apparent during incidence of disruptive behaviour. These noises could come from television, loud talking and shouting of other residents or staff, and/or alarms and bells. 	 Reduce unnecessary loud noise by turning down the volume of television and public address systems, restricting unnecessary traffic, instructing staff not to shout and to perform noisy activities away from residents' common areas. [1.3]



Reference	Study purpose and design	Key findings	Recommendations
	Threshold (PLST) model, reactance theory and basic need theory.		 Reduce exposing residents to disturbing images by monitoring television programs. Design special purpose rooms for residents to watch television or interact in smaller groups. Facilitate small group dining. [2]
Netten A (1989) The effect of design of residential homes in creating dependency among confused elderly residents: A study of elderly demented residents and their ability to find their way around homes for the elderly. International Journal of Geriatric Psychiatry, Vol.4, No.3, pp.143-53.	Environmental effects on residents with dementia are examined. Sample included 104 residents across 13 RACFs in the UK.	 Lighting was an important cue for residents with dementia. Wayfinding was impaired in low light levels. 	 Design lighting to assist residents in purposeful and guided movement. [1.5]
Nijs KA, de Graaf C, Siebelink E, et al. (2006) Effect of family-style meals on energy intake and risk of malnutrition in Dutch nursing home residents: A randomized controlled trial. Journals of Gerontology, Series A: Biological Sciences and Medical Sciences, Vol.61, No.9, pp.935-42.	Randomised control trial investigating the effect of family-style meals on energy intake among RACF residents. The study was conducted at five Danish nursing homes involving 178 residents. Factors examined were table dressings, cooked meal service with menu choice, mealtime protocols, staff activities during mealtimes and balanced table dining groups.	 Family-style meals stimulated food consumption among residents. 	 Preference family-style meals over pre-plating meal services. [2]
Nolan BA, Mathews RM and Harrison M (2001) Using external memory aids to increase room finding by older adults with dementia. American Journal of Alzheimer's Disease and Other Dementias, Vol.16, No.4, pp.251- 4.	Research exploring the hypothesised influence of placing name signage upon portraits of residents on residents' ability to find their rooms in a large RACF. Multiple baseline data was generated by observing three people with dementia diagnoses for several weeks prior to introducing the intervention.	 A combination of large name signage with portrait-style photographs of residents placed outside of their bedroom entrances assisted residents to locate their rooms. 	 Name signage and portraits are a cost-effective and minimally invasive way to reminding residents where their rooms are. [1.1]



Reference	Study purpose and design	Key findings	Recommendations
Orthia L, Hosking D and McCallum J (2022) "As close to home as possible": Older Australians' hopes and fears for aged care. Canberra: National Seniors Australia.	Report on the follow-up survey of the National Social Survey of Australians aged 50 and over (also known as the NSSS-9).	 Most survey respondents were concerned about reports of neglect and abuse documented by the Royal Commission into Age Care Quality and Safety in 2021. 18% of respondents said they planned to avoid moving into a RACF for as long as possible. 	 Government interventions can improve public perception of aged care. [1.1]
Passini R, Pigot H, Rainville C, et al. (2000) Wayfinding in a nursing home for advanced dementia of the Alzheimer's type. Environment and Behavior, Vol.32, No.5, pp.684-710.	Design criteria were developed in this study to encourage and facilitate wayfinding for people with Alzheimer's disease. Qualitative study involved interviews with ten nursing home staff and observation of a wayfinding exercise with six residents.	 People with Alzheimer's disease were able to reach certain destinations, but wayfinding decisions needed to be based on readily available environmental information (e.g. landmarks, reference points and differing architectural composition) to proceed from one decision point to the next. Barriers to wayfinding were elevators, complexity in floorplans, dark lines or surfaces, and monotony in architectural composition leading to repetitive environments. A differentiated environment allows residents to create reference points. Facilitators of wayfinding included visual access to main destinations, e.g. cafeteria or activity room, and signage that compensated for the loss of memory and spatial understanding. While staff guiding residents to their destination might be helpful, it also leads patients not to use their remaining wayfinding abilities. This can lead to a reduction in achievement and autonomy. 	 Rooms involved in basic living (e.g. eating, relaxing) should have a fixed location, permanent furniture arrangement and be kept tidy and uncluttered. [1.2] Avoid dark patterns. [1.6] Reference points should be distinctive in relation to form, function and meaning, e.g. the nursing station, cafeteria. [1.7] Design for direct visual access to common rooms. [2.4] Room names must relate to function and be consistent and reflect a resident's culture. Nursing stations should be placed as discreetly as possible while still allowing for supervision of essential points such as entrances. [2.9] RACFs for people with Alzheimer's disease should not include elevators.
