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Optimising Refurbishment in Australian Residential Aged Care Facilities Using a Mixed Methods Approach

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OPTIMISING REFURBISHMENT IN AUSTRALIAN RESIDENTIAL AGED CARE FACILITIES USING A MIXED METHODS APPROACH

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Author's Declaration

To the best of my knowledge, this thesis contains no material previously published by another person, except where due acknowledgement has been made. I have clearly stated the contribution by others to jointly authored works included in this thesis. The content of my thesis is the result of work I have conducted since commencement of my research higher degree candidature. I declare that this thesis comprises only my original work and contains no material which has been accepted for the award of any other degree or diploma in any institution.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council Statement on Ethical Conduct in Human Research (2007, updated 2018). The research study received human ethics research approval from the University of Notre Dame Australian Human Research Ethics Committee (EC00418), Approval Numbers #017025F and 019025F.

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Samantha Neylon

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Abstract

The growth in ageing populations in addition to an increase in rates of chronic diseases such as dementia, has led to projections that this upsurge will be matched by increased demand for residential aged care placements for the foreseeable future. Currently, significant proportions of aged care government funding both locally and internationally are directed towards the residential sector. Australia has recently released Aged Care Quality Standards whereby the outcomes to residents need to be verified specifically across a range of domains (including the living and built environment) in order to maintain this government funding. Building new facilities is not always a financially viable option for aged care organisations, so refurbishment of existing stock needs to be considered. However, it is often not clear how residential organisations are to identify, prioritise and undertake minor refurbishment initiatives in ways which both addresses the needs of the residents and also fulfils rising consumer expectations.

The purpose of this research was to determine how minor refurbishment of residential aged care facilities (RACFs) could be undertaken in a prioritised, consistent and sustainable manner to ensure the outcomes enhance the abilities and wellbeing of the people who live within them. This work sought to contribute to the future development of a resource for providers who are planning minor refurbishments at RACFs.

A sequential mixed methods research design using a pragmatic approach was undertaken to identify the elements of minor refurbishments; examine the ways in which they can be objectively assessed; determine the most suitable assessment approach and tool to be used in the assessment; and pilot the tool at a RACF. Data were gathered from diverse sources including narrative review of minor refurbishment elements, systematic review of environment assessment tools, e-Delphi survey, nominal stakeholder focus groups and the pilot tool findings including content validity index (CVI) and rater concordance measures. The research encompassed three phases. Phase 1 identified the elements of minor refurbishment and the existing environment assessment tools which could assess these elements. Phase 2 examined these tools at international, national and local levels and piloted and evaluated the identified assessment tool at a RACF. Phase 3

synthesised all the data to formulate recommendations when undertaking minor refurbishments.

Seven minor refurbishment elements were identified and were represented in four environment assessment tools. International and national experts examined and ranked the tools for the local stakeholder groups to consider in their review of the tools. Evaluation of Older People's Living Environments (EVOLVE) was selected as the tool to pilot at a RACF. Although initially developed for assisted or retirement living, the tool was found to be transferrable to RACF, including demonstrating good concordance and good correlation between the four raters. The tool results reiterated the value and importance of the minor refurbishment elements with a particular focus on lighting.

The minor refurbishment elements of colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding are complex and often interwoven. Differing levels of expertise are also required to translate the assessment findings into outcomes that can provide the appropriate support to residents living in residential aged care. This research ideally positions RACF managers to undertake minor refurbishment initiatives in an informed and systematic way. This can facilitate appropriate prioritisation and allocation of often tightly contested funds. Future research that evaluates measuring and undertaking minor refurbishments is recommended.

Publications, Presentations and Awards

Published Works by the Author Incorporated into this Thesis

Neylon, S., Bulsara, C., & Hill, A-M. (2019). Improving Australian residential aged care facilities: A review of minor refurbishment elements. *Journal of Housing For the Elderly*. DOI: 10.1080/02763893.2018.1561591.

Neylon, S., Bulsara, C., & Hill, A. (2017). The effectiveness of environment assessment tools to guide refurbishment of Australian residential aged care facilities: A systematic review. *Australasian Journal on Ageing*, 36 (2), 135-143. https://doi.org/10.1111/ajag.12367

Neylon, S., Bulsara, C., & Hill, A-M. (2019). Expertise and e-Delphi: Assisting with Australian aged care facility refurbishment. *The Journal of Aging and Social Change*. 9(4), 33-50. https://doi.org/10.18848/2576-5310/CGP/v09i04/33-50

Manuscripts Submitted by the Author for Publication Under Peer Review

Neylon, S., Bulsara, C., Hampson, R., & Hill, A-M. (2019). Refurbishing residential aged care facilities using a consumer focused approach. *(Ref. No.: 193215459 – under peer review)*

Neylon, S., Bulsara, C., Bulsara, M., & Hill, A-M. (2020). Can a modified environment assessment tool guide priorities for minor refurbishments at a residential aged care facility. *(Ref. No.: 20445228 – under peer review)*

Other Published Works by the Author during Candidacy Not Included in the Thesis

Neylon, S., de Fiddes, D., & Batt, G. (2019). Designing for dementia: Making small spaces work. *The Journal of Aging and Social Change* 9 (3): 1-12. doi:10.18848/2576-5310/CGP/v09i03/1-12

Oral Conference Presentations by Author

National Conferences

Neylon, S., Bulsara, C., & Hill, A-M. What could future refurbishment of aged care facilities look like? Presented at the *51th Australian Association of Gerontology Conference*, Melbourne, Australia, 21-23 November 2018. Abstract published: https://www.aag.asn.au/documents/item/2487

Neylon, S., Bulsara, C., & Hill, A-M. Refurbishing residential aged care facilities – where do we start? Presented (rapid-fire) at the *50th Australian Association of Gerontology Conference*, Perth, Australia, 8-10 November 2017.

Neylon, S., Bulsara, C., & Hill, A-M. Anyone can find the dirt. Be the one that finds the gold. Presented at the *16th National Conference of Emerging Researchers in Ageing*, Perth, Australia, 6-7 November 2017.

International Conference

Neylon, S., Bulsara, C., & Hill, A-M. The E's in research – Expertise and e-Delphi. Presented at the *Ageing & Social Change 9th Interdisciplinary Conference*, Vienna, Austria, 16-17 September 2019.

Conference Posters

Neylon, S., Bulsara, C., & Hill, A-M. Refurbishing residential aged care facilities: Where do we start? Poster presented at the *50th Australian Association of Gerontology Conference*, Perth, Australia, 8-10 November 2017. Abstract published: https://www.aag.asn.au/documents/item/2002

Awards

Neylon, S.(2017) Runner up best oral presentation award 16th National Conference of Emerging Researchers in Ageing, Perth, Australia, 6-7 November 2017

Neylon, S. (2017) Bursary 16th National Conference of Emerging Researchers in Ageing, Perth, Australia, 6-7 November 2017

Statement of Contributions by Others

Contributions to Jointly Authored Works

Signed statements of consent for the inclusion of jointly authored works in this thesis are located in Appendix A.

- **Neylon, S.,** Bulsara, C., & Hill, A-M. (2019). Improving Australian residential aged care facilities: A review of minor refurbishment elements. *Journal of Housing For The Elderly*. DOI: 10.1080/02763893.2018.1561591.

  SN, CB and AMH all conceptualised and contributed to the development of the study one (narrative review) design. CB provided guidance in qualitative methodology and AM in the planning and application. The interpretation of data and drafting of the manuscript was led by SN, with all authors contributing to revisions and approving the final manuscript for submission.

- **Neylon, S.**, Bulsara, C., & Hill, A. (2017). The effectiveness of environment assessment tools to guide refurbishment of Australian residential aged care facilities: A systematic review. *Australasian Journal on Ageing, 36 2,* 135-143. https://doi.org/10.1111/ajag.12367

  SN, CB and AMH all conceptualised and contributed to the development of the study two (systematic review) design. SN and AMH were responsible for the review framework. The interpretation of data and drafting of the manuscript was led by SN, with all authors contributing to revisions and approving the final manuscript for submission

- **Neylon, S.,** Bulsara, C., & Hill, A-M. (2019). Expertise and e-Delphi: Assisting with Australian aged care facility refurbishment. *The Journal of Aging and Social Change*. 9(4), 33-50. https://doi.org/10.18848/2576-5310/CGP/v09i04/33-50

  SN, CB and AMH all conceptualised and contributed to the development of the study three (e-Delphi) design. CB provided guidance in qualitative methodology and AM in quantitative methodology. The interpretation of data,

analysis and drafting of the manuscript was led by SN, with all authors contributing to revisions and approving the final manuscript for submission

- **Neylon, S.,** Bulsara, C., Hampson, R., & Hill, A-M. (2019). Refurbishing residential aged care facilities using a consumer focused approach. *(Ref. No.: 193215459)*

  SN, CB and AMH conceptualised and contributed to the development of the study four (focus group) design. CB provided guidance in qualitative methodology and AM in quantitative methodology. The interpretation of data, analysis and drafting of the manuscript was led by SN, with all authors contributing to revisions and approving the final manuscript for submission.

- **Neylon, S.,** Bulsara, C., Bulsara, M., & Hill, A-M. (2020). Can a modified environment assessment tool guide priorities for minor refurbishments at a residential aged care facility. *(Ref. No.: 204452282)*

  SN, CB, MB and AMH conceptualised and contributed to the development of the study five (tool pilot) design. The interpretation of data and analysis was undertaken by AMH, MB and SN. The drafting of the manuscript was led by SN, with all authors contributing to revisions and approving the final manuscript for submission.

Contributions to the Thesis as a Whole

Professor Anne-Marie Hill was the principal supervisor who conceptualised the research and provided major guidance and assistance with the design, structure, data analysis, drafting and editing of all manuscripts and the thesis.

Associate Professor Caroline Bulsara was the associate supervisor who provided guidance and assistance with the design, structure, data analysis, drafting and editing of all manuscripts and the thesis.

List of Abbreviations

DDAT	Dementia Design Audit Tool
EAT	Environment Assessment Tool
e-Delphi	Electronic Delphi
EHE	Enhance the Healing Environment
EQUAL	Environmental Quality Assessment for Living
EVOLVE	Evaluation of Older People's Living Environments
HREC	Human Research Ethics Committee
MEAP	Multiphasic Environment Assessment Procedure
MESH	Medical Subject Headings
NGT	Nominal Group Technique
PAF	Physical and Architectural Features
PEAP	Professional Environment Assessment Protocol
RACBEAT	Residential Aged Care Built Environment Audit Tool
RACF	Residential Aged Care Facility
SCEAM	Sheffield Care Environment Assessment Matrix
TESS-NH	Therapeutic Environment Screening Survey for Nursing Homes
W.A.	Western Australia
U.K.	United Kingdom

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Did you ever know that you're my hero,
And everything I would like to be?

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My fiancé Stuart Fiedler and my daughter Jordyn Dobie for their endless support, believing in me and showing that love always finds a way.

"I can fly higher than an eagle,
For you are the wind beneath my wings"

Chapter 1

Chapter 1: Thesis Introduction and Outline

1.1 Introduction

The Australian residential aged care sector is challenged by the costs of providing facilities and services for increasing numbers of older Australians, particularly those with complex care needs (Aged Care Financing Authority, 2018; Deloitte, 2011; Vu, Davey, & Ansell, 2012). The cost of this sector to governments in 2016-17 was $12.1 billion with an additional $4.7 billion contributed by residents (Australian Institute of Health & Welfare, 2019). Growing numbers of older persons, many with chronic conditions, physical and cognitive disabilities, require residential aged care facilities that are not only 'fit for purpose' but are also attractive places to live out their later years. As of June 2018, 59% of people accessing residential aged care in Australia were aged 85 years or older (Australian Institute of Health & Welfare, 2019). The increase in ageing populations alongside increasing levels of chronic disease such as dementia, strongly suggest that demand for residential aged care, or long term care, is expected to continue to increase internationally into the foreseeable future (Organisation for Economic Development & Cooperation, 2019). Terms for residential aged care facilities vary between countries and may include nursing home, care home or aged care home (Milte et al., 2018). A residential aged care facility (RACF) in this research is described similarly as a care home - a place of residence where the resident has his/her own room and shares communal spaces such as dining rooms, lounge, activity or therapy rooms and gardens (Kenkmann et al., 2017). Staff only spaces in these places normally include kitchen, laundry, meeting room and offices (Kenkmann et al., 2017). These facilities provide accommodation, services such as meals and laundry, and assistance with personal tasks such as bathing and dressing for people with high health care requirements (Access Economics, 2010).

Australian residential aged care services are distributed across 886 residential care organisations with more than half of the places (55%) managed by not-for profit

organisations with government funding increasing each year (Australian Institute of Health and Welfare, 2018). This growth in Australia is reflected internationally with 60-80% of aged care expenditure going towards residential care (Milte et al., 2018). Significant changes to both funding and regulations (Access Economics, 2010) challenge the aged care industry responses in the face of demographic ageing, changing consumer expectations, levels of skilled care needed for older people with complex medical conditions including dementia and required quality indicators (Deloitte, 2011; Jeon & Forsyth, 2016). Comparative economic modelling evaluating the cost of providing residential aged care services in Australia (Access Economics, 2010; Vu, Davey, & Ansell, 2012) illustrated a significant financial reach for organisations considering building new facilities as the returns generated would not offset the capital costs (Vu, Davey & Ansell, 2012). That modelling was reflected in the reduction of aged care facility building approvals from 405 in February 2017 to 330 in February 2019 (Aged Care Financing Authority, 2019).

There is a degree of uncertainty surrounding future profitability of a new facility when compared to an established and viable facility given the impact of construction cost, construction timing, occupancy and operating costs (Deloitte, 2011). Western Australian aged care providers have particular challenges in terms of geographical, financial and industrial issues including delays in development applications and prohibitive construction costs that impact on the provision of care for older Australians (Aged & Community Services Western Australia, 2008).

Consequently aged care providers, particularly not for profit organisations, need to compare the potential cost of, and returns from, redeveloping or modernising existing facilities (Vu, Davey, & Ansell, 2012). Based on current supply and future growth, it is projected that the sector would need to build over 88,000 places and refurbish or rebuild approximately a quarter of the existing stock of buildings in the next decade (Aged Care Financing Authority, 2019).

Refurbishment can be considered major or minor. This research has defined major refurbishment to mean additional buildings, extensions or structural improvements to the RACF of a significant nature (Department Social Services, 2014) and minor refurbishment to mean improvements to finishes, furniture, fixtures and fittings which could provide a direct benefit to residents beyond aesthetics in ways such as functionality or quality and does not require planning approvals (Department Human Services, 2007; Department Social Services 2014). A

preliminary literature search did not find systematic reviews addressing minor refurbishment or what components should even be considered when undertaking minor refurbishments at a RACF.

In many organisations, refurbishment of some facilities proceeds at the same time the organisation tracks the changing demands, needs and expectations of consumers regarding the type and quality of accommodation (Productivity Commission, 2011) whilst also ensuring changes are cost effective for the organisation. Though fiscal parameters and financial incentives often determine viability of refurbishments, accreditation requirements are a contributing incentive. The former Standard 4.4 (Living Environment) set by The Aged Care Standards and Accreditation Agency to ensure the facility is working actively to provide an environment which is safe, comfortable and meets resident requirements, is only one of 44 outcomes that need to be met for a facility to retain its accreditation (Hunter and Elkington, 2005). These outcomes have been superseded by eight quality standards in July 2019 of which one (Standard 5) specifically focuses on the service organisation's environment to ensure resident independence and functions are optimised (Aged Care Quality and Safety Commission, 2019).

It is important to ensure any refurbishment undertaken supports older adults to live well with age related impairments (Pantzartzis, Price, & Pascale, 2016) as the physical environment can impact significantly on their lives (Cooney, 2012) and level of function (Poulos & Poulos, 2019). Given dementia is the greatest cause of disability in Australians aged 65 or older and that people living with dementia currently represent 52% of all residents in RACFs (Dementia Australia, 2019), environments which optimise their abilities in particular are required (Hadjri, Faith, & McManus, 2012).

Studies have shown that physical environments which have supportive features for residents do enhance function (Degenholtz et al., 2006; Fleming & Purandae, 2010) with empirical literature demonstrating support for a wide range of environmental features such as colour and contrast, opportunities for personalisation and comfortable noise levels to have measureable positive effects on resident wellbeing and quality of life (Calkins, 2009; Day, Carreon, & Stump, 2000; Jeon & Forysth, 2016). Residential design and improvements research have been conducted in other countries (Cutler & Kane, 2009; Innes, Kelly, & Dincarslan, 2011) with strong indications that environmental improvements are becoming increasingly

important (Joseph, Choi, & Quan, 2016; Topo, Kotilainen, & Eloniemi-Sulkava, 2012).

Whilst the impacts of the physical environment in residential aged care, particularly in dementia specific areas, have been noted; there are gaps and limitations (Chaudhury et al., 2018). For example, the majority of this research is cross-sectional with small sample sizes (Chaudhury et al., 2018), methodological weakness have been identified such absence of comparison groups and details on the intervention (Gitlin, Liebman, & Winter, 2003; Calkins, 2018), and there is often insufficient detail about the environmental component(s) being studied (Calkins, 2018). It is also difficult to determine which component(s) impacts on resident well-being and function (Chaudhury et al., 2018). Whilst there is a growing body of work on scale, design, layout and household models in residential aged care (Calkins, 2018) with transferability to new build or extension works (major refurbishments), the elements applicable to minor refurbishments have not been made explicit.

Whilst the Australian Government has outlined the accreditation requirements to ensure the physical environment of RACFs address functional needs of residents (Aged Care Quality & Safety Commission, 2019) and continues to offer additional funding for significant refurbishment initiatives (Department Social Services, 2014), there is a paucity of research to inform and guide providers to undertake minor refurbishment initiatives in Australian residential aged care facilities. The purpose of this research was to determine how minor refurbishment of (RACFs) could be undertaken in a prioritised, consistent and sustainable manner to ensure the outcomes enhance the abilities and wellbeing of the people who live within them. This work sought to contribute to the future development of a resource for providers who are planning minor refurbishments at RACFs.

1.2 Organisation of Chapters

Chapter 2

Chapter Two describes the preliminary review of the research topic and the subsequent development of a mixed methods approach to address the research aims. The five phase sequential design of the research is described in detail.

Chapter 3

Chapter Three describes Study 1 which identified and detailed the elements associated with minor refurbishments of residential aged care facilities through a narrative lens.

This chapter is based on a published manuscript:

- **Neylon, S.,** Bulsara, C., & Hill, A-M. (2019). Improving Australian residential aged care facilities: A review of minor refurbishment elements. *Journal of Housing For The Elderly*. DOI: 10.1080/02763893.2018.1561591.

Chapter 4

Chapter Four describes Study 2 which aimed to identify and systematically examine existing environment assessment tools which incorporate these minor refurbishment elements.

This chapter is based on a published manuscript:

- **Neylon, S.**, Bulsara, C., & Hill, A. (2017). The effectiveness of environment assessment tools to guide refurbishment of Australian residential aged care facilities: A systematic review. *Australasian Journal on Ageing, 36 2*, 135-143. https://doi.org/10.1111/ajag.12367

Chapter 5

Chapter Five describes Study 3 which explored and evaluated expert opinion on four environment assessment tools and details the adapted e-Delphi process adopted to rank the tools for further review.

This chapter is based on a published manuscript:

- **Neylon, S.,** Bulsara, C., & Hill, A-M. (2019). Expertise and e-Delphi: Assisting with Australian aged care facility refurbishment. *The Journal of Aging and Social Change.* 9(4), 33-50. https://doi.org/10.18848/2576-5310/CGP/v09i04/33-50

Chapter 6

Chapter Six describes Study 4 which aimed to engage stakeholder and resident groups to review the expert contributions and reach consensus on an assessment tool to pilot at a RACF preparing to undergo minor refurbishment.

This chapter is based on a submitted manuscript:

- **Neylon, S.,** Bulsara, C., Hampson, R., & Hill, A-M. (2019). Refurbishing residential aged care facilities using a consumer focused approach. *(Under peer review at journal).*

Chapter 7

Chapter Seven describes Study 5 which piloted the selected environment assessment tool in a RACF and examined content validity, concordance and correlation of the instrument.

This chapter is based on a submitted manuscript:

- **Neylon, S.,** Bulsara, C., Bulsara, M., & Hill, A-M. (2020). Can a modified environment assessment tool guide priorities for minor refurbishments at a residential aged care facility. *(Under peer review at journal).*

Chapter 8

Chapter Eight synthesises the findings from the five studies and discusses these in relation to the research aims. The strengths and limitations of the research along with implications for practice and future research are also identified.

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Chapter 2

Chapter 2: Research Methods

2.1 Introduction

Chapter 2 describes the methods used in the research conducted as part of the thesis. An overview of the methodology and methods is provided in this chapter while the specific methods for each study are described in the relevant chapters.

2.2 Research Aims

The purpose of this research was to determine how minor refurbishment of residential aged care facilities (RACFs) could be undertaken in a prioritised, consistent and sustainable manner to ensure the outcomes enhance the abilities and wellbeing of the people who live within them. This work sought to contribute to the future development of a resource for providers who are planning minor refurbishments at RACFs.

The specific research aims were:

- Study 1 (Chapter 3): To identify elements pertaining to minor refurbishments of residential aged care facilities.
- Study 2 (Chapter 4): To determine applicability of environment assessment tools in guiding minor refurbishments of Australian Residential Aged Care Facilities.
- Study 3 (Chapter 5): To explore and evaluate national and international expert review and ranking of selected aged care environment assessment tools in the context of minor refurbishments with resident based outcomes.
- Study 4 (Chapter 6): To describe the expert review process by a stakeholder focus group using nominal group technique to reach consensus on a single tool to pilot at a RACF and the resident participation group process to corroborate the findings.

- Study 5 (Chapter 7): To pilot an environment assessment tool at a RACF and evaluate the content validity, concordance and correlation of the tool and describe its transferability to Australian residential aged care and to minor refurbishment.

2.3 Research Structure

An overview of the research structure is presented in Figure 2.1.

2.4 Research Design

The research utilised a sequential exploratory mixed methods design within a pragmatic paradigm. A mixed methods design synthesises elements of qualitative and quantitative approaches to yield a broader understanding and corroboration of the data (Creswell, 2013; Schoonenboom & Johnson, 2017). The sequential approach involved the initial collection of data for Study 1 serving as the basis for the collection and analysis of data for Study 2 and so on (Onwuegbuzie & Combs, 2010). The exploratory design was selected because there is scant research published to date on the topic of aged care minor refurbishments. Hence the collection and analysis of descriptive qualitative data prior to quantitative data was required (Creswell & Plano Clark, 2011). Of the four commonly cited methods in the literature to integrate qualitative and quantitative data in mixed methods research, the building data approach, whereby the results of each study informs the approach to the next study, was adopted (Office of Behavioural and Social Sciences, 2018; Creswell et al., 2011). Some synthesising also occurs through the data collection phases such as Study 3, where qualitative data from survey results were transformed into quantitative scores, and Study 5 where the results from quantitative audit scores were compared with the themes that emerged from qualitative data in earlier studies as per Creswell et al. (2011).

Figure 2.2 represents an overview of the research design.

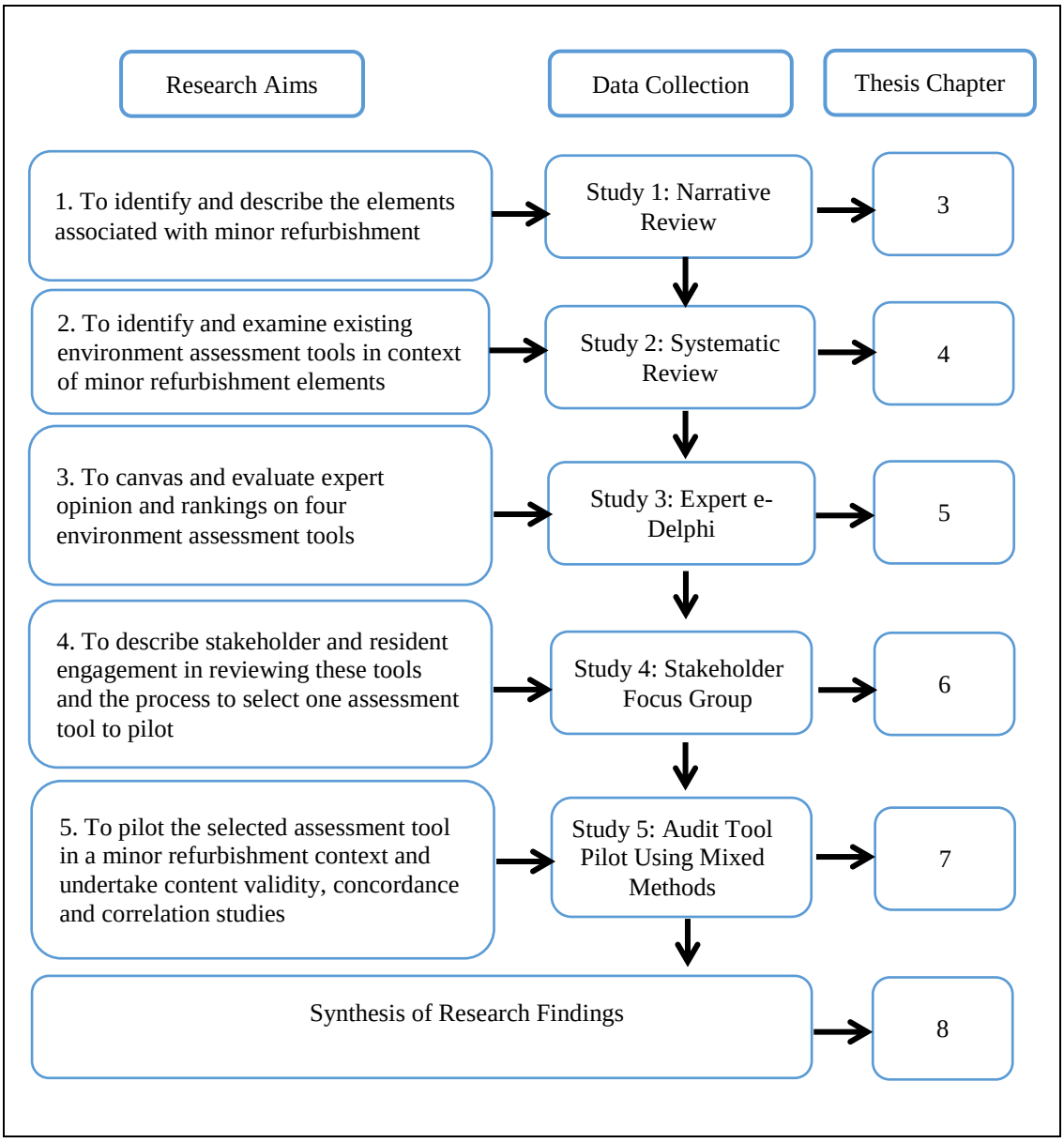

Figure 2. 1 Research Structure

The researcher took a pragmatic stance (Moore & Geboy, 2010) throughout the trajectory of the research. Pragmatism is orientated toward solving practical problems in real life situations rather than on assumptions of a theoretical framework (Hall, 2012). Therefore pragmatism befits studying interventions within a residential care environment requiring an outcome oriented line of inquiry (Onwuegbuzie & Combs, 2010). The basic pragmatic maxim to select the combination of methods and procedures that works best to answer the research aims was adopted (Johnson and Onwuegbuzie, 2004).

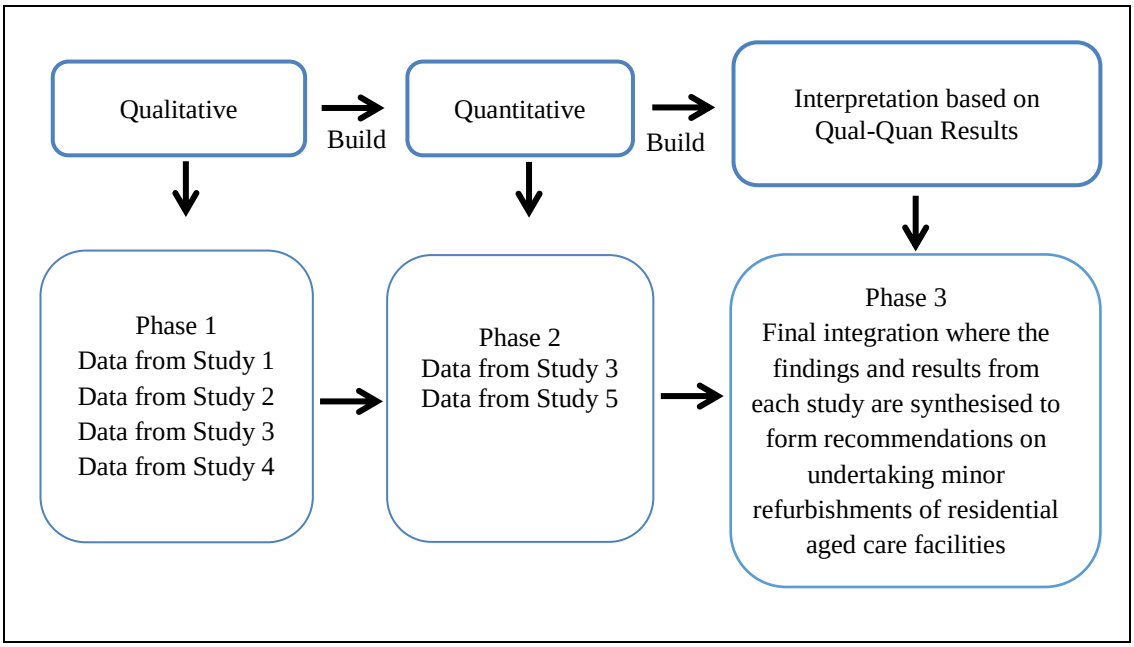

Figure 2. 2 Mixed Methods Research Design (based on Creswell and Plano Clark, 2011)

2.4 Ethical Considerations

Ethics approval from the University of Notre Dame Australia's Human Research Ethics Committee (HREC) was required and granted for Studies 3 and 4 (017025F, March 2017) and Study 5 (019025F, March 2019). Information sheets were provided to all participants and they subsequently all provided written consent to participate. Nonetheless, they were made aware that they had the option to withdraw from the research at any time.

2.5 Participants and Settings

Participants were engaged in three of the five studies in this research. Details regarding participant recruitment and settings are presented in each chapter. Study 3 (expert e-Delphi) was conducted via internet with expert aged care environment participants nationally and internationally and is described in full in chapter 5. Study 4 Part A (focus group) was conducted with aged care stakeholders representing a variety of professions and roles in residential aged care at a central metropolitan venue. Study 4 Part B (resident participation group) was conducted with residents at their southern metropolitan care facility. Study 4 is described in full in chapter 6.

Study 5 was conducted via the internet with local residential care experts and lay people to review the audit tool in Part A, whereas the piloting of the audit tool took place at the same southern metropolitan care facility in Part B. Study 5 is described in full in chapter 7.

2.5 Data Collection Procedure

The overarching sequential design required the data to be collected and analysed for each study prior to moving to the next study (Onwuegbuzie & Combs, 2010). Table 2.1 summarises the data collected in each study and identifies the rationale for each and the corresponding chapters which describes the processes in detail.

Table 2. 1 Study Data Collection

Study	Data Collection	Rationale	Chapter
1	Narrative Review (NR)	NR aim to broadly identify and summarise existing material to progress the development of a concept (Ferrari, 2015) and as the elements of minor refurbishment had not previously been defined and described systematically, the research began with a NR.	3
2	Systematic Review (SR)	SR address a well-defined query with clear study inclusion criteria, comprehensive methods and explicit synthesis (Ferrari, 2015) and this ensured a transparent analysis of existing environment assessment tools with a focus on which tools incorporated the minor refurbishment elements.	4
3	e-Delphi	e-Delphi is a technique drawing on expert opinion to reach a consensus (Shariff, 2015) utilizing the internet (Donohoe et al., 2012) which enabled extensive knowledge within the aged care sector to contribute to the review and ranking of assessment tools for consideration by local stakeholders.	5
4	Focus Group	A focus group gathers specific data from participants in an interactive forum (Braun & Clarke, 2013) and using a nominal group technique (Harvey & Holmes, 2012) ensured a single assessment tool could be selected by stakeholders for piloting. A participant experience approach (Agency for Clinical Innovation, 2016) with a subsequent resident group was utilised for data complementarity.	6
5	Tool Pilot	The content validity of an instrument needs to be examined to determine the extent it reflects the construct being measured (Zamanzadeh et al., 2010) as does the level of concordance and correlation (Liu et al., 2016) before recommendations for use in a minor refurbishment context can be made.	7

2.6 Data Analysis

All data are presented in detail in figures, graphs and tables in the corresponding chapters and the analysis also described in full in each chapter. Briefly, the mixed methods approach resulted in a mix of qualitative and quantitative approaches. Study 1 (Qualitative or Qual) used inductive content analysis (Vaismoradi, Turenen & Bondas, 2013) to code the narrative review data which were subsequently ordered and presented numerically and in frequency counts. The inductive approach was selected as the concepts were initially unknown and these subsequently emerged from the data analysis (Weil, 2017). The systematic review in Study 2 (Qual) used a critical appraisal screen to examine constructs including reliability, validity and quality with the latter scored numerically (Dixon Woods et al., 2005). The use of an appraisal screen permitted synthesis of methods, samples, outcome measures, data analysis, studies and potential sources of bias (Katrak et al., 2004).