Philpin S, Merrell J, Warring J, et al. (2014) Memories, identity and homeliness: The social construction of mealtimes in	Study investigating factors associated with nutritional care provided in different residential care environments. Data was collected from two nursing homes.	 Providing homeliness and family-style dining arrangements encouraged sociability – enhancing enjoyment of mealtimes, which encouraged eating. 	 A larger dining setting (two dining areas with three and six tables versus two tables accommodating eight residents) was seen to have



Reference	Study purpose and design	Key findings	Recommendations
residential care homes in South Wales. Ageing and Society, Vol.34, No.5, pp.753-89.	Methods included focus groups with care home and catering staff. Interviews with managers, residents and informal carers were conducted. Food preparation and mealtimes were observed and appropriate documents, including assessment tools and resident case notes were analysed.	 Shared mealtimes and, where possible, shared food preparation was shown to improve the resident experience. 	 some advantages as it creates a broader range of residents and sense of community. Smaller units could preclude other people, such as families and friends, from joining residents for meals. Enable residents to be involved in or to watch meal preparation. [2.3]
Pittet D, Allegranzi B, Sax H, et al. (2006) Evidence based model for hand transmission during patient care and the role of improved practices. The Lancet Infectious Diseases, Vol.6, No.10, pp.641- 52.	Article reviews the evidence on hand hygiene to propose a model for future research and education strategies.	 A sequence of five steps that enable infection transmission from hands is outlined. This includes inadequate handwashing by care workers. 	 "Educational materials should strongly consider steps in hand transmission to help promote hand hygiene practices" (p649).
Poulos C, Kelly J, Chapman R, et al. (2012) Review of current seating practices in supporting people living with dementia in residential aged care – a pilot study. Brisbane, Queensland: Dementia Collaborative Research Centres.	Pilot study reviewing seating practices used to support people with dementia who live in RACFs. Methodology consisted of literature review, interviews of residential aged care staff and family carers, and a one-day workshop with an expert reference group.	 Seating and postural position for people with dementia is important and impacts quality of life. Different people have different seating needs. 	 Recommendations are provided for providers and practitioners, service leaders and researchers. [1.9] Decisions about seating should be made on a person-by-person needs basis.
Reimer MA, Slaughter S, Donaldson C, et al. (2004) Special care facility compared with traditional environments for dementia care: a longitudinal study of quality of life. Journal of the American Geriatrics Society, Vol.52, No.7, pp.1085-92.	Prospective matched-group study examining the effect of a specialised care facility on the quality of life of residents. Over a one-year period, two matched controls were compared with residents' outcomes in the special care facility. The special care facility in this study was a homelike environment, with more choice and privacy, personal contact and activities than the control sites.	 One-hundred and eighty-five people participated in the study. Ability to perform activities of daily living was significantly greater among residents living in the special care facility, compared with the large traditional facility. Overall, quality of life was better among residents living in the special care facility. 	 Design with a domestic scale. [2.1] Purposefully design physical and social environments to support residents with dementia.



Reference	Study purpose and design	Key findings	Recommendations
Rota-Bartelink A (2006) Guardianship and administration services: The view from an aged care homeless service provider – Wintringham. Parity, Vol.19, No.3, pp.15-6.	Commentary about the role and challenges associated with guardianship, from the perspective of an aged-care service provider in Melbourne.	 It is very common for residents and prospective residents of RACFs to have their decisions regarding where they live managed by a guardian. Many residents do not understand the role of their guardian and this can be the source of frustration, negativity and other problems between residents and RACF staff. Communication between guardians, their clients (RACF residents) and staff is important. 	 Administrators should help their clients to understand the role of guardianship and broaden their role to include financial advice for their clients.
Rudolph JL, Zanin NM, Jones RN, et al. (2010) Hospitalization in community-dwelling persons with Alzheimer's disease: frequency and causes. Journal of the American Geriatrics Society, Vol.58, No.8, pp.1542-8.	Large prospective cohort study examining risk factors associated with hospitalisation among people with a diagnosis of dementia.	 Eight hundred and twenty-seven people with Alzheimer's disease participated in this study. Rates of hospitalisation among participants with Alzheimer's disease were at least three-times higher than among participants without this diagnosis. Leading reasons for hospitalisation were falls, ischemic heart disease, gastrointestinal disease, pneumonia and delirium. The strongest risk factor for hospitalisation was high comorbidity. Other risk factors were a recent history of hospitalisation, older age, male sex and shorter duration of symptoms. 	 Interventions that prevent falls should be central to environmental design. [1.8]
Scandura DA (1995) Freedom and safety. A Colorado center cares for Alzheimer's patients. Health Progress, Vol.76, No.3, pp.44-6.	Descriptive study of the features and interventions employed to reduce falls at a special purpose RACF in Colorado, US.	 Aged-care workers conducted a survey to determine when and where falls had been occurring. They found that most falls occurred between 4-8pm. Staff implemented several interventions which appeared to have successfully reduced falls incidence. These included: changing the furniture to soft, low-to-ground beanbags and futons; and deploying more staff to bath residents at times when falls were less frequent. 	 Select furniture that is unrestrictive and close to the floor. [2.8] Encourage residents to bathe and do other activities with a greater risk of falling, such as bathing during the daytime. [2.7]



Reference	Study purpose and design	Key findings	Recommendations
Sharkey SS, Hudak S, Horn SD, et al. (2011) Frontline caregiver daily practices: A comparison study of traditional nursing homes and the Green House project sites. Journal of the American Geriatrics Society, Vol.59, No.1, pp.126-31.	Caregiver practices were compared in this observational, interview and survey study conducted at 27 US-based RACFs. Researchers examined staffing hours, allocation of time to direct and indirect care and specific activities in the small, homelike model (Green House) compared with larger institutions.	 Two-hundred and forty staff participated across the different RACFs. Roles different among the staff at small-scale RACFs and traditional larger institutions, with the former spending more staffing hours per resident per day. Overall, however, staff were engaged for fewer hours in the Green House model. 	 Staffing efficiencies can be achieved in small, homelike RACF settings. [2.1]
Sheppard LA (2008) Privacy within aged care facilities. Internet Journal of Advanced Nursing Practice, Vol.10, No.2, pp.1-8.	Qualitative, comparative case study to identify themes and categories related to privacy. Thirty-five interviews with residents, families, staff, visiting service providers and management were conducted at an old and a new aged-care facility, in South Australia.	 Private bedrooms are a key source of physical privacy for residents. Bedroom features (e.g. locks on doors, a telephone in the room and bed placement such that the entry/exit is not in view) add to a sense of physical privacy. Private bedrooms were not found to contribute to feelings of isolation, but rather enhanced personal control over environments and a sense of wellbeing. Staff protocols, such as knocking before entering residents' private. 	 Design for physical privacy with private bedrooms. [2.6]
Simpson AH, Lamb S, Roberts PJ, et al. (2004) Does the type of flooring affect the risk of hip fracture? Age and Ageing, Vol.33, No.3, pp.242-6.	Retrospective case-control study assessing the association between fall incidence and the mechanical properties of floors. Floor types assessed were wood sub-floors with and without carpet, and concrete sub- floors with and without carpet. Thirty-four 34 residential care homes participated.	 Data on 6,641 falls and 222 fractures were assessed. Wooden carpeted floors were associated with the lowest rate of fractures. "Risk of fracture resulting from a fall was significantly lower compared to all other floor types". The average force of impact was significantly lower on wooden carpeted floors. 	 Floor design should prioritise wooden carpeted floors. [1.8]



Reference	Study purpose and design	Key findings	Recommendations