The ordinal responses to the expert survey in Study 3 (Quantitative or Quan/Qual) were examined on a 5-point Likert scale and described using measures of central tendency. The open ended responses were coded via inductive content analysis (Vaismoradi, Turenen & Bondas, 2013) and presented as frequency counts. Study 4 (Qual) used a nominal group technique (Harvey & Holmes, 2012) in iterative rounds as this discussion and rating process is widely used to reach consensus (Ivankova & Kawamura, 2010). The group recordings were transcribed verbatim and data underwent inductive content analysis with the codes or key themes visually represented in content clouds (Cidell, 2010) for comparison between the two groups. The data from the tool pilot in Study 5 (Quan/Qual) were examined using Content Validity Index (Zamanzadeh et al., 2010) and concordance and correlation measures (Liu et al., 2016) to determine applicability and use of the tool in a residential aged care context. The relationship between variables was examined using deductive content analysis as the constructs were known (Onwuegbuzie & Combs, 2010).

2.7 Summary of Chapter

This chapter described the mixed methods sequential exploratory research design using a pragmatic approach and the translation of the study aims from Chapter

1 to the research structure which forms the basis of subsequent thesis chapters. An overview of the methods used in the five studies was provided in this chapter.

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Chapter 3

Chapter 3: Improving Australian Residential Aged Care Facilities: A Review of Minor Refurbishment Elements

Preface

There is limited published information on the elements to be considered when undertaking minor refurbishment at a residential aged care facility. This chapter describes a narrative review to identify these elements and is based on a published manuscript (see Appendix B):

Neylon, S., Bulsara, C., & Hill, A-M. (2019). Improving Australian Residential Aged Care Facilities: A Review of Minor Refurbishment Elements. *Journal of Housing for the Elderly.* doi: 10.1080/02763893.2018.1561591

The author's own version of the manuscript is presented with slight modifications to facilitate flow in the style and format of this thesis.

3.1 Abstract

The objective of Study 1 was to identify elements pertaining to minor refurbishments of residential aged care facilities. A narrative review of relevant publications was conducted. Inductive content analysis was used to categorise coded data into major or minor refurbishment or staff practices. Further analysis identified minor refurbishment domains. There were 14 major refurbishment, seven minor refurbishment, and two staff practices domains established. The minor refurbishment elements (n=7) identified were lighting, furniture, colour and contrast, wayfinding, noise, signage and flooring. Assessing these elements would assist residential aged care providers to prioritise the provision of minor improvements to the environment for residents.

3.2 Introduction

Constrained funding means that aged care providers, particularly those in the not for profit sector, may need to examine the feasibility of redeveloping or

modernising existing facilities versus embarking on new building projects or expansion initiatives (Vu, Davey, & Ansell, 2012). Refurbishment of a residential aged care facility (RACF) can be considered as the remodelling or renovation of a building and may be classified in one of two ways: first, as a major renovation (involving a floor area of at least 2000m^2 with the replacement, upgrade or repair of over 50% of the base building and considering aspects such as heating, ventilation, plant/equipment), or second, as minor renovation (any works not constituting a major refurbishment) (Australasian Procurement & Construction Council, 2010; Department of Environment & Water Resources, 2007). Minor renovation involves undertaking redecoration and repair works to update or improve functional suitability of a space without any major changes to structure or interior layout and may occur in an occupied building (Giebler et al., 2009). In a residential aged care context, improvements to finishes, furniture, fixtures and fittings to provide quality or functional benefits to residents beyond aesthetics, are classified as minor refurbishment (Department Social Services, 2014). However, few studies have examined the specific elements that constitute minor refurbishment in residential aged care facilities.

There is little research or few resources available to guide service providers as they embark upon and undertake minor refurbishment projects. How should they prioritise refurbishment interventions in a cost effective, consistent and sustainable way that is going to benefit residents? The purpose of Study 1 was to identify elements that fall within the scope of minor refurbishments of residential care facilities both locally and internationally to aid this decision making.

3.3 Methods

3.3.1 Design

A narrative review was conducted (Ferrari, 2015).

3.3.2 Search Strategy

An initial limited search of Emerald and Cinahl databases was undertaken to ascertain if the chosen search terms would identify articles that examined refurbishment in the retrieved set. In addition to the Medical Subject Headings (MeSH) (National Institutes of Health, 2016) of Residential Facilities, Nursing

Homes, Facility Design and Construction, Environmental Design, a number of search terms were used such as refurbishment, minor and major improvements, renovations, physical environment, design and guidelines.

After this initial search, a scoping search of Emerald, Cinahl, Summons, Trove and Google Advanced Search databases was undertaken. Reference lists from included publications were also hand searched for additional studies.

The review question was 'What elements identified in residential aged care research could be considered when undertaking minor refurbishments of a care facility?' Relevant criteria for studies to be included for analysis were set as follows:

- Information was available in full text and in English
- Restricted to residential aged care environments
- Included only those features or aspects considered to be 'improvements'
- Articles could be studies that evaluated interventions or reviews (as outcome measures i.e., furnishings were being examined and not the outcomes themselves i.e., the results of changing the furnishings) as long as it was clear that refurbishment had taken place or was being discussed. Our focus was to identify refurbishment elements or themes and their frequency counts, not to critically appraise the evaluation of the interventions themselves.

The review excluded publications focusing primarily on new building designs, outdoor environments, gardens and clinical interventions.

3.3.3 Procedure

The first researcher scanned through the titles and abstracts and excluded those that did not meet the inclusion criteria. The remaining abstracts were then read and screened with full articles selected after discussion with the second researcher. Once the agreed inclusions were confirmed, the narrative review process (Ferrari, 2015) continued with a description and summary of each article highlighting the main contributions of each to the research topic. Given the challenges in obtaining studies implicitly specifying minor and major refurbishment of residential aged care environments, an inductive content analysis (Elo & Kyngäs, 2008) was used to identify components of these initiatives. The first researcher carefully read the

articles and selectively coded the content of each one. This process reduced the data to key words pertaining to refurbishment. Subsequently a random selection of six articles was independently coded by the second researcher and the two researchers then met to confirm interpretations and set the coding parameters. Discussions held with the third researcher confirmed both labels and coding methods. Consequently the codes were then grouped according to building or design components (major refurbishments or new builds) and interior components (minor refurbishments). The final coded data representing refurbishment were then entered verbatim onto a Microsoft Excel (2013) spreadsheet and ordered using colour highlights. Frequency counts for each coded item were completed. Multiple categories were generated from the different headings on the spreadsheet. These were subsequently grouped under higher order headings to reduce the number of categories through the collapse of 'like' and 'unlike' categories. The selected articles were then reviewed again given the now established categories. Two subcategories minor and major were now applied. All three researchers then independently reviewed the categories and met to reach consensus regarding final generic categories and sub-categories. This dialogical process to achieve agreement amongst the research team followed research by Graneheim & Lundman (2004) on essential components for a rigorous review. This triangulation process aimed to enhance trustworthiness of the article selection and decision making process for inclusion and exclusion (Elo et al., 2014).

3.4 Results

The search terms resulted in a broad range of publications so the researchers pragmatically screened them by starting with articles appearing multiple times in the searches to remove duplicates and then proceeded with hand searching. Over 3,000 titles or abstracts from the years 2000 to 2015 were viewed and of these, 94 articles were retrieved and read in full to confirm they met the inclusion criteria. Subsequently there were 37 articles excluded as the studies were either not situated in RACF, were descriptions of new builds or related primarily to the outdoors or to resident directed interventions. The resultant 57 articles were then catalogued using EndNote reference management software (refer to Appendix C for list of included studies).

The grouping of the final coded data revealed 26 categories pertaining to refurbishment. These categories and the frequency count of each are represented in Table 3.1.

Table 3. 1 Refurbishment Components Coded Into Categories.

Subcategory	Frequency
Lighting	43
Layout	36
Furniture	35
Size	34
Colour	33
Personalisation	32
Functions	32
Privacy	31
Views out	30
Noise	29
Wayfinding	26
Signage	26
Flooring	23
Safety	21
Contrast	21
Visual Access	21
Sensory balance	18
Landmarks	18
Camouflaged exits	15
Security	15
Temperature	10
Automation	9
Other	9
Adaptation	8
Storage	7
Ventilation	6

The categories were further examined and grouped according to whether they were building or design (major refurbishment) or interior (minor refurbishment) elements.

A number of the categories were considered to be related and were grouped to form a single category. There were 10 publications that cited only one term, such

as camouflaged exits, wayfinding or landmarks, while 22 cited a combination of these terms. Since the majority of the included publications used a combination of these categories and they all related to a similar element, the researchers agreed to collapse them to form a single category. This resulted in a new category of wayfinding which was a combination of the categories of camouflaged exits, wayfinding and landmarks.

Additionally, there were 33 publications that cited only colour but 21 cited both colour and contrast. Since this was the majority of the publications and these publications argued that colour alone was insufficient, the researchers agreed to collapse them to form the new category of colour/contrast which combined the two previous categories of colour and contrast.

Finally, categories that were ensuring sensory balance within the environment and personalisation (placing personal belongings or identification in or near a resident's room), were judged to be primarily staff practices rather than a refurbishment category. Figure 3.1 shows the representation of these 14 major refurbishment categories, seven minor refurbishment categories and two staff practices categories.

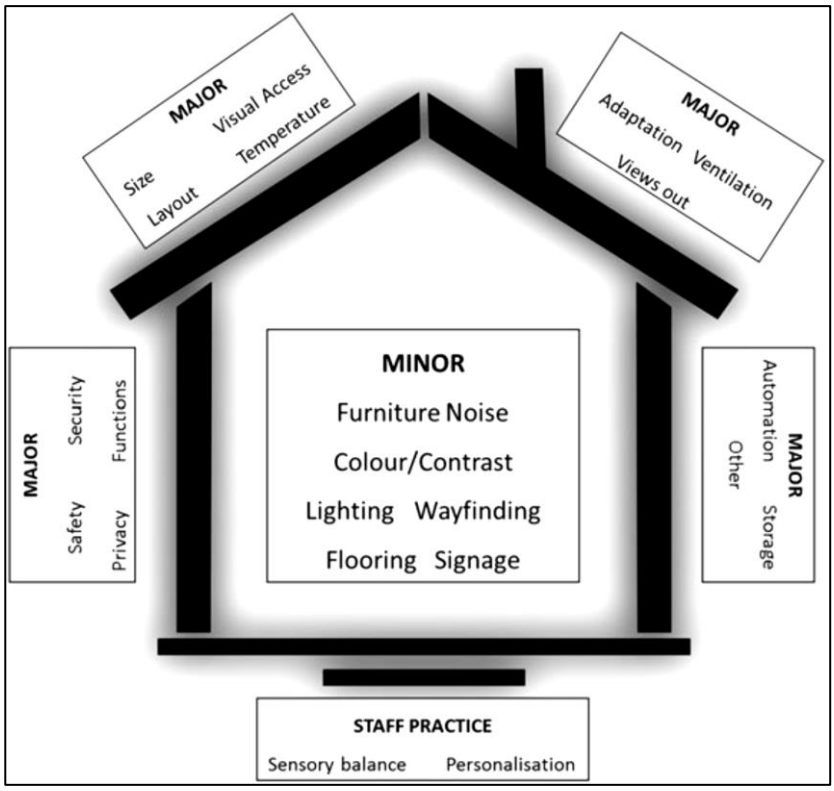

Figure 3. 1 Categorisation of Coded Data According to Major or Minor Refurbishment Components or Staff Practice

With seven minor refurbishment categories identified (Colour/Contrast, Flooring, Furniture, Lighting, Noise, Signage, and Wayfinding), the 57 publications were reviewed again. One was found to relate only to major refurbishment so consequently was not subjected to further review. From the remaining 56 publications, 10 were found to have only one minor refurbishment category so the authors addressed on the remaining 46 publications as the focus was on frequencies of categories. Of these publications, 21 were reviews and 25 were studies. Of the 25 studies, 16 were qualitative and nine were quantitative. Lighting was found to occur the most frequently with furniture and colour/contrast close together in second and third places. The frequency count of the seven minor refurbishment categories in the revised sample is represented in Figure 3.2.

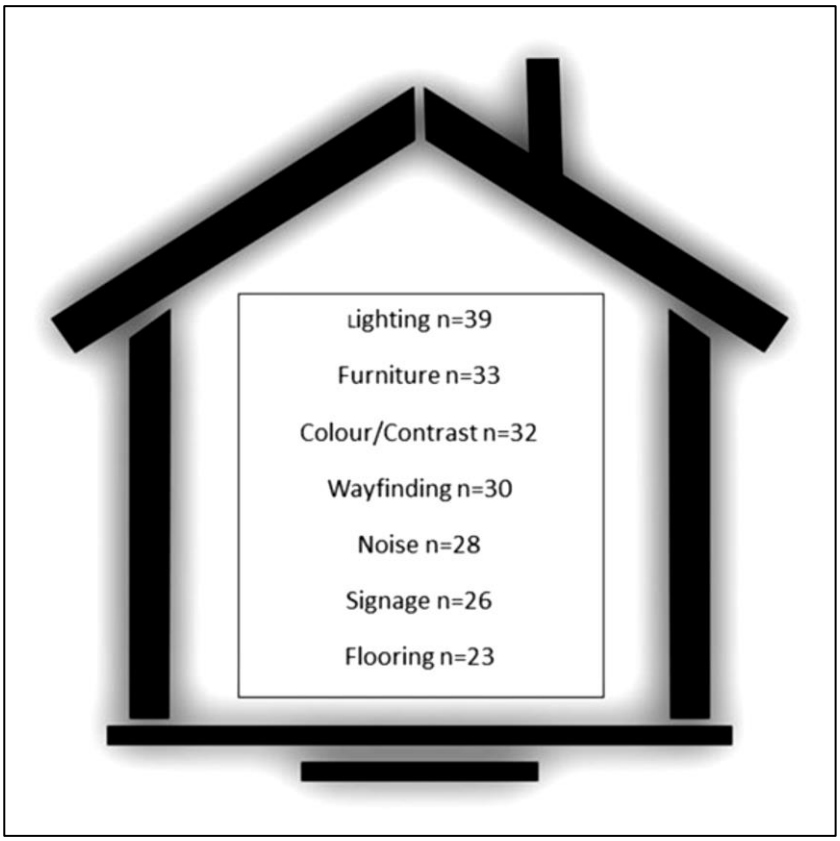

Figure 3. 2 Frequency Count of Minor Refurbishment Categories

The review thus identified seven categories or elements that could inform persons undertaking minor refurbishment initiatives at their residential aged care facilities. Over 80% of publications mentioned lighting and flooring (the least frequent) was identified in 50% of the articles. Nine publications mentioned all seven elements and concluded they were the top priorities for designers and renovators to take into account (Wang & Kuo, 2006) with more care in fitting of the environment required (Hadjri, Faith, & McManus, 2012). Additionally, design quality, environment, refurbishment and use of space were stated to be contributing factors to more enabling resident outcomes (Hadjri, Rooney, & Faith, 2015; Lee et al., 2012).

3.5 Discussion

It is challenging for service providers to identify and prioritise minor refurbishment initiatives that may benefit residents. It has been identified that minor refurbishment consists of minimal alterations to building services (Giebler et al., 2009) with improvements to finishes, furniture, fixtures and fittings to provide

quality or functional outcomes to residents (Department Social Services, 2014). The seven minor refurbishment elements identified in our study appeared to be supported in this context. Whilst Gitlin, Liebman, & Winter's (2003) qualitative synthesis of effects of environmental interventions on people with dementia in primarily long term care facilities identified all seven refurbishment elements, more rigorous testing with larger sample sizes was proposed which was also raised in Day, Carreon, & Stump's (2000) review. Other researchers have suggested that ignoring details such as these elements may contribute to poor design choices that create environments which may impact negatively on the function of elderly residents more than the ageing process itself (Bakker, 2000; 2003). Marquardt, Bueter, & Motzek, (2014) found support for a range of specific design interventions including these seven elements to be beneficial for people living with dementia.