Sloane PD, Mitchell CM, Preisser JS, et al. (1998) Environmental correlates of resident agitation in Alzheimer's disease special care units. Journal of American Geriatrics Society, Vol.46, No.7, pp.862-9.	Activities in fifty-three Alzheimer's Special Care Units were observed to identify environmental factors associated with agitation among residents. Features of the physical environment measured included: light intensity, noise, tactile and visual stimulus, unit size, homelike attributes, cleanliness and maintenance, and quality of views from common areas.	 Repetitive mannerisms, non-loud verbal excess and wandering were the most observed agitated behaviours. "Summary scales of physical environmental quality (the SCU environmental quality scale) and of staff treatment quality were associated strongly with lowered agitation levels" (p866). 	 Improve the physical environment to reduce the prevalence of agitated behaviours among residents with dementia. [1.5]
Stull JW, Hoffman CC and Landers T (2018) Health benefits and risks of pets in nursing homes: A survey of facilities in Ohio. Journal of Gerontological Nursing, Vol.44, No.5, pp.39-45.	Survey of 95 nursing home administrators from nursing homes in Ohio to generate descriptive data on policies regarding residents' having pets.	 Animals were permitted in 99% of facilities. Ninety-three per cent of facilities had a policy related to pets. Perceived benefits of pet ownership were high. The survey highlighted health and safety concerns about having animals in the facility. 	 Nursing home administrators should be encouraged to work with veterinarians to develop guidelines that allows individuals to enjoy the benefits of pets while mitigating potential risks. [3.6]
Tartarini F (2017) Impact of temperature and indoor environmental quality in nursing homes on thermal comfort of occupants and agitation of residents with dementia. Wollongong, NSW: University of Wollongong.	Cross-sectional case study examining the impacts of indoor environmental quality factors on the behavioural responses and perceptions of satisfaction among residents of RACFs. Research was conducted at six RACFs in NSW.	 Older facilities reported significant variations in temperature, which were attributed to relatively poor thermal performance of the building envelope. Where residents were able to open windows to the outside, corresponding fluctuations in temperature levels could occur. Residents were observed to have difficulty operating the split air-conditioning systems in their rooms. "Unsatisfactory thermal comfort conditions were found to significantly increase the frequency and disruptiveness of agitated behaviours in residents with dementia" (p169). Regarding adequate lighting, only 5% of bedrooms, bathrooms and corridors were adequately lit to the minimum level of illuminance required to perform simple tasks. 	 Minimum standards for thermal care, noise and light levels should be developed. [1.5, 1.11]



Reference	Study purpose and design	Key findings	Recommendations
		 Only 1-2% of the data recorded across the six RACFs was within the Australian Standard recommended noise levels of 40dB and 45dB. 	
Taylor J, Sims J and Haines TP (2014) Quality mobility care in nursing homes: A model of moderating and mediating factors to guide intervention development. Research in Gerontological Nursing, Vol.7, No.6, pp.284-91.	Ethnographic study exploring mobility care in three nursing homes in Australia from July 2010 to October 2012. Researchers interviewed 10 senior staff and 15 residents and conducted a focus group with 18 staff. Approximately 16 hours of observation were undertaken.	 Staff assistance, residents' mobility effort, and equipment used during mobility were found to be complete or partial mediators of resident mobility outcomes. Person-centred care may improve the quality of staff assistance and consequent resident mobility outcomes. Future studies are needed that focus on ambulatory residents and how to maintain their transfer and walking ability, and/or on residents requiring mechanical assistance to transfer, and how to ensure safe and person-centred staff interactions. 	 Support less-mobile residents to access outdoors. [3]
Torrington J (2006) What has architecture got to do with dementia care? Explorations of the relationship between quality of life and building design in two EQUAL projects. Quality in Ageing, Vol.7, No.1, pp.34-48.	Findings from two studies are reported in this article about the relationship between the built environment and resident quality of life. Private housing, sheltered housing and residential care are discussed.	 Large RACFs tend to have higher scores for safety and health. Medium-sized RACFs scored highest for personalisation and connectedness with community. Small homes tended to score higher for comfort, "normalness", autonomy and choice. The studies discussed in the article provided evidence towards the Built Environment Design Matrix, which can be used to evaluate technological interventions in RACFs. 	 Design should manage exit-seeking behaviours with familiar and comfort-generating design. [2.2]
Ulrich RS, Zimring C, Zhu X, et al. (2008) A review of the research literature on evidence-based healthcare design. HERD, Vol.1, No.3, pp.61-125.	Review of empirical studies examining associations between the physical environmental characteristics of hospitals and healthcare outcomes.	 Well-designed hospitals contribute to healing patients. Some characteristics of environments, for example access to outdoors or exposure to noise, influence patient outcomes. 	 Adopt effective air-quality controls to prevent airborne infections, such as HEPA filters, barriers between rooms, negative air pressure in key spaces, and sealing windows. [1.4]



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			 Place alcohol-based hand rub in accessible positions. [2.9] Choose joinery and finishes that are easy to clean, and clean high touch areas regularly. [1.2] Keep outdoor water features clean to reduce waterborne infections. [3.1] Provide private bedrooms with ensuites. [2.6, 2.7]
van den Berg MEL, Winsall M, Dyer SM, et al. (2020) Understanding the barriers and enablers to using outdoor spaces in nursing homes: A systematic review. Gerontologist, Vol.60, No.4, pp.e254-e69.	Systematic review of the barriers and enablers to the use of outdoor areas in aged care homes. Twenty-four studies are included.	 Adverse or unfavourable weather conditions can be a barrier to accessing outdoors. Built features such as gazebos, overhead rooftops and seating options in sunny and shaded areas are important. Design should consider local climate conditions. Heavy and locked doors, steps and thresholds, which were too high or difficult to cross, were experienced as barriers to outdoor access. Upper floor resident rooms were a barrier to outdoor access because residents needed to navigate stairs or use an elevator. Incorporation of recommendations from architects and facility managers in the design of RACFs may increase use of outdoor areas and improve the quality of life of residents. 	 Provide shelter in outdoor areas. [3.3, 3.4] Rethink the need for locked doors. [2.2, 3.2, 4.4] Do not use heavy doors. [2.2] Do not have steps or high thresholds where residents usually walk. [1.7]
Van Hoof J, Kort HS, van Waarde H, et al. (2010) Environmental interventions and the design of homes for older adults with dementia: an overview. American Journal of Alzheimer's Disease	Focus groups with experts aimed to examine private-home interventions to support people with dementia.	 Several interventions were identified to support cooking and other domestic activities. Environmental interventions to support toileting include leaving access doors open, removing toilet lid, contrasting and coloured toilet seat lid, removal of waste baskets and other items resembling toilet bowls. 	 Make toilets easier to access by leaving doors open. [1.10] Support independent use of toilets by removing toilet lids and objects easily confused with toilets, such as waste bins.



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and Other Dementias, Vol.25, No.3, pp.202-32.			 Support toilet visibility by contrasting toilet cistern from wall. Encourage participation in domestic activities. [2]
van Hoof J, Verhagen MM, Wouters EJ, et al. (2015) Picture your nursing home: exploring the sense of home of older residents through photography. Journal of Aging Research, No.312931.	Qualitative study aiming to identify the key factors that RACF residents associate with a sense of home. Method involved photograph elicitation and interviews with 12 RACF residents in the Netherlands.	 Residents valued being able to view outdoors from their rooms, being able to move around the RACF uninhibited, making decisions about the décor and object placement in their bedrooms, having routines, and accessing adequate spaces to host visitors and join recreational activities. 	 Allow residents to personalise spaces. [1.1] Support resident autonomy by providing spaces that enable movement and self-determination. [1.7]
van Lieshout-van Dal E, Snaphaan L and Bongers I (2019) Biodynamic lighting effects on the sleep pattern of people with dementia. Building and Environment. Vol. 150, pp.245- 253.	Study examining the relationship between 3 weeks of exposure to biodynamic lighting and circadian functioning among 13 participants all of whom had a diagnosis of dementia. The research setting was a psychiatric hospital in the Netherlands.	 Frequency and duration of night-time bed wandering, and daytime napping were strongly affected by biodynamic lighting. Three-weeks of exposure to biodynamic lighting was found to approximately halve the mean frequency of bed-leave moments during the night, and to also approximately halve the mean frequency of daytime naps. 	 Increase ambient light in rooms in order to promote better sleep. [1.5] Biodynamic lighting should be considered as an alternative or complimentary intervention alongside other non-pharmacological interventions and pharmacological interventions.