3.5.1 Lighting

The most frequently occurring minor refurbishment element was lighting which was cited in 85% of the included studies and reviews. Lighting is an important environmental factor given that by age 60 there is 66% less light reaching the retina of the eye, thereby reducing visual and discrimination abilities (Teresi, Holmes, & Ory, 2000). Glare, low light and uneven lighting all contribute to vision difficulties (Brawley, 2001; Teres, Holmes, & Ory, 2000) with issues of increased visual misinterpretation by people who have dementia (Benbow, 2013). Poor lighting in RACF has been identified as a problem (Bakker, 2000; Brawley, 2001; Calkins, 2009) with a need for specialised lighting components that better cater for the needs of elderly people in RAC settings (Shikder, Mourshed, & Price, 2012) and reduces shadows (Gitlin, Liebler, & Winter, 2003). Even and increased light levels (both ambient and task lighting), controlled glare, controlled night time lighting and balanced brightness were all cited as supporting vision, task performance, sleep and behaviour (Davis, et al., 2009; Day, Carreon, & Stump, 2000; Falk, Wijk, & Persson, 2009; Garre-Olmo et al., 2012; Joosse, 2012; Marquardt, Bueter, & Motzek, 2014; Tilly & Reed, 2004; Wang & Kuo, 2006). Increased levels of natural light were also considered important (Brawley, 2009; Dewing, 2009; Hadjri, Faith, & McManus, 2012; Marquardt, 2011; Torrington & Tregenza, 2007; Wilkes et al., 2005) particularly at the design phase (Leung, Yu, & Yu, 2012; van Hoof et al., 2014).

3.5.2 Furniture

Furniture was cited in 72% of the publications. Furniture shapes instrumental, sensory, cognitive, emotional and meaningful experiences (Jonsson et al., 2014). Designers need to be aware of features that enhance these experiences as well as those features resulting in dependence or discomfort (Bakker, 2000) as well as the arrangement and type of furniture (Leung, Chan, & Olomolaiye, 2012; Morgan et al., 2004). Furniture needs to reflect the purpose of the room (Marquardt & Schmieg, 2009; Zeisel, 2013) and to be non-institutional and pleasant in appearance (Danes, 2002; Day, Carreon, & Stump, 2000; Zeisel et al., 2003) with personal furniture pieces encouraged in bedrooms (Davis et al., 2009; Hadjri, Rooney, & Faith, 2015; Innes, Kelly, & Dincarslan, 2011; Passini et al., 2000; Rabig, 2009). Whilst 'homelike' furniture requires some assumptions to be made as styles in individual homes can vary greatly; Calkins (2009), Cioffi et al. (2007), Fleming & Purandare (2010), Wilkes et al. (2005) and van Hoof et al. (2014) all suggest furniture and fittings familiar to age/generation of residents. The design of furniture needs to be considered to symbolise everyday life (Edvardsson, 2008) and to reduce falls risks (Teresi, Holmes, & Ory, 2000; Wang & Kuo, 2006) and hazards associated with inappropriate seating (Brawley, 2001; Lee et al., 2012). Furniture upholstery can aid with the management of glare (Wang & Kuo, 2006), noise (Bakker, 2003) and provision of contrast to the floor (Torrington & Tregenza, 2007). Labelling of doors and drawers to be considered also (Marquardt, Bueter & Motzek, 2014).

3.5.3 Colour/Contrast

Colour/contrast featured in 70% of included publications as it was deemed to aid in enriching the environment to compensate for visual changes that come with ageing (Wang & Kuo, 2006). Yellowing of ageing eyes means reduced perception of colours (Dewing, 2009), particularly in blue-purple range (Torrington & Tregenza, 2007) so strong contrasts of significant features enables them to be seen and understood (Bakker, 2003; Benbow, 2013; Hadjri, Faith, & McManus, 2012; Shikder et al., 2012), for example a dark background with light information (Brush et al., 2015). Neutral colours are to be used with strong contrasts to highlight thresholds and obstacles (Teresi, Holmes & Ory, 2000) and emphasise important aspects of the environment such as doorways (Day, Carreon, & Stump, 2000; Hadjri,

Rooney & Faith, 2015) and table settings (Davis et al., 2009; Marquardt, Bueter, & Motzek, 2014). The purported health benefits of colour were noted in Codinhoto et al., (2009)'s work. The aesthetics of colour assist facilities to appear less clinical (Calkins, 2009; van Hoof et al., 2014) and more 'homelike' (Danes, 2002; Falk, Wijk, & Persson, 2009; Zeisel, 2013) with neutral tones suggested in quiet areas (Day, Carreon & Stump, 2000; Jonsson et al., 2014) and clear, saturated colours and contrasts in common areas to increase levels of energy and alertness (Jonsson et al., 2014). Paints provide useful contrast for walls with predominantly white fixtures found in most bathrooms (Brawley, 2009). The amount of light available impacts on the role of colour (Gross et al., 2004) and the colour needs sufficient strength to be distinguishable (Passini et al., 2000).

3.5.4 Wayfinding

Wayfinding was the fourth most often cited element, appearing in 65% of the included publications. People with cognitive impairments such as dementia (who represent a growing proportion of residential aged care populations) (Australian Institute of Health & Welfare, 2012) rely on easily accessible environment information to help them safely navigate their environment (Hadjri, Faith, & McManus, 2012; Passini et al., 2000). Accessible information includes defined architectural features such as defined doorways and changes in floor surfaces (Bakker, 2003; Davis et al., 2009), landmarks (Bakker, 2000; Innes, Kelly & Dincarslan, 2011), images on walls (Hadjri, Rooney, & Faith, 2015) and signs (Calkins, 2009; Gross et al., 2004; Innes, Kelly, & Dincarslan, 2011). Distinct reference points that aid residents' wayfinding are not necessarily the points staff thought the residents would find helpful (Passini et al., 2000). Memorable reference points (such as fittings, fixtures or furniture) can support orientation – particularly if placed at a spot where direction changes e.g., junctions where corridors meet or open into large spaces (Marquardt, Bueter, & Motzek, 2014; Marquardt & Schmieg, 2009) or if the furniture/decorations are distinctive in form and function (Marquardt, 2011). Multiple cues can aid navigation (Davis et al., 2009; Marquardt, 2011) with both inviting and camouflaged doors showing ways for independent and safe movement (Day, Carreon, & Stump, 2000; Fleming & Purandare, 2010; Tilly & Reed, 2004; Zeisel, 2013; Zeisel et al., 2003) as visible exits with no access can impact on

behaviour (Garcia et al., 2012). The right colour cues may promote orientation as colour perception is usually well preserved (Innes, Kelly, & Dincarslan, 2011; Wijk et al., 2002) as can the use of photographs and memorabilia (Nolan et al., 2002). Having clear and available space to promote freedom of movement is important for wayfinding also (van Hoof et al., 2014).

3.5.5 Noise

Noise was cited in 60% of publications. An older person's reduced hearing or ability to interpret sounds can mean that excess noise results in distress, confusion and communication difficulties (Bakker, 2003). Noise can significantly impact behaviour with relationships found between more pleasant sounds and positive behavioural outcomes (Garcia et al., 2012; Marquardt, Bueter, & Motzek, 2014; Tilly & Reed, 2004). Noise as an environmental pollutant was reported to impact also on function, health (Codinhoto et al., 2009; Dewing, 2009; Edvardsson, 2008; Leung, Chan, & Olomolaiye, 2013; Leung, Yu, & Yu, 2012; Teresi, Holmes, & Ory, 2000) and quality of life (Garre-Olmo et al., 2012) and needs to be controlled (Fleming & Purandare, 2010; Joosse, 2012; Lee et al., 2012; Morgan et al., 2004; Zeisel et al., 2003). Strategies include noise mitigating design features including ceiling and wall products; noise reducing adaptations such as window treatment and soft furnishings; and scheduling intrusive noises from tasks such as cleaning at times that have lesser impact on residents (Bakker, 2000; Benbow, 2013; Jonsson et al., 2014; Wang & Kuo, 2006). Other strategies such as appropriate and balanced auditory stimulation (natural and soothing sounds) as well as silence or provision of quiet places (Gitlin, Liebler, & Winter, 2003; Hadjri, Faith, & McManus, 2012; Hadjri, Rooney, & Faith, 2015; Innes, Kelly, & Dincarslan, 2011) along with audio privacy in bedrooms (Zeisel, 2013) were found to have positive effects. Having fewer residents eat meals in smaller allocated spaces was also suggested as a means of controlling noise levels (Morgan et al., 2004).

3.5.6 Signage

In 57% of the publications, signage was the 6th most frequently occurring minor refurbishment element. Personalised and/or unique signage may support orientation (Calkins, 2009; Leung, Yu, & Yu, 2013) and wayfinding (Falk, Wijk, &

Persson, 2009; Innes, Kelly, & Dincarslan, 2011) particularly where architectural and design features are not sufficiently prominent (Marquardt, 2011; Passini et al., 2000). Signs contribute to visually accessible information but position and height is important as residents whose visual field is near the ground need to be considered (Calkins, 2009; Marquardt, 2011). Image and text is to be large and simple (Bakker, 2003; Davis et al., 2009; Nolan et al., 2002) with attention to contrast and spacing (Wang & Kuo, 2006) and background (Bakker, 2000). Non relevant displays or visual clutter are to be minimised (Marquardt, 2011; Passini et al., 2000). Printed names are often still recognisable and aided with the use of matte background to reduce glare (Gross et al., 2004). Directional and participant room signage (Lee et al., 2012) with text and pictograms aided wayfinding (Brush et al., 2015; Hadjri, Rooney, & Faith, 2015), particularly to toilets (Day et al., 2000; Gitlin et al., 2003; Hadjri, Faith, & McManus, 2012; Marquardt & Schmieg, 2009; Tilly & Reed, 2004).

3.5.7 Flooring

Flooring featured in 50% of the publications (the 7th most cited). Visual and perceptual changes in older people, particularly those with dementia, make it difficult to differentiate patterns or dark borders on flooring resulting in attempts to avoid or step over those areas (Bakker, 2003; Calkins, 2009; Day, Carreon, & Stump, 2000; Gitlin, Liebler, & Winter, 2003; Marquardt, Bueter, & Motzek, 2014; Passini et al., 2000). The installation of flooring needs to define carefully any steps and not to have significant change in material to be perceived as a step (Torrington & Tregenza, 2007; Wang & Kuo, 2006). Flooring materials that produce glare or appear wet are hazardous (Brawley, 2001, 2009) with confusion, falls risks and agitation (Bakker, 2000; Marquardt, Bueter & Motzek, 2014; Shikder, Mourshed, & Price, 2012; Teresi, Holmes, & Ory, 2000) often the outcomes of poorly selected flooring. The type of flooring recommended seems to vary with one study favouring carpet in bedrooms due to its ‘homelike’ appearance (Schwarz, Chaudhury, & Tofle, 2004) and another advocating non slip vinyl tiles (Leung, Chan, & Olomolaiye, 2012).

3.6 Limitations and Considerations

Limited previous research and defined criteria relating to minor refurbishments led to a narrative rather than systematic review of the literature at this

time as a narrative review allows a broader focus on the topic and outcomes to be evaluated and provides less explicit criteria for the selection of articles (Ferrari, 2015). This may mean that some articles which describe minor refurbishments in RACF were not identified. However, through searching key databases Medical Subject Headings (National Institute of Health, 2016) terms and other relevant search terms and screening over 3000 articles, a broad scoping of studies relevant to the topic was completed. It was possible to source publications and to develop coding for transparent inductive content analysis. There was no clear minor refurbishment framework identified in the reviewed publications, nor was there consistency regarding selected elements or the relationships between them. For example, one article included lighting and colour/contrast (our two most frequent elements) yet another article would cite lighting and flooring (our first and seventh frequently occurring elements). Coding of categories was the primary focus in this study to determine the frequencies, then to identify which elements should be included for consideration when undertaking minor refurbishments of residential aged care facilities. This is important to aid in the service providers' awareness and decision making when commencing these initiatives. We did not evaluate the rigor of the studies or the actual outcomes they measured as several other studies have done this previously (Day, Carreon, & Stump, 2000; Fleming & Purandare, 2010; Gitlin, Liebler, & Winter, 2003; Marquardt, Bueter, & Motzek, 2014). Gitlin, Liebler, & Winter (2003) along with other publications, argue for more rigorous testing of these minor refurbishment elements and larger samples to assess their effects on residents' outcomes, care and quality of life.

It is important to recognise that these seven elements are complex and interactive – with lighting and colour/contrast being one such example. There are also cultural and geographical factors that would influence the use and prioritisation of these domains. Therefore, although these seven elements are reflected constantly in the literature, other design features may also be important. Ours is the first research to attempt to identify and quantify elements of minor refurbishment for future use in research and practice. There are possibly more elements that may also fit the brief of minor refurbishment but are yet to be evaluated and the combinations or inter-relations of these domains are an important consideration. In addition, we suggest that researchers explicitly state what they consider to be minor refurbishments as opposed to new building design or major refurbishments. This

could assist service providers to scope works to enable functional and wellbeing outcomes for residents in a cost effective and sustainable way.

Davis et al. (2009) pose a useful challenge: think first of the living experiences and then create the environments accordingly which promote active participation for a person living with dementia. For example, consideration of large clocks, appropriate ornaments, furniture, lighting, colour/contrast, access to meal preparation areas all contribute to the eating experience (Davis et al., 2009) rather than each component in isolation. Davis et al. (2009) conclude that in meeting the needs of the residents with the highest care needs, you are likely to meet the needs of all residents.

3.7 Conclusion

As part of continuous improvement and consumer demands, residential aged care providers explore ways to provide the best possible living outcomes in their facilities in the most cost effective way. For some, refurbishment of current buildings is a more viable outcome than investing in building new facilities.

We identified seven minor refurbishment elements of lighting, furniture, colour and contrast, wayfinding, noise, signage and flooring. Applying these elements to minor refurbishment of RACF may address many residents' needs. We do not suggest that these elements represent any order of priority and are cognisant that these elements will be impacted by overlying regulatory frameworks and staff practices.

3.8 Summary of Chapter

Based on a review of the literature, this study identified seven elements associated with minor refurbishment of residential aged care facilities. In order of frequency, these were lighting, furniture, colour/contrast, wayfinding, noise, signage and flooring. However, there is a need to objectively identify and assess these elements in the facility environment to ensure they deliver benefits to residents beyond aesthetics. Chapter 4 outlines the process adopted in Study 2 to identify and review environment assessment tools which include these minor refurbishment elements.

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Chapter 4

Chapter 4: Identification of Environment Assessment Tools as Refurbishment Guides for Australian Residential Aged Care Facilities: A Systematic Review

Preface

Objective evaluations of requirements for minor refurbishment would assist residential aged care providers prioritise interventions. This chapter describes a systematic review to identify environment assessment tools and determine which tools contain the seven minor refurbishment elements and is based on a published manuscript (see Appendix D):

Neylon, S., Bulsara, C., & Hill, A-M. (2017). The effectiveness of environment assessment tools to guide refurbishment of Australian residential aged care facilities: A systematic review. *Australasian Journal on Ageing, 36 2*, 135-143. doi:10.1111/ajag.12367

The author's own version of the manuscript is presented with slight modifications to facilitate flow in the style and format of this thesis.

4.1 Abstract

Objective

To determine applicability of environment assessment tools in guiding minor refurbishments of Australian Residential Aged Care Facilities.

Method

Studies conducted in residential aged care settings using assessment tools which address the physical environment were eligible for inclusion in a systematic review. Given these studies were limited; tools which have not yet been utilised in research settings were also included. Tools were analysed using a critical appraisal screen.

Results

Forty three publications met the inclusion criteria. Eleven environment assessment tools were identified of which four addressed all seven minor refurbishment elements of colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding. Only one had undergone reliability and validity testing.

Conclusion

There were four tools identified as possibly suitable to use for minor refurbishment of Australian residential aged care facilities. Data on their reliability, validity and quality is limited.