Verbeek H, van Rossum E, Zwakhalen SM, et al. (2009) Small, homelike care environments for older people with dementia: a literature review. International Psychogeriatrics, Vol.21, No.2, pp.252-64.	Review of literature published between 1970 to 2008 was conducted to examine the features of small-scale RACFs. In total, 859 publications were included in the analysis.	 Eleven different concepts of small-scale RACFs were identified. These were found in 11 different countries: ""CADE units" (Australia), "Cantou" (France), "Care Housing" (Scotland), "Domuses" (U.K.), "Green Houses" (U.S.A.), "Group Home" (Japan), "Group Living" (Sweden), "Residential groups" (Germany), "Small-scale Living" (Netherlands/Belgium), "Special Care Facility" (Canada) and "Woodside place" (U.S.A./Canada)" (p254). Costs were only analysed in four studies, and results were mixed. 	 Reflect upon the different skills, responsibilities and training that RACF staff need when working in smaller homelike RACF models. [2] More cost analyses are needed to assess domestic scale facilities.



Reference	Study purpose and design	Key findings	Recommendations
Walker P, Kifley A, Kurrle S, et al. (2019) Process outcomes of a multifaceted, interdisciplinary knowledge translation intervention in aged care: results from the vitamin D implementation (ViDAus) study. BMC Geriatrics, Vol.19, No.177.	Report on the implementation of a vitamin D supplement intervention at 41 Australian RACFs. Barriers to implementing the intervention were identified.	 The intervention aimed to increase the proportion of residents in each facility prescribed an adequate dose of a vitamin D supplement. Prior to attending education sessions 30% of staff rated themselves to be knowledgeable on the risk factors for low vitamin D, 27% were confident to assess residents for these risk factors, 24% were knowledgeable about vitamin D supplements and the same proportion were confident in explaining supplement use to residents and families. 	 A range of quality improvement strategies can increase vitamin D supplement use, including face-to- face education for staff, residents and families. [3]
Ward R, Rummery K, Odzakovic E, et al. (2022) Beyond the shrinking world: Dementia, localisation and neighbourhood. Ageing and Society, Vol.42, No.12, pp.2892-913.	Mixed qualitative methods study investigated how communities can support people living with dementia to remain socially and physically active. Methods included interviews and social network mapping/interviews over three field sites in the UK and Sweden. Interviews were repeated after a break of 8-12 months. Case studies from each site were developed.	 People with dementia reported feeling socially excluded. Familiarity with the local neighbourhood was a source of comfort and safety. Familiarity could be built through routines and habitual practices. Walking through green spaces can trigger memory, recall and produce feelings of pleasure and enjoyment. 	 Build familiarity with local neighbourhood through routine outdoor activities. [4.1] Encourage outdoor activities, particularly getting out into green and blue space. [3]
Westera A, Snoek M, Duncan C, et al. (2019) The AN-ACC assessment model. The Resource Utilisation and Classification Study: Report 2. Wollongong, NSW: Australian Health Services Research Institute, University of Wollongong.	Report from the Resource Utilisation and Classification Study, which presents the model by which the Australian National Aged Care Classification (AN-ACC) system will be independently and externally assessed. A study of service utilisation and classification development was undertaken across 30 RACFs over 3 geographic areas, 1877 resident assessments and 1600 staff were involved.	 The assessment model includes eight key drivers of cost in RACFs. These include end of life care needs, frailty, mobility, activities of daily living function, cognition and communication, behaviours and psychosocial factors, risk of pressure wounds, technical nursing requirements. Approximately half of RACF residents require support to move around, such as using wheelchairs or walking aids. 	 Adoption of the Australian National Aged Care Classification (AN-ACC) Version 1.0 Assessment Tool as the national standard funding assessment for residential aged care.