4.2 Introduction

Refurbishment of residential aged care facilities may be major or minor. Major refurbishment includes additional buildings, extensions or structural improvements to the residential aged care facilities (RACFs) (Department Social Services, 2012) and minor refurbishment the improvements to finishes, furniture, fixtures and fittings that provides a direct benefit in quality or functionality to residents' life that is beyond aesthetics (Department Social Services, 2012; NSW Aged Care Building Committee, 2014). Design elements of the newly built facility to accommodate various physical and cognitive impairments of this group have been researched in both Europe and North America (Calkins, 2009; Cutler et al., 2006; van Hoof et al., 2010). Studies demonstrate positive findings for a range of design elements such as facility size (Fleming & Purandae, 2010), control of stimulation (Day, Carreon, & Stump, 2000), lighting (Dewing, 2009; Shikder, Mourshed, & Price, 2012), signage (Gross etal., 2004; Marquardt, 2011), sound (Joosse, 2012) , visual access (Day, Carreon, & Stump, 2000; Fleming & Purandae, 2010), colour/contrast (Teresi, Holmes, & Ory, 2000), and wayfinding (Barnes, 2002; Passini et al., 2000) in terms of impact on residents' wellbeing or functional abilities. However, studies focusing on a single element (such as colour or décor) in isolation or omitting an assessment process or not incorporating the functional needs of occupants have not been successful in demonstrating a change in outcomes post interventions (Andersson, 2011; Cutler, 2007; Davis et al., 2009). Previous research

described in Chapter 3 has found seven commonly occurring elements of minor refurbishment in the form of colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding (Neylon, Bulsara, & Hill, 2019).

There were few guidelines for appropriate minor refurbishment of residential aged care facilities either internationally or in Australia. Well-researched guidelines to optimise the refurbishment outcomes for the RACF environment in the current financial and regulatory environment should mitigate where possible, ageing related impairments, and be maintenance friendly. The purpose of Study 2 was to systematically review environment assessment tools to determine which would be suitable for minor refurbishment of a RACF.

4.3 Methods

The Cinahl, Cochrane Library, PubMed, Trove databases and a RACF organisation's resource collection in addition to Google Advanced Search were all searched between May and November 2015 for references which described or reviewed environment assessment tools published between 1996 and 2015. Reference lists from included articles were also hand searched for additional studies. Other tools were identified by searching a number of Internet sites, particularly Australian government sites in the various states and territories. Further tools were identified by contact with researchers or experts in the field.

The full list of search terms, shown in Appendix E, included terms such audit, screen and assessment. These were combined with terms such as residential aged care, nursing homes, and residential facilities, and terms relating to the physical environment, design and refurbishment. The introduction of 'dementia' as a key word increased the results significantly. Finally, studies using the tools were also searched by entering the name of the tool.

Colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding elements consistently appeared in the literature as considerations for improvement to function and wellbeing; and are within the parameters of minor refurbishment (Neylon, Bulsara, & Hill, 2019). The design elements of major refurbishment initiatives such as building size, configuration or layout, access to the outdoors, private bedrooms and bathrooms and total visual access were outside the scope of this study and were excluded.

Using the review question ‘Can existing environment assessment tools be used to establish minor refurbishment priorities in an Australian residential aged care facility?’ the relevance criteria were as follows:

- Studies or resources available in full text and in English
- Employing tools developed to measure the physical environment in RACFs
- Tools readily accessible and preferably include an instruction manual
- Measuring at least two established minor interior refurbishment elements associated with changes in function or ability (colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding)

Studies related to behaviours, clinical health, therapeutic interventions, care needs, community or hospital settings and outdoor environments were not included. Each tool was populated into a table listing tool description; author/source; country of origin; purpose of tool; population or setting of tool; number and description of items; time to conduct; requirements for use; number of refurbishment elements addressed; studies using the tool; strengths and limitations. The reliability; validity and quality components were tabulated separately.

The quality of included studies were assessed using a structured questionnaire, with a maximum of five points (Dixon Woods et al., 2005) as shown in Figure 4.1.

1. Are the aims and objectives of the research clearly stated?
2. Is the research design clearly specified and appropriate for the aims and objectives of the research?
3. Do the researchers provide a clear account of the process by which their findings were produced?
4. Do the researchers display enough data to support their interpretation and conclusions?
5. Is the method of analysis appropriate and adequately explicated?

Figure 4. 1 Quality Criteria for Tools Assessment (Dixon Woods et al., 2005:28)

4.4 Results

The literature was initially searched by the first author (SN) and almost 3000 articles were identified and their titles and/or abstracts reviewed. Of these, 101 relevant articles were retrieved in full with the second author (AMH) confirming eligibility, and catalogued using EndNote reference management program (Reuters, 2016). Disagreements were discussed and if needed, referred to the third researcher CB to arbitrate. This flow is presented in Figure 4.2.

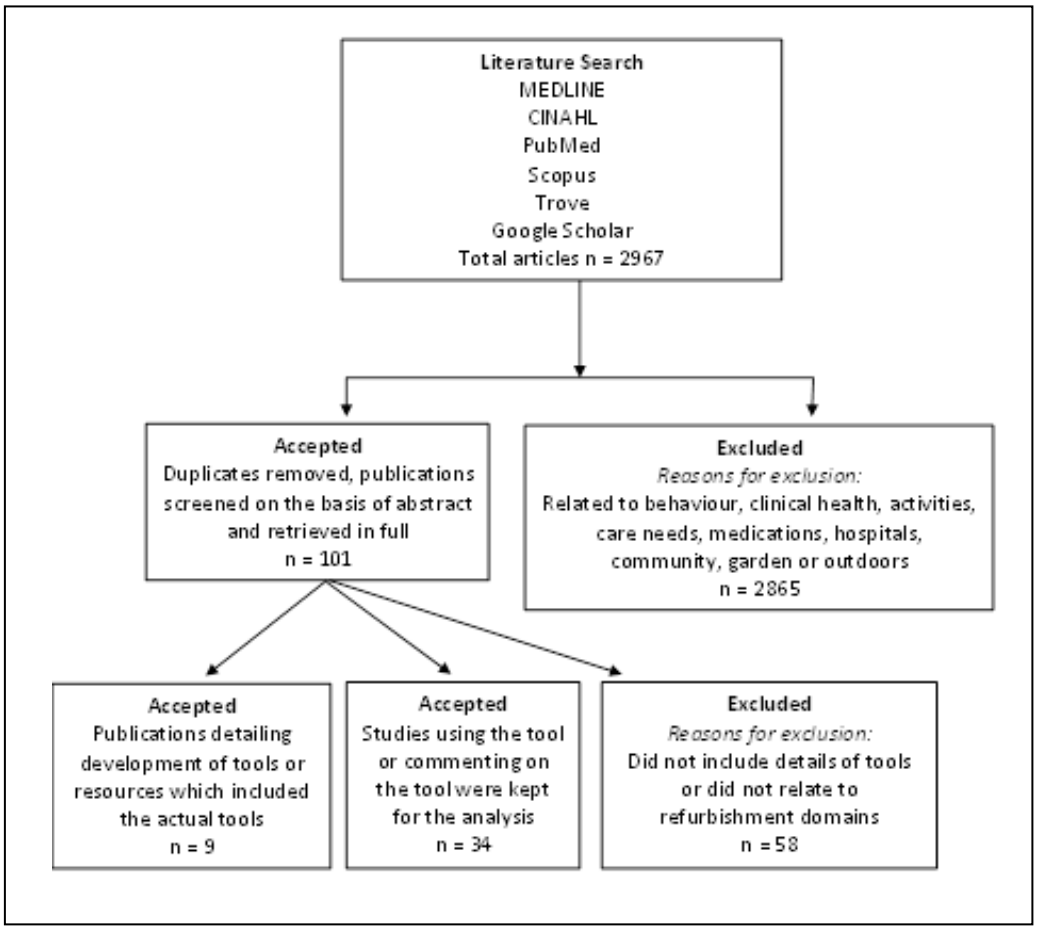

Figure 4. 2 Study Selection Flow Chart

The tools were examined to determine their potential to establish minor refurbishment priorities for Australian RACFs. Ten tools from the United Kingdom, United States of America and Australia were identified as meeting inclusion criteria and these are summarised in Table 4.1 with the reliabilty, validity and quality components recorded in Table 4.2. Some tools had been subjected to prior reviews or studies and their strengths and limitations noted (Fleming, 2009; Norris-Baker et

al.,1999; Sloane et al., 2002). It was evident certain tools had been used to audit the environment, but we investigated their use in the context of minor refurbishment in seven elements: colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding.

The Dementia Services Development Centre's (Cunningham et al., 2008) Dementia Design Audit Tool (DDAT) includes questions on all seven refurbishment elements. This UK tool has 345 questions with 118 deemed essential items and 227 recommended items with the overall score weighted according to category. However published data on the tool development or on any initial reliability and validity studies could not be found. Innes, Kelly, & Dincarslan (2011) conducted a study which provided some validity, reliability and quality information on the tool (scoring 3 from 5). The DDAT has an explanation for each item but is time consuming to complete and score.

DesignSmart (Cunningham et al., 2015) is similar to DDAT and also addresses all seven refurbishment elements in detail. This Australian tool has 609 questions with 272 deemed required and 337 advisable with comprehensive explanations to assist with scoring. A literature review was undertaken to establish the tool criteria, however each criterion are not referenced or linked to the relevant literature. The authors advise that DesignSmart is not a research tool and thus has not undergone reliability and validity tests. Furthermore there do not yet appear to be published studies using the tool and the quality score was 0. Finally, Design Smart is time consuming to complete, and purchasing the tool provides a lience to undertake the audit at one facility only. If more facilities are to be audited, then more tools need to be purchased.

Table 4. 1 Summary of Environment Assessment Tools

Tool	Author/ Source and year	Purpose or goal of tool	Number/Description of items	Requirements for use	Refurbishment elements addressed (n=7)	Strengths	Limitations
Dementia Design Audit Tool (DDAT)	Dementia Services Development Centre, Stirling Scotland 2008	To help structure consultancies commissioned by care homes to examine the environments where dementia care is delivered.	N= 181 encompassing entrance/corridors/wayfinding and lift; lounge area; dining room; meaningful occupation; examination room; hairdressing room; bedrooms; en suite provision; communal toilets/bathrooms; external areas; and general principles.	Audits to be completed by 2 people who have a good understanding of dementia Tool instructs 20% of bathrooms, toilets & bedrooms to be audited.	N = 7 with all elements addressed i.e. Lighting Colour & contrast Sound Flooring Furniture Signage Wayfinding	Detailed questions grouped according to locations in facility. Includes specifications.	Audit is time consuming to complete. Score is weighted according to categories and also time consuming to complete.
Design Smart	Colm Cunningham, Danielle McIntosh, Simon Thorne & Meredith Gresham, 2015	To assist in the creation of built environments that empower and enable older people and people with dementia - assist with decisions on new build & refurbishment.	N = 623 encompassing master site planning, front entry, corridors, lounge areas, dining room, bedrooms, ensuites, communal bathrooms and toilets, outside areas, kitchen, laundry, lifts, hairdressing salon, treatment/clinic room.	Audits to be completed by 2 people who have a good understanding of dementia	N= 7 with all elements addressed	Very comprehensive tool with specific criteria which are fully explained. Scoring is linked to an action plan.	Absence of validity and reliability tests Absence of studies using tool.
EHE (Enhance the Healing Environment) Environmental Assessment Tool	The Kings Fund, 2014	To aid people charged with designing or refurbishing buildings.	N= 59 encompassing environment: promotes meaningful interaction and purposeful activity between residents, families and staff; promotes wellbeing; encourages eating and drinking; promotes mobility; promotes continence and personal hygiene; promotes orientation; promotes calm, safety & security.	Recommended that assessment be conducted collaboratively by a variety of stakeholders	N= 7 with all elements addressed	Simple questions and a section to record or insert photographs of good practice or areas of concern.	Absence of validity & reliability tests. Absence of studies using tool. Absence of improvement specifications. No information on how to score - only on 1 (barely met) and 5 (totally met).

Tool	Author/ Source and year	Purpose or goal of tool	Number/Description of items	Requirements for use	Refurbishment elements addressed (n=7)	Strengths	Limitations
Environmental Audit Tool (EAT)	New South Wales Health/ Richard Fleming and Ian Forbes 2003	Observational tool to assess homelike environments for people with dementia.	N = 72 with domains of safety, size, visual access, stimulus reduction, stimulus enhancement, provision for wandering & access to outside, familiarity, privacy & community, community access & domestic activities.	No specific requirements set.	N = 6 i.e. Lighting Colour & contrast Sound Furniture Signage Wayfinding	Australian tool Simple to use and score Reliability and validity studies Information readily available Used in 6 studies.	Yes/No questions to show gaps but does not always provide specifications as to what the improvements should detail.
Environmental Quality Assessment for Living (EQUAL) Checklists	Lois Cutler, Rosalie Kane, Howard Degenholtz, Michael Miller and Leslie Grant, 2006	To assess physical environments experienced by people with or without dementia and to specifically include individual rooms as well as communal areas.	N =176 Bath and Room Indices N = 63: Visual separation, Personalisation, Life-enriching features, Function enhancing, Bathroom function enhancing, Environmental control, Storage, Maintenance. Unit indices N=65: Function enhancing, Clutter, Life enriching features, Outdoor amenities, Bathing -shower experience, Dining experience. Facility indices N = 48: Amenities, Outdoor amenities, Life-enriching features, function enhancing	Training and practice recommended to avoid overlooking familiar features/practices (i.e. staff to view their familiar environment more critically) and can be conducted by caregivers and other staff.	N = 4 i.e. Lighting Colour/contrast Sound Furniture	Dining and bathing checklists need further detail Checklists do not adjust for size or resources of facility Emphasis is on Quality of Life outcomes.	Overall checklists are extremely detailed Whilst several articles report on the initial study, there do not appear to other separate studies also using the tool.
Multiphasic Environment Assessment Procedure (MEAP)	Rudolph Moos and Sonne Lemke, 1996	The MEAP can be used to evaluate implementation of programs, monitor interventions and plan/improve facilities.	1. Resident and Staff Information Form (RESIF) 2. Physical and Architectural Features Checklist (PAF) 3. Policy and Program Information Form (POLIF) 4. Sheltered Care Environment Scale (SCES) 5. Rating Scale	Recommended assessors are clinicians, consultants, program evaluators, researchers.	Only the PAF addresses the physical environment N = 2 i.e. Lighting Furniture	Reliability and validity studies Information readily available.	Not currently in use Scoring biased towards larger facilities Limited applicability to refurbishment domains.

Tool	Author/ Source and year	Purpose or goal of tool	Number/Description of items	Requirements for use	Refurbishment elements addressed (n=7)	Strengths	Limitations
Professional Environmental Assessment Protocol (PEAP)	Carolyn Norris-Baker, Gerald Weisman, M Powell Lawton, Philip Sloane and Migette Kaup, 1999	Developed as a global assessment to evaluate special care units for older people in dementia disorders.	Maximise safety and security, maximise awareness and orientation, support functional abilities, facilitation of social contact, provision of privacy, opportunities for personal control, regulation and quality of stimulation, and continuity of the self.	Trained professional with experience in person-environment design/research and time availability.	Considers fixed or structural features, semi-fixed features and non-fixed features.	Used in 6 studies.	Difficult to comment as not able to review tool.
Residential Aged Care Services Built Environment Audit Tool	State of Victoria, Dept of Health 2012	To perform built environmental audits to improve staff knowledge and the physical environment as well as considering impact of the environment on older people.	N = 193 with domains addressing external, entrances and hallways, communal areas, resident room, bathroom, ensuites and toilets.	The tool is designed to be completed by staff at the residential aged care service.	N = 7 i.e. all elements addressed	Specifications are all included and referenced against relevant resources/standardsReadily available tool kit with accompanying resources including photographs to visualise particular recommendations in the audit tool.	Lack of published tool reliability and validity information Only one study able to be sourced.
Sheffield Care Environment Assessment Matrix (SCEAM)	Chris Parker, Sarah Barnes, Kevin McKee, Kevin Morgan, Judith Torrington & Peter Tregenza, 2004	To assess buildings from the viewpoint of the residents/users by describing a building through a profile of scores.	N = 318 with domains clustered into universal, physical, cognitive and provision for staff with questions on privacy; personalisation; choice and control; community; safety and health; support for physical frailty; comfort; support for cognitive frailty; awareness of outside world; normalness and authenticity; and provision for staff.	Do not have to be a trained assessor to use SCEAM.	N = 7 i.e. all elements addressed	"Provides a set of scores which can be used to make comparisons between buildings, examine individual buildings in relation to specific criteria or to examine the relationship between buildings and measurements such as quality of life scores" (Barnes et al 2004).	Some terms are specific to the UK Yes/No questions with some subjective estimations.

Table 4. 2 Reliability, Validity and Quality of Environment Assessment Tools

Tool	Reliability	Validity	Quality (n = 5)
Dementia Design Audit Tool (DDAT)	Scoring is 1 point for each item if standard is met (0 if not) or blank if N/A. Percentage agreement between two raters: 68.7% (good) Intraclass correlation coefficient (ICC): 0.632 (substantial) Internal consistency (Cronbach's alpha): 0.776 (Acceptable).	The validity of the questions and focus of the audit tool generally married well with what people with dementia and their families say about the importance of: - Outside space - Wayfinding - Personal space and personal items.	There does not appear to be a study on the actual DDAT's development. The information gathered regarding reliability and validity are from Innes' study 1 = 1 2 = 1 3 = 1 4 = 0 5 = 0 Total = 3
Design Smart	The required items have a strong evidence base whereas the advisable items are supported by evidence based research and contemporary best practice. Not formally tested	According to one of the authors, DesignSmart is not a research tool and therefore has not undergone validity studies, as this was not the intended function.	1 = 0 2 = 0 3 = 0 4 = 0 5 = 0 Total = 0
EHE (Enhance the Healing Environment) Environmental Assessment Tool	Informed by research evidence, best practice and >300 survey responses from people who have used the tools in practice to develop rationale for effecting change in care environments.	The first tool for ward environs was developed with NHS trusts participating in The King's Fund's EHE programme. Since then >70 care organisations have been involved in field-testing the tools but the outcomes not easily obtainable.	1 = 0 2 = 0 3 = 0 4 = 0 5 = 0 Total = 0
Environmental Audit Tool (EAT)	High interrater reliability (.97). Majority of subscales have internal consistency (Cronbach's alpha of 0.6).	Strong concurrent validity when compared to TESS-NH (86.8%).	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 Total = 5
Environmental Quality Assessment for Living (EQUAL) Checklists	Formal interrater reliability tests midway with significant kappa statistic (96%) in 112 checklist items tested by 24 pairs of raters.Single assessor (author L. Cutler) for unit & facility checklist.	Acknowledged that the 20 indices cannot be used as scales - simply allocates environmental attributes into meaningful groups.Groupings appear to have face validity but are not comprehensive.	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 Total = 5
Multiphasic Environment Assessment Procedure (MEAP)	PAF test-retest reliability moderate to high. PAF interobserver reliability was predominantly high (r = .70 or above on 6 of the 8 subscales) with the trained observers providing the most reliable results.	Built content and face validity by defining constructs and preparing items to fit definitions, grouping conceptually related items into subscales, and evaluating these according to set empirical criteria.	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 Total = 5
Professional Environmental Assessment Protocol (PEAP)	Strong correlation to TESS-NH and may be used separately or in conjunction with TESS. Initial Kappa results ranged from .69 to .85 showing good to very good interrater reliability.	Originally developed to validate the TESS 2+ but as PEAP is global, only portions of the TESS-NH could be compared during validation studies. A follow up validity study found both a 5 point and 13 point PEAP scale was able to discriminate between nursing home environments.	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 Total = 5

Tool	Reliability	Validity	Quality (n = 5)
Residential Aged Care Services Built Environment Audit Tool	Although results do not appear to be published, the tool was pre-tested at 3 services to assess wording, readability, structure and content and then modified prior to a trial at 14 health services over a one week period.	Although not validated, staff using the tool were surveyed and the feedback resulted in restructuring of tool and a photographic shoot conducted to illustrate good practice examples.	Although research on the tool not published, Moore's study details was used as Moore was one of the authors involved in tool development 1 = 1 2 =1 3 = 1 4 = 1 5 = 0 Total = 4
Sheffield Care Environment Assessment Matrix (SCEAM)	Several binary factural items showed high inter-rater reliability when used in similar settings - cited Sloane et al 2002 as example.	The process of developing the SCEAM gave it high face and content validity. Concurrent validity of the tool has been demonstrated. Subjective views of temperature, light level etc. were validated against objective measures.One author noted SCEAM was developed for academic rather than commercial use and has not been fully validated.	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 Total = 5
Therapeutic Environment Screening Survey for Nursing Homes (TESS-NH)	12 SCU were assessed by 2 research assistants with 86.7% agreement and the majority of items had kappa's greater than .70. The inter-rater reliability of the SCUEQS was .93 with test-retest at .88. High levels of test-retest reliability for fixed environmental features and moderate for those that reflect staff or resident actions/ behaviour.	Validation was conducted using the PEAP where 44 SCU were jointly assessed by a PEAP expert and a trained TESS-NH researcher conducting the SCUEQS. The correlation was moderate to very strong. Cronbach's alpha was .78 for non SCU dementia units and .63 for the non SCU units	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 Total = 5

Enhance the Healing Environment (EHE) Environmental Assessment Tool (The King's Fund, 2014) covered all seven refurbishment elements. This UK tool has straightforward and short (59) questions scored on 5 point Likert scale with a section to add photographs. However there was a lack of information on how to score the responses which provides options from 1 (barely met) through to 5 (totally met). The tool was described as being informed by research, best practice, surveys and field testing, but information regarding outcomes was not obtainable. No associated reliability or validity studies were found using the search strategy, and any published studies using the tool were not able to be located. Consequently, a quality score of 0 was assigned. The tool does not include specifications for improvement. The tool authors recommend involving a range of people in the assessment as this enables discussions likely to encourage improvements in both the physical environment and the quality of care delivery.

The Environmental Audit Tool (EAT) (Fleming, Forbes, & Bennett, 2003) is another Australian tool which encompasses six of the refurbishment elements with 72 questions which are scored yes, no or not applicable. It does not include the flooring domain. Originally designed to assist with modifications to hospital wards to ensure suitability for people with dementia, EAT has been modified and tested. Reliability and validity studies have been conducted and quality rated as 5. Environment Audit Tool questions centres on 10 design principles to provide an environment that maintains the abilities of a person with dementia. Completion is straight forward, and information about how to use the tool is readily available.

Environmental Quality Assessment for Living (EQUAL) Checklists (Cutler et al., 2006) were specifically developed for a quality of life study. The aim is to describe environments as experienced by individuals. Data from room (112 items), unit (140 items) and facility (134 items) checklists were grouped to form 20 indices which encompass four of the refurbishment elements – colour/contrast, furniture, lighting and noise. It is acknowledged that these indices cannot be used as scales but extensive testing has been conducted by the authors with reliability and face validity yielding a quality score of 5. There were no additional studies identified that used EQUAL Checklists other than those by the authors.

The American Multiphasic Environment Assessment Procedure (MEAP) (Moos & Lemke, 1996) is lengthy and complex to complete and has five instruments within the tool. Whilst reliability, validity and quality have been thoroughly

examined, only one of the instruments addresses the physical environment and this encompasses two of the refurbishment elements (furniture and lighting) in 15 items from the 153 item Physical and Architectural Features (PAF) checklist. Specifications for improvement are not provided, and we could not find further studies that examine this further. MEAP requires expertise to complete.

The Professional Environmental Assessment Protocol (PEAP) (Norris-Baker et al., 1999) is an American tool developed to provide a standardised evaluation of special care units for people with dementia-type disorders. It takes approximately three hours to complete by a trained professional, and reliability, validity and quality have all been established. However the actual tool itself or a manual was not found to be readily available in the public domain, so the number and type of refurbishment elements included could not be examined.

Australia's Victorian Department of Health released the Residential Aged Care Services Built Environment Audit Tool in 2012 (Department Health, 2012). The tool has 193 items across five domains including all seven minor refurbishment elements. Although the results do not appear to be published, the tool was pre-tested and trialled to ascertain reliability and a single study using the tool was reviewed to assess quality (score of 4). The first author of this study was one of the authors involved in the development of the tool. Published studies which validated the tool could not be found. Specifications are included and referenced against relevant standards and resources. The tool kit with accompanying resources including photographs to assist comprehension of the tool recommendations were readily available.

The Sheffield Care Environment Assessment Matrix (SCEAM) (Barnes et al., 2004) was developed in the UK in 2004. The SCEAM has 318 questions across several sections which address all seven minor refurbishment elements and can take up to half a day to complete. The SCEAM was developed for research purposes rather than commercial use and has not yet been fully validated (S. Barnes, personal communication, 2015). Inter-rater reliability is high, and the quality score is 5 with a number of studies using this tool. Uniquely, this tool captures the difference between a building as designed versus the building as used. Some terms eg 'pastiche' were found to be specific to the UK and not applicable to Australia. The tool kit and accompanying information were readily available.

The American Therapeutic Environment Screening Survey for Nursing Homes (TESS-NH) (Sloan et al., 2002) consists of 84 items across 13 domains. Widely used in studies, this tool has established reliability and validity yielding a quality score of 5. TESS-NH has a small subscale (Special Care Unit Environment Quality Scale) and a single global scale embedded within a survey so provides limited recommendations for refurbishment improvements. The TESS-NH has 12 from 31 items relating to four of minor refurbishment elements (furniture, lighting, noise and wayfinding). Scoring is on a categorical basis where a higher number respresents a more favourable attribute of the environment. The tool is quick and simple to conduct (approximately ¾ hour).

4.5 Discussion

Of the ten environment assessment tools reviewed, five addressed all seven minor refurbishment elements. Specifically, the DDAT (Cunningham et al., 2008), DesignSmart (Cunningham et al., 2015), EHE Environmental Assessment Tool (The King's Fund, 2014), Residential Aged Care Built Environment Audit Tool (Victorian Government, 2012) and SCEAM (Barnes et al., 2004). Thus, any one of these tools may be considered foremost when addressing minor refubishment of residential aged care facilities in terms of colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding. However, the EHE Environmental Assessment Tool had limited information available on the development and scoring or specifications for improvement. The EHE scoring prompts are simple: low scores highlight areas for action such as changing crockery or improve flooring as part of maintenance programs. Scoring was subjective, with the assessor determining if an item is barely met or completely met without any criteria to guide the score allocation. These limitations would impede establishing rigorous refurbishment priorities and recommendations to obtain funding, which is largely contested and limited. The EHE Environmental Assessment Tool was therefore not subject to further review.

DesignSmart is very similar to DDAT and was developed in Australia, so may have more significance to the refurbishment of facilities in this country than the DDAT. Dementia Design Audit Tool scoring is ‘yes’ or ‘no’ to the items with essential and recommended items interwoven in each category. DesignSmart is also yes or no and has required and advisable items in each category. However

DesignSmart has more detailed information relevant to refurbishment which is easily categorised – for example in the Lounge Area section, it has subsections listing room layout and furnishing; detailed design elements (tonal properties); lighting; acoustics; thermal comfort and signage whereas DDAT's lounge area section listed general features and different types of lounges. Thus DDAT did not undergo further review.

This resulted in three tools which addressed all seven minor refurbishment elements to subsequently be considered for further validation. These are DesignSmart (Cunningham et al., 2015), Residential Aged Care Built Environment Audit Tool (Department Health, 2012) and SCEAM (Barnes et al., 2004). One of the authors of SCEAM proposed consideration of the EVOLVE (Evaluation of Older People's Living Environments) (Lewis et al., 2010). The first two are Australian tools, whereas the latter are from the United Kingdom. Evaluation of Older People's Living Environments has not yet been examined, and DesignSmart and Residential Aged Care Built Environment Audit Tool do not yet have established reliability and validity. The Sheffield Care Environment Assessment Matrix had partial reliability and validity established but were not fully tested. The tools varied in length (DesignSmart with 608 items through to Residential Aged Care Built Environment Audit Tool with 193 items) and time to complete, so the feasibility of using these tools when commencing renovations also needs to be examined.

One major limitation was that it was not possible to obtain full details of the PEAP which meant the number and details of the minor refurbishment elements included in the PEAP could not be established. To recommend a tool for refurbishment, the criteria included ready access and inclusion of an instruction manual. Minor refurbishment was limited to seven specific elements (we acknowledge there may be more) and limited studies have investigated these elements by using an assessment tool in this context. Therefore our work is exploratory and our findings may not be generalisable to other residential aged care settings.

4.6 Conclusion

Ten environment assessment tools were systematically reviewed for their use in RACF minor refurbishment with a focus on seven elements and one tool was proposed for consideration. From the eleven, four tools – DesignSmart

(Cunningham et al., 2015), Residential Aged Care Built Environment Audit Tool (Department Health, 2012) and SCEAM (Barnes et al., 2004) and EVOLVE (Evaluation of Older People's Living Environments) (Lewis et al., 2010) may be useful in providing guidance in refurbishing colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding. However, all tools require further work to establish reliability, validity and quality. It is proposed that these four tools undergo further testing to determine their suitability for use in conducting minor refurbishment in Australian RACFs.

4.7 Summary of Chapter

This second study identified four environment assessment tools which potentially may be useful for providing minor refurbishment guidance for the elements of colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding. These tools were then examined more closely in Study 3 in order for one to be selected for piloting at a RACF preparing to under minor refurbishment. The methods for this expert examination will be described in detail in Chapter 5.

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Chapter 5

Chapter 5: Expertise and e-Delphi: Assisting with Australian Aged Care Facility Refurbishment

Preface

It was maintained that expert opinion would assist residential aged care stakeholders to review assessment tool information and determine one to select for piloting at a residential aged care facility preparing to undergo minor refurbishment interventions. This chapter describes Study 3 which examined expert opinion on four environment assessment tools and used an adapted e-Delphi technique to rank and reach consensus on the tool to pilot. It is based on a published manuscript (see Appendix F):

Neylon, S., Bulsara, C., & Hill, A. (2019). Expertise and e-Delphi: Assisting with Australian Aged Care Facility Refurbishment. *The Journal of Aging and Social Change, 9(4),* 33-50. https://doi.org/10.18848/2576-5310/CGP/v09i04/33-50(Article)

The author's own version of the manuscript is presented with slight modifications to facilitate flow in the style and format of this thesis.

5.1 Abstract

Objective

To explore and evaluate national and international expert opinion and ranking of selected aged care environment assessment tools in the context of minor refurbishments with resident based outcomes.

Method

A two round adapted e-Delphi survey was completed by professionals with expertise in aged care design and environments. Their evaluations on the content and applicability of the four tools were gathered. Ordinal responses were analysed using descriptive statistics and open ended responses analysed using content analysis.

The four tools were subsequently ranked in order of recommendation to pilot using a weighting system.

Results

A 60% uptake rate resulted in a purposive sample (n=18 experts) from eight countries. The experts concurred in the priorities they identified when reviewing the tools. These were thoroughness, cultural specificity, accessibility, ease of use and time taken to complete. A range of advantages and challenges were presented for each tool in addition to application in a minor refurbishment context. Residential Aged Care Built Environment Audit Tool followed by Evaluation of Older People's Living Environments were ranked as the top two tools to be piloted.

Conclusion

Assessment of residential aged care environments using appropriate tools is necessary to ensure refurbishment works contribute to resident function and well-being. Expert perspectives through an adapted e-Delphi process facilitated local stakeholder decision making process to select a single tool to pilot for validity and reliability at a residential aged care facility preparing to undergo minor refurbishment. Using an adapted e-Delphi process in an international context may be useful for other aged care researchers seeking to gain expert input to a local problem.

5.2 Introduction

Refurbishments may be a more viable option for Australian residential aged care providers seeking to improve the living environment of their facilities (Access Economics, 2012; Deloitte, 2011). Minor and major refurbishments were described and the key elements associated with minor works identified in Chapter 3. The seven elements of colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding were found to impact on resident functionality and wellbeing and thus optimising them should result in more enabling environments for residents as they age (Day, Carreon & Stump, 2000; Hadjri, Rooney, & Faith, 2015; Marquardt, Bueter & Motzek, 2014). In order to improve features that relate to these positive resident outcomes, there is a need to evaluate the environment with valid and usable instruments (Elf et al., 2017; Nordin, et al., 2015). Environment assessment tools

were systematically reviewed and four tools that contained all these seven refurbishment elements were identified in Chapter 4. These four tools were DesignSmart (Cunningham et al., 2015) referred to as Tool 1 in this study, Residential Aged Care Built Environment Audit Tool (Department Health, 2012) referred to as Tool 2, Sheffield Care Environment Assessment Matrix (Parker et al., 2004) referred to as Tool 3, and Evaluation of Older People's Living Environments (Lewis et al., 2010) referred to as Tool 4. Limitations to aged care environment assessment tools or instruments have been identified as containing general principles rather than specific criteria (Day, Carreon, & Stump, 2000; Pantzartzis, Price, & Pascale, 2016), weak empirical basis, limited use beyond the initial study and minimal details on execution of the instrument (Elf et al., 2017). There was also sparse evidence for applying the tools in a refurbishment context which limited further applications of the tools in this setting. Thus all four tools were recommended to undergo further examination (including piloting in the local setting and reliability and validity testing) in the context of minor refurbishments prior to making any recommendations for use in aged care facility refurbishment projects (Neylon, Bulsara, & Hill, 2017).