Reference	Study purpose and design	Key findings	Recommendations
Wilson NL, Dickinson JI, McLain- Kark J, et al. (1995) The effects of visual barriers on exiting behavior in a dementia care unit. Gerontologist, Vol.35, No.1, pp.127-31.	Experimental study aiming to reduce exiting attempts among RACF residents who have dementia. The interventions tested manipulated light through using a window blind, a cloth barrier and a combination of both.	 The cloth barrier alone was the most effective intervention, resulting in a 95% reduction in exiting attempts compared with baseline data. Combined window blind and cloth barrier resulted in an 88% reduction in exiting attempts. Closed blind alone resulted in a 44% reduction in exiting attempts. 	 Use barriers that camouflage exits to reduce exiting behaviour. [2.2]
Wood W, Harris S, Snider M, et al. (2005) Activity situations on an Alzheimer's disease special care unit and resident environmental interaction, time use, and affect. American Journal of Alzheimer's Disease and Other Dementias, Vol.20, No.2, pp.105- 18.	The aim of this US-based study was to investigate the relationship between routine activities in a special dementia care unit with the daily activities and interactions of seven residents. Researchers recorded the behaviours of study participants every 10 minutes for 12 hours each day during the study.	 Residents were observed to not be engaged socially for an average of 10.5 hours of each 12- hour period. 	 A homelike and personalised environment alone is not enough to stimulate engagement and activity among RACF residents who have dementia, direct engagement strategies are needed. [2]
Wright F and Weller RB (2015) Risks and benefits of UV radiation in older people: More of a friend than a foe? Maturitas, Vol.81, No.4, pp.425-31.	Review of literature on the harms and benefits of UV exposure in older adults.	 Sun avoidance is harmful to older people. Lower levels of sun exposure are associated with stroke incidence. Studies have established independent associations between Vitamin D levels and muscle weakness, bone density loss, potential for fractures, as well as auto-immune disorders, and some types of cancers. Sun exposure is linked to melatonin production and serotonin regulation, and positively impacts mental health. Nitric oxide, the production of which is stimulated by UVA, may be protective against hypertension and vascular disease. 	 Benefits and risks associated with UV exposure need to be weighed up. [3] Some sun exposure is beneficial to older adults, but the precise amounts need to factor individual circumstances and biology.
Yang ACH, Lau N and Ho JCF (2020) The role of bedroom privacy in social interaction	GPS data from 50 aged care residents in Hong Kong facilities were examined to	 Residents who lived in bedrooms that opened directly onto social space had higher social withdrawal tendencies. 	 Transitional spaces between bedrooms and common spaces are important. Avoid designs where



Reference	Study purpose and design	Key findings	Recommendations
among elderly residents in nursing homes: An exploratory case study of Hong Kong. Sensors, Vol.20, No.15, pp.4101.	assess patterns of social interaction in facilities with 3, 4 and 5 beds per room.	 Residents sought out spaces for small group or paired activities, often using each other's rooms. 	 bedrooms open onto public spaces. [2] Design special purpose rooms for small group activities.
Zeisel J, Silverstein NM, Hyde J, et al. (2003) Environmental correlates to behavioral health outcomes in Alzheimer's special care units. Gerontologist, Vol.43, No.5, pp.697-711.	Study assessing associations between seven environmental design features and various behavioural health measures. Participant characteristics and non- environmental potential confounding factors were assessed in the model. Behavioural health measures were incidence of aggression, agitation, social withdrawal, depression and psychotic problems. Participants were 427 residents residing in 15 special care units.	 Residents who had more options for privacy, such as private bedrooms, reported less anxiety and depression, and less psychiatric issues problems. Social withdrawal decreased among residents, as the number of residents at a facility increased; and also, where the variability of common spaces in a facility increased. Unobtrusive exit doors that were camouflaged by paint or other devices and were located along sidewalls helped to reduce resident elopements. Depressive symptoms among residents were less common in facilities whose exits were well-camouflaged and which had silent electronic locks rather than alarms. Incidence of verbal aggression was correlated with restrictive physical environments. Residents who experienced greater freedom to move around were more likely to feel a greater sense of control and empowerment. More controlled sensory environments (e.g. moderate level of background noise) were associated with reduced incidences of verbal aggression from residents. Prevalence of psychosocial issues was also less in controlled sensory environments. 	 Design to preserve resident privacy alongside lively and varied common spaces. [2] Make exits unobtrusive or camouflaged and with silent alarms. [2.2] Outdoor areas should be accessible, safe and secure. [3] Sensory input should be meaningful and familiar, and unnecessary noise reduced. [1]