This posed a dilemma for the nominated Western Australian (WA) based stakeholder group to determine which tool to select to pilot. Situations such as these where there is insufficient information to make effective decisions, have increasingly led to the use of consensus methods such as nominal group or Delphi techniques (Hasson, Keeney, & McKenna, 2000). However, whilst the WA stakeholder group members had experience across many facets of residential aged care including operations, they did not all have expertise in residential aged care environments. Thus further information was required to be gathered before the stakeholders could embark on decision making.

It was proposed that experts in aged care environments would be able to critically review all the tools and use their personal experience to appraise the tools and provide feedback. The consensus of these views achieved through the use of the Delphi survey technique could then augment local stakeholder knowledge to guide the subsequent selection of an appropriate tool to pilot in a local setting. Experts are seen to have extensive domain knowledge, experience and insights from their area of expertise to draw upon in conjunction with using feedback from others and available resources for critical analysis (Chi, 2006; Skulmoski, Hartman & Krahn, 2007).

Refurbishment which considers functional, environmental and fiscal aspects in conjunction with the complex needs of people living in residential aged care requires appropriate assessment. The purpose of this study was to seek views from those with aged care environments expertise to aid in the identification of an environmental assessment tool to pilot in the context of minor refurbishment of residential aged care facilities. We aim to describe the process of using an adapted Delphi technique and examine the results of this survey in relation to four assessment tools developed for aged care environments.

5.3 Methods

5.3.1 Design

The study was conducted using a Delphi technique, a widely used method in health research to reach a consensus based on multiple expert opinions on a given topic (Shariff, 2015). The lack of a clear theoretical framework has been a criticism in using the Delphi technique (Habibi, Sarafrazi, & Izadyar, 2014). Shariff (2015:1) proposes the tenets of the positivistic paradigm such as logical reasoning, measuring and quantifying with a view to make generalisations aligns with the Delphi technique as the "intentions and objectives (of the latter) are to primarily build consensus and require the use of quantifiable methods". Although the qualitative data are generated through open ended questions, the more frequently occurring themes are identified which also supports the positivistic approach (Shariff, 2015).

Typically the Delphi technique uses iterative rounds of surveys with feedback reports and interpretations of expert opinion inserted throughout until consensus is reached (Donohoe, Stellefson, & Tennant, 2012). The first round consists of a survey containing statements to which respondents' rate using a 5 or 7 point Likert scale the extent they agree or disagree with the comment (Sullivan & Artino, 2013) and questions for respondents to record their views. In the second round, the responses are summarised and the respondents asked to review and rank items to establish priorities to start to form consensus (Hsu & Sandford, 2007). The next round has the result summarised with the respondents to view the consensus and to either revise position if outside the consensus or to provide reasons for being in this position (Hsu & Sandford, 2007). Any subsequent round is considered opportunity for respondents to revise judgements in the face of collective group opinion (Hasson,

Keeney, & McKenna, 2000). In several studies, two rounds were used as more could result in panel attrition (McMillan, King, & Tully, 2016).

Due to the international location of the experts, an e-Delphi technique whereby the Delphi process is undertaken via the internet to organise, control and facilitate the communications between researcher and experts was used (Donohoe , Stellefson, & Tennant, 2012). An e-Delphi design has the benefits of combining geographically dispersed expertise (Gill et al., 2013) with the assurance of individual contributor anonymity. Therefore the experts who provide their opinion are not subjected to any influence of familiarity with the other panel members (Toronto, 2017) which is an advantage of using an international panel.

5.3.2 Participants

Ethical approval for the study was obtained from University of Notre Dame Australia #017025F with a participant information sheet and consent form prepared for the potential experts in addition to institutional policies which were applied to protect participant confidentiality such as de-identification measures and secure data storage (Burford et al., 2009). A preliminary email was sent to introduce the study, to have potential participants confirm their eligibility and to request permission to send a formal invitation to participate. Granted permission resulted in a second email being sent along with the participant information sheet, consent form and survey attached. All participants provided written informed consent to participate.

Participants were recruited using initial purposive sampling and a subsequent snowball sampling technique whereby those already recruited were asked for any recommendations for other potential participants (Hasson, Keeney, & McKenna, 2000). Professional networks and publications in the subject area were used to identify experts. Considerable research has been conducted on residential aged care environments in United Kingdom, Canada, Norway as well as Australia and United States (Elf et al., 2017; Joseph, Choi, & Quan, 2016) so experts from these regions were asked to participate in this study. The experts were recruited using the email addresses associated with the publication or via LinkedIn (online professional networking system). The inclusion criteria for participants were set as:

- Design, research or clinical expertise in aged care environments
- Relevant postgraduate qualification or publication history

- Not an author of the environment assessment tools reviewed to limit any potential bias in the responses

Whilst sample sizes for Delphi panels are not bound by statistical sampling requirements (Akins, Tolson, & Cole 2005), studies have shown effective and reliable outcomes to be achieved with small numbers of experts (particularly in fields where the expertise may be limited) (Akins, Tolson, & Cole 2005) using panels consisting of 12-20 participants (Hsu & Sandford 2007; McMillan, King, & Tully 2016; Skulmoski, Hartman, & Krahn 2007). Working on the basis of response rates varying (Toronto, 2017), 24 experts were identified to be contacted directly with each requested to refer any other potential candidates.

5.3.3 Data Collection

Each expert was provided with an overview of: the narrative review undertaken to identify the minor refurbishment themes (Neylon, Bulsara, & Hill, 2019); the systematic review undertaken to identify environment assessment tools and the subsequent selection of the four tools which contained the minor refurbishment elements (Neylon, Bulsara, & Hill, 2017) with web links to associated material or pdf print copies of the tools where possible in order to aid the expert's review and understanding of the tools prior to completing the survey. One tool required purchasing and did not have a preview component. It was made explicit that the authors were seeking opinions and recommendations based on this available information in conjunction with the participant's expertise. Experts were also to prioritise (rank) the four tools in the context of minor refurbishment to present to a stakeholder focus group in the next stage of the study. This background information sheet was placed at the front of the survey and the introduction to the survey stated that this background information needed to be read prior to answering the questions.

Similar to Hsu & Sandford's (2007) process, the survey was developed with both open ended questions and closed statements for the respondent to rate the extent to which they agree or disagree using 5-point ordinal Likert type scale (Sullivan & Artino, 2013). Prior to survey commencement, the survey was sent to four colleagues (two with and two without expertise in aged care environments) for piloting (Toronto, 2017) and to provide feedback on time taken, clarity and flow. This piloting process identified issues with the check box function and some

anomalies with the background information content which reiterated the need for background information to be read prior to the survey. The final ten questions were formulated as shown in Appendix G.

Given the specific and short parameters of the subject material, the qualitative approach, to minimise potential technological glitches (Toronto, 2017) and the need for simplicity to maximise retention, the e-Delphi process was adapted for this study to be via email with an attached word file questionnaire. This enables the data to be returned in the same format from all participants and the same method works for distributing responses to the participants (Kent, 2013).

The e-Delphi process was planned to be further adapted a priori to utilise two rounds. Round one consisted of the dissemination of the background information sheet and the survey for participants to complete individually and confidentially. The results were tabulated and the four tools ranked in order of preference for piloting using a weighting system. A summary report of the findings with an exemplar selection of comments was formulated and distributed to all participants for round two. This sharing of the results was accompanied by the invitation to experts to comment, change or revise their position or to accept the results as they stood. To achieve responses within the given timeframe, it was articulated that no further response implied agreement with ranking identified in round one. The process was designed to be as straightforward as possible with minimal iterations (McMillan, King, & Tully, 2016) to avoid attrition which could ulitmately compromise validity (Toronto, 2017).

5.3.4 Data Analysis

The median and mode measures of central tendency were used to summarise the Likert scale data (Hsu & Sandford, 2007) and to analyze the survey's quantitative data in addition to percentage of responses in each category (Jamieson, 2004). In order to undertake a content analysis, the survey's qualitative data was consolidated into a single large spreadsheet and grouped by question and by tool. Content analysis is a reflective process (Erlingsson & Brysiewicz, 2017) and following the inductive approach (moving from the specific to the general) involved continuously reading the data and condensing meaning units into codes (Elo & Kyngäs, 2008; Vaismoradi, Turunen, & Bondas, 2013) in addition to linking a different colour to

each code. Using short meaning units and codes made it simpler to categorise and analyze the data whilst colour enhanced visibility. These all aided the dialogue between researchers to reach agreement on the coding and analysis. Credibilty was also depicted through representative quotations from the data set (Graneheim & Lundman, 2004).

5.4. Findings

Overall, there were 30 experts who responded to the invitation by email and of these, 18 (60%) consented to participate in the study. The purposive recruitment and subsequent snowballing sampling approach is summarised in Figure 5.1.

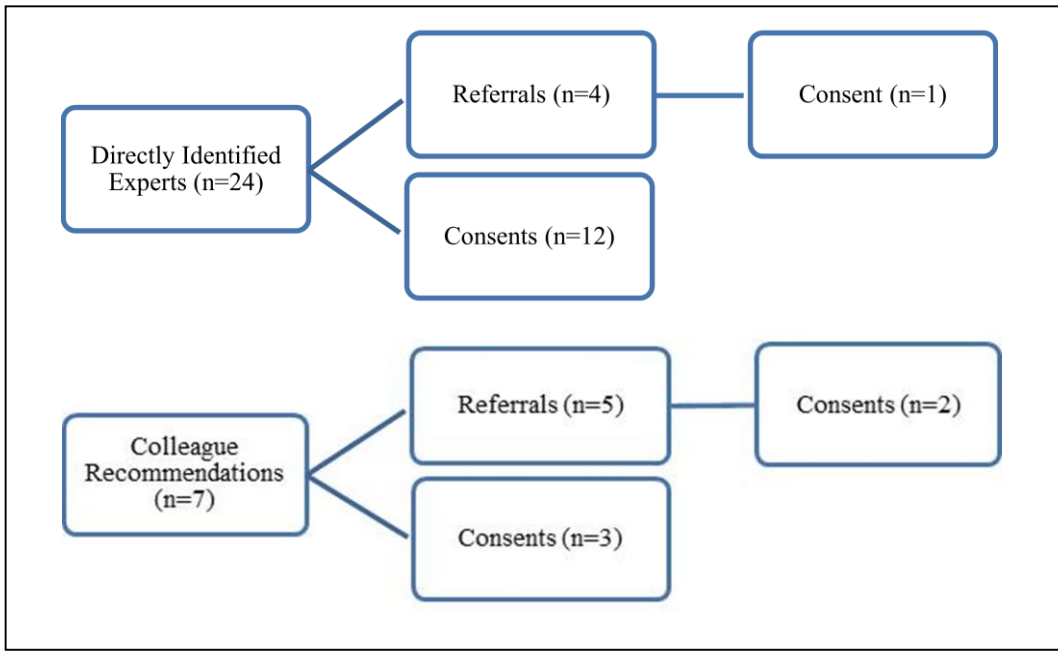

Figure 5. 1 Adapted e-Delphi Recruitment

Six experts declined to participate due to time constraints or perceiving that they were not the most appropriate person to participate in this study whilst providing contact details of alternative people to email. The participant professions/areas of expertise and countries in which they were working or had worked in represented the demographic questions 1 and 2 of the survey with results summarised in Table 5.1.

Table 5. 1 Adapted e-Delphi Participant Demographics

Profession/Area of Expertise	n=18	Country Represented
Architect specialising in RACF environments – build or repurpose, design, review, research and landscapes	7	Australia, Canada, South Africa, United Kingdom, United States
Occupational Therapist specialising in environmental and design issues or adaptation	2	Canada, Norway
Social Worker specialising in design and built environments	2	Australia, Canada
Environmental Designer, researcher and consultant	1	Canada
Environmental Engineer and researcher in aged care living	1	Netherlands
Gerontologist and author on design and housing	1	Canada
Nurse and post doctorate researcher in RACF	1	Norway
Geriatric Psychiatrist specialising in dementia	1	Japan
Psychologist and research fellow in extra care housing environmental housing	1	United Kingdom
Research Fellow in older people's health and social care	1	United Kingdom

Further demographic questions sought to ascertain the capacity the participants worked in the sector (Q3) and any prior experience in using any of the tools (Q4). The majority (67%) of participants reported currently working in the residential aged care sector in research, consultancy, and clinical/private practice or design capacities. Approximately one quarter (27%) of the participants had used the environmental assessment tool(s) previously.

Q5 asked participants for their views on using the four tools in a minor refurbishment context based on either their prior experience and/or the tool summary provided. The experts provided extensive and detailed feedback on both the positive and challenging aspects of using the tools. These data were analyzed in a stepwise process (Graneheim & Lundman, 2004). Data were read several times and the expert comments sorted into meaning units. These units were then condensed and labelled as a code (Erlingsson & Brysiewicz, 2017). An example of this process is shown in Table 5.2.

Table 5. 2 Example of Coding Process

Meaning Unit	Condensed Meaning Unit	Code
Limited accessibility because of licensing is prohibitive	Need license to access	
It is not accessible even for previewing sections	Can't preview tool	Tool Access
Tool must be purchased so is not available for review on-line	Need to buy tool in order to review	
Government made tool widely available	Available from government	
Readily available on-line	Readily available	

Codes were then tabulated and frequency counts recorded with two examples of meaning units (comments) for each coded category with results shown in Table 5.3.

Table 5. 3 Codes, Frequencies and Examples of Comments to Q5

Code	T 1 Freq	T 2 Freq	T 3 Freq	T 4 Freq	Total	Example meaning units for each code
Thoroughness	6	7	8	10	30	This tool is very extensive and detailed. In my opinion too detailed for clinicians to detect needs for refurbishment.
						Comprehensive coverage of key areas.
Cultural specificity	4	10	8	5	27	Australian authorship and development ensures higher degree of local relevance and reliability and adherence to local modes of practice.
						Aspects of architecture and interior design are very much dictated by culture and rooted in tradition
Testing	6	3	8	4	21	I particularly like the fact that it has been trialled in a number of settings, albeit by the authors/designers of the tool.
						Absence of assessment studies limits validity testing and therefore reliability judgement.
Person completing	3	8	7	3	21	A concerning limitation is that assessments must be conducted by staff which removes designers and consultants from direct access and interpretation.
						Would be good if there was some dementia training involved prior to conducting assessment.
Ease of use	3	7	5	4	19	From the description, the tool appears to be easy to use as the criteria are explained.
						This tool has a user friendly scoring system and well described items
Time	6	3	4	4	17	Depending on who is completing the survey, a survey with 623 items is very time consuming
						This is an economic tool with limited items and domains which implies a limited required time investment which will appeal to practitioners and consultants and increase usefulness
Tool access	6	3	1	2	12	Accessibility of tool….supports ease of use.
						Tool is free and readily available on line.
Action plan/photos	4	5	2	1	12	I would think that this can be a useful tool for clinicians, especially because the scoring is linked to an action plan.
						For best uptake better to have openly available.

People involved in developmt	2	3	2	4	11	The fact that an occupational therapist was involved in the development of the tool is important. Architectural expertise contributed to its (the tool) design.
Costs	4	3	2	1	10	It is free to download so affordable. Purchasing of the tool can be a barrier.
Quality of life	4	1	3	2	10	Commend purpose statement and quality of life focus. This tool is based on collection of data influencing QoL and this might strengthen the usefulness of it.
Familiarity with dementia	6	2	1	0	9	Ease of use is limited because of the requirement of specialised dementia care knowledge and communication. Strongly agree that the folks that implement the tool have a good understanding of dementia
Design vs use	0	0	3	2	5	It (the tool) captures differences between a building's design and its use. That items are not restricted to the physical space but consider the interplay with the resident.
Objective measures	0	0	0	4	4	I also like that it uses objective measurement tools: a tape measure, compass, illuminance meter, temperature monitor. This tool uses measureable devices such as light meter, tape measure, etc.

Q6 asked the participants if they considered the tools to be useful in *identifying* the minor refurbishment needs and Q7 asked whether the tools were considered to be useful in *prioritising* the minor refurbishment needs. The responses along the 5 point Likert Scale are represented in Figure 5.2 with Tool 2 having the highest percentage (72.2%) of respondents citing agree or strongly agree to the usefulness of the tool in *identifying* minor refurbishment needs and Tool 3 had the highest percentage agreement for *prioritising* minor refurbishment needs (66.7%). Tool 1 had the most indecision for both the identification and prioritisation questions. No tool elicited a strongly disagree response. Disagreement was uniform across the questions with 16.7% of respondents citing this against Tool 1, 2 and 4 for identification with 5.6% against Tool 3. Prioritisation saw a similar disagreement pattern with 16.7% noted against Tools 1 and 3 and 5.6% against Tools 2 and 4.

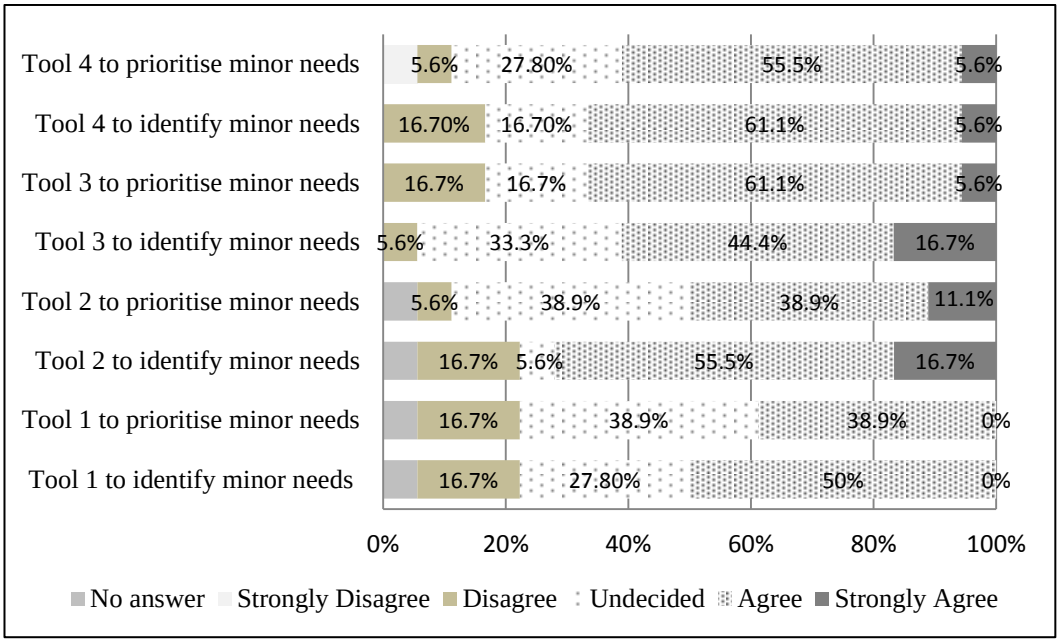

Figure 5. 2 Tools Useful to Identify or Prioritise Minor Refurbishment Needs

Question 8 sought to ascertain from the participants whether they recommended each tool to be examined further in a minor refurbishment context and to provide the reasons for their recommendation. Tools 2 and 4 were equally highest recommended with 55.6% replying 'yes'. Tool 3 was close at 50% and Tool 1 last at 22.2%. The distribution of responses is shown in Figure 5.3.

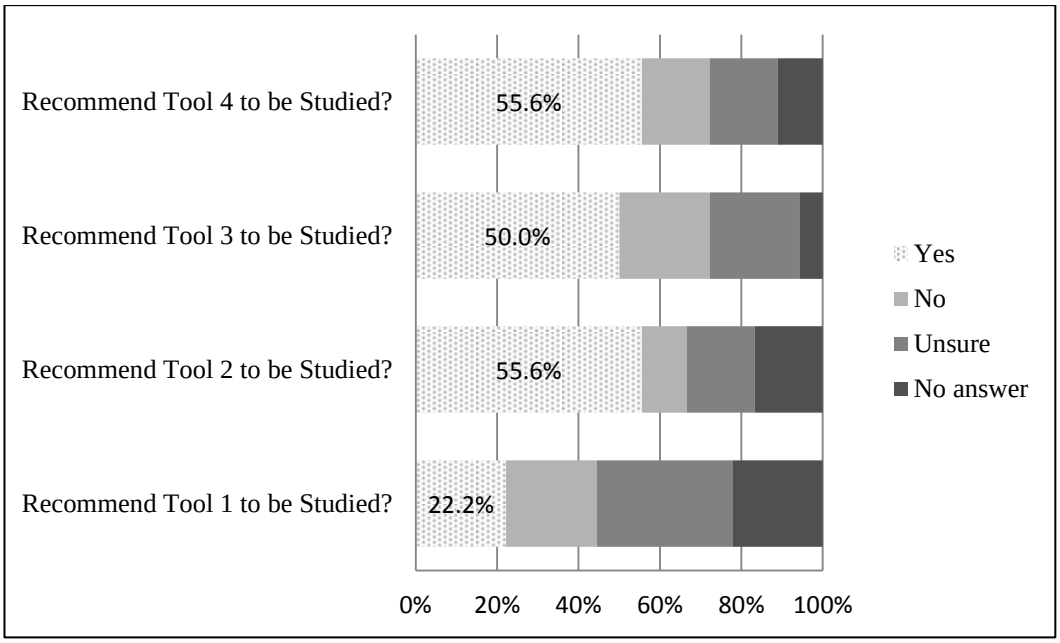

Figure 5. 3 Recommendations for Tool to be Studied

Participants provided diverse responses regarding why they recommended that a particular tool to be studied further. Some provided reasons for why, in their opinion, the tool *shouldn't* undergo further review whereas others gave their rationale for why the tool *should* be used with examples indicated in Table 5.4.

Experts were then asked to rank the tools in order of preference for further study. Two participants did not answer this section and one indicated that all four tools should be studied. The weighting system was implemented whereby 5 points were allocated for first preference, 3 points for second preference, and 1 point for third preference with 5 points allocated to each tool for the participant who recommend all four. The hierarchy of tools then emerged with Tool 2 at 42 points, Tool 4 at 40 points, Tool 3 at 37 points and Tool 1 at 14 points.

Table 5. 4 Participant Viewpoints on the Tools

Tool	Expert Feedback
Tool 1	Propriety licensing limits access; requires specialised dementia care knowledge to implement.
	The purpose is relevant. Low threshold tool to quickly detect and refurbish for current needs (that is – if the commercial keeps what it promises). Particularly because action plans are included.
	I do not have enough information to judge this audit tool at the design stage of a refurbishment project (as it must be purchased before it can be viewed).
	Good breakdown of degree of evidence base for items. Cost may make tool less accessible to users.
Tool 2	Brevity is a positive quality. Australian development implies local relevance.
	This seems to be a promising tool because of its organisation, content and legibility.
	Purpose of tool is relevant. Is easy to use for clinicians and they may easily detect needs for refurbishment. Action plan included.
	There are pluses and minuses to tools that are designed to be completed by staff members. It assumes a relatively high level of understanding not only of dementia, but also of design issues and potential solutions.
Tool 3	It is a comprehensive tool that still has scope for scalability.
	Probably not suitable, as it seems to require more training for interpreting the score profiles. And thereafter one must select what actions to do and prioritise them. Seems more time consuming and difficult to use in clinical settings. More appropriate for research.
	I think either this tool or (EVOLVE) would give scope to assess minor refurbishments. They are both manageable and comprehensive without being onerous in terms of the length of time to complete.
	Anyone who uses it must learn what the scores mean and how to translate this into needs for refurbishment.
Tool 4	It uses objective measurement, making results more meaningful when comparing projects.
	I have not used this tool but am impressed by the authors, the design and detail, the user-friendly scoring system and the helpful glossary.
	This tool seems to have an emphasis on the interior design aspects which makes it suitable for identifying minor renovations.
	Although this update and extension of scope (to SCEAM) extends possible usefulness, this may also be a weakness if overcollection of data and time consumng application prohibits use or obscures interpretation and the definition of relevant design parameters.

There were 12 (67%) participants who responded to the final question which invited open comments about the tools. Responses included comments which identified that tools containing substantial content resulted in the time consuming task to collect large amounts of data. In addition, the simplicity and suitability of the

environment in which the tools are to be used was highlighted by the experts (with three illustrative expert responses below):

> The over collection of data prohibits access and effective use. This also complicates the interpretation of information and its translation into practical design criteria and implementation.

> If (a tool) is to be adapted to residential aged care contexts, it needs to be simple to use and not too unwieldy to make it more time and cost efficient.

> For minor or low investment interventions, it is important to assess the 'movable/non-fixed' environment. These tools, by and large, focus on the fixed environment. We need to pay more attention to the 'stuff' in the spaces eg furnishings, items for positive stimulation and engagement.

5.5. Discussion

Eighteen experts from eight different countries participated in the e-Delphi process and provided comprehensive feedback. The participants represented a variety of professions with the expertise effectively situated along a continuum consisting of knowledge and experience related to the job (mandated expertise) or knowledge gained through academic pursuits such as education or research (objective expertise) similar to the panel expertise outlined in (Shariff, 2015). Opinions on the four environmental assessment tools were provided as were indicators of their usefulness (or not) in identifying and prioritising refurbishment requirements with recommendations for further study outlined. Thoroughness, cultural specificity, testing, person completing, ease of use and time (to complete) were the most frequent occurring codes which indicated these were of significance to the expert reviewers. Studies have identified the relationship between appropriate design interventions in residential care and the functional and wellbeing outcomes of residents, particularly those living with dementia (Day, Carreon, & Stump, 2000; Hadjri, Rooney, & Faith, 2015) so examinations (tools) which thoroughly explore

elements such as wayfinding, lighting, colour/contrast are key to improving the physcial environment (Hadjri, Rooney, & Faith, 2015).

Four tools were identified in a previous study (Neylon, Bulsara, & Hill, 2017) as containing the minor refurbishment elements which when optimised, should result in more enabling environments for residents (Day, Carreon, & Stump, 2000; Marquardt, Bueter, & Motzek, 2014): DesignSmart = Tool 1(Cunningham et al. 2015), Residential Aged Care Built Environment Audit Tool = Tool 2 (Department Health, 2012), Sheffield Care Environment Assessment Matrix = Tool 3 (Parker et al., 2004) and Evaluation of Older People's Living Environments = Tool 4 (Lewis et al., 2010). The experts' ranking of these tools to be tested further were Tool 2, Tool 4, Tool 3 and Tool 1. The weighted ranking system revealed only two points separated first recommendation (Tool 2) and second (Tool 4) and the third recommendation (Tool 3) was three points behind the second. Tool 1 (Design Smart) was ranked fourth and this may have been due to the inability to view the tool and evaluate its suitability due to purchase requirements. Several experts indicated that cost and licensing may be barriers to uptake.

According to the expert reviewers, all the tools were considered to have both advantages and disadvantages and these were clearly articulated to the stakeholder group in order to best inform their decision making when selecting the preferred tool to pilot at a local facility. The first placed Tool 2 (Residential Aged Care Built Environment Audit Tool) was considered to be economical, easy to use and with local (Australian) applicability. However, the stipulation that the audit be conducted by staff (the only tool to do so) was considered to be a limitation by some reviewers as this may introduce bias with regard to the outcomes. Other studies have found that when planning recommendations for design interventions or guidelines the expertise from a range of professional groups is recommended to be included (Marquardt, Bueter, & Motzek, 2014) and examine which design features are harmonising or detracting from each another and those which are the priorities (Day, Carreon, & Stump, 2000).

The second placed Tool 4 (Evaluation of Older People's Living Environments) was deemed to be comprehensive with a range of items that consider both the environment and the individual and the inclusion of objective measures advantageous. It has been noted in studies that the resident's perception of the atmosphere of a facility has guided refurbishment and how the spaces are used

(Hadjri, Rooney, & Faith, 2015) and thus a tool that considers how the space was designed against how it is actually used is beneficial. The transferrability of this UK developed tool to the Australian context was questioned as was the length of the tool. The third placed Tool 3 (Sheffield Care Environments Assessment Matrix) was the tool most familiar to the experts, was considered to be extensive and had some independent studies undertaken using this tool. Further to this, the application of this UK developed tool to an Australian context was raised as a consideration also.

As the Australian residential aged care sector is challenged by the costs of providing suitable environments for older people with increasingly complex needs (Access Economics, 2010, Deloitte, 2011), refurbishment of existing aged care facilities may be a more viable proposition (Vu, Davey, & Ansell, 2012). Given the strong impact the physical environment (particularly colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding (Hadjri, Rooney & Faith, 2015; Marquardt, Bueter, & Motzek, 2014) may have on the functional abilities of older people and their quality of life and wellbeing (Pantzarzis, Price, & Pascale, 2016), it is necessary to assess carefully the facility to see how it can best support this (Joseph, Choi, & Quan, 2016). The assessment can help determine which components can be implemented immediately, which can be built into routine maintenance and which need to be factored into future capital works as well as to guide decision making processes (Pantzarzis, Price, & Pascale, 2016). An issue with assessment tools is they often have not undergone use beyond the original development and details on use, reliability and validity are often limited (Elf et al., 2017). Further study is planned to evaluate the two tools chosen by the experts for use in the context of minor refurbishment in local facilities.

5.6. Strengths and Limitations

The stepwise process of the adapted e-Delphi technique reflected the reasoning involved, the intention to reach consensus and the quantifiable measures used to identify the most appropriate tool to use appears to support Shariff's (2015) positivistic approach. By detailing the methodology, the study can contribute to the development of a consistent approach to the e-Delphi technique (Toronto, 2017) as the administration aspects are often absent from literature (Donohoe, Stellefson, & Tennant, 2012). The advantages of the e-Delphi process outlined by Donohoe,

Stellefson, & Tennant (2012) were also experienced in this study such as convenience (the participants could complete the questionnaire at times/intervals that suited them), time and cost savings (the use of email facilitated quick response rates, there was a short period of time between the two rounds compared to traditional Delphi methods and geographical location did not impede participation). Adapting the e-Delphi process to two rounds (McMillan, King, & Tully, 2016) minimised the attrition rate (0%) which assists with validity as the latter can be compromised if there is significant participant variation between rounds (Toronto, 2017).

Piloting the survey with both people who have expertise in the field as well as those who do not, improved the quality of the survey by ensuring the questions were understandable, credible, applicable and consistent as in Burford et al. (2009) as true statistical reliability is difficult to establish with the Delphi process (Hasson, Keeney, & McKenna, 2000). However, it was stated in the background information sheet that the tools predominantly had not been tested and yet testing ranked third in the code frequency count which indicated that this needed to have been made more explicit. The recruitment of experts in the field with knowledge and interest in the subject for the final survey may have assisted to increase content validity with the second round of questionining/confirmation to improve concurrent validity (Hasson, Keeney, & McKenna, 2000).

Whilst it may be considered a limitation that this e-Delphi study did not use an online platform or portal to administer the survey, nevertheless in order to manage the responses and the data flow, the use of email is a readily accepted tool to facilitate this process (Donohoe, Stellefson, & Tennant, 2012). A criticism of the Delphi technique is it does not permit discussion of issues or elaboration of views by participants (Hasson, Keeney, & McKenna, 2000). Consequently a number of survey questions were structured to invite thoughts with the final question to present respondents with the opportunity to provide any additional comments that they believed to be of importance. This proved to be invaluable as these questions were completed by the majority of participants.

5.7. Conclusion

Appropriate assessment of residential aged care environments can ensure minor refurbishment works are prioritised and executed which support the functional

and wellbeing needs of older people whilst also considering fiscal implications and implementation strategy. The use of an adapted e-Delphi process enabled international expertise and opinion to be gathered and the identification of the Residential Aged Care Built Environment Audit Tool as a tool to be piloted followed by the Evaluation of Older Peoples' Living Environments. Experts concurred that a suitable assessment tool needed to provide sufficient detail to inform refurbishment works, be applicable to local context, and be accessible, easy to use and to be completed within a practicable time frame. Attention was drawn to the skill set of the person using the tool with several experts suggesting that objective design expertise was an important adjunct to local knowledge. The use of an action plan and consideration of both objective and quality of life measures was also seen as important to prioritise. These expert perspectives will inform the local stakeholder decision making process when determining a tool to pilot for validity and reliability at a facility considering minor refurbishments. The adapted e-Delphi process outlined may be useful for other researchers seeking to gain expert input to a local problem.

5.8 Summary of Chapter

This study examined expert opinion on four environment assessment tools and used an adapted e-Delphi technique to rank and reach consensus on Residential Aged