Zhu X, Lee H, Sang H, et al. (2022) Nursing home design and COVID-	Investigation of the association between nursing home characteristics and COVID-	 Greater number of private bedrooms, larger bedrooms, and access to ventilators were each 	 Increase private rooms and living areas in RACFs to reduce



Reference	Study purpose and design	Key findings	Recommendations
19: Implications for guidelines and regulation. Journal of the American Medical Directors Association, Vol.23, No.2, pp.272- 9.	19 incidence and related mortality among residents. The final sample involved 7,785 RACFs, that is, over half of all Medicare providers in the USA.	 associated with reduced COVID-19 incidence, resident deaths and spread of infection. Increased number of certified beds was associated with reduced resident COVID-19 cases and deaths. COVID-19 is less transmissible in conditions where cases among staff are controlled. 	transmissibility of COVID-19 and other infections. [2]
Zieschang T, Dutzi I, Muller E, et al. (2010) Improving care for patients with dementia hospitalized for acute somatic illness in a specialized care unit: a feasibility study. International Psychogeriatrics, Vol.22, No.1, pp.139-46.	Evaluation of a dementia special care unit in a hospital in Germany. The unit was designed on a domestic scale, with no restrictions on resident movement and more activities for residents. Participants were 332 patients. Measures used were the Barthel Index (for activities of daily living), mobility and behaviour indexes. Mean length of stay in hospital was the cost effectiveness variable of interest.	 No difference was observed in length of hospital stay among patients admitted to the Special Care Unit compared with the regular rehabilitation unit. The maintenance of residents' abilities to perform daily activities was better in the special care facility, compared with other patients. Significant reductions in wandering, aggression and agitation were reported. 	 Design pathways and thoroughfares to provide unrestricted movement to residents. [1.7, 2.2] Engage residents in daily activities to support maintenance of functional abilities. [2, 4.2] Employ design interventions to reduce the need for ad hoc psychotropic medications and restraints.
Zimmerman S, Bowers BJ, Cohen LW, et al. (2016) New evidence on the Green House model of nursing home care: Synthesis of findings and implications for policy, practice, and research. Health Services Research, Vol.51, pp.475-96.	Report on the findings of the THRIVE Research Collaborative, which aimed to generate a sizable database on 28 Green House models of aged care in the US.	 Implementation of the Green House model was found to be inconsistent across the study sites. The model appears to reduce hospitalisations, three measures of poor-quality care and hospice expenditure. 	 Identify which elements of Green House design can be employed consistently, and which are best tailored to each RACF. [2] Do not assume that the Green House model itself guarantees high quality resident care. Promote equity and ensure that financial barriers do not determine who can and cannot access smaller, domestic models of RACFs. Cultivate resident control.
Zimmerman S, Dumond-Stryker C, Tandan M, et al. (2021) Nontraditional small house	Cohort study undertaken with 43 Green Home facilities and 177 traditional (large)	 COVID-19 cases, related hospital admissions, re- admissions and mortality were all lower among 	 Small-scale facilities are recommended as an infection control measure. [2]



Reference	Study purpose and design	Key findings	Recommendations
nursing homes have fewer COVID-19 cases and deaths. Journal of the American Medical Directors Association, Vol.22, No.3, pp.489-93.	nursing homes in the USA to compare rates of COVID-19 infections.	residents of Green Houses compared with residents of traditional RACFs.	
Zuidema SU, de Jonghe JF, Verhey FR, et al. (2010) Environmental correlates of neuropsychiatric symptoms in nursing home patients with dementia. International Journal of Geriatric Psychiatry, Vol.25, No.1, pp.14-22.	Cross-sectional cohort study to examine the hypothesis that environmental features in Special Care Units in Dutch nursing homes are associated with the prevalence and determinants of dementia symptoms.	 Environmental variables played a very small role in explaining the overall relationship between the prevalence and determinants of dementia symptoms. Agitation was primarily explained by factors at the patient level. "The number of patients per unit or per living room, the presence of a walking circuit, staff/patient ratio or the time spent on direct patient care were not associated with neuropsychiatric symptoms" (p25). Apathy occurred less among Special Care Units compared with traditional nursing homes. 	 Environmental design should support interactions and activities between staff and residents. [2] More evidence is needed to support the alleged neuropsychiatric benefits of small unit living arrangements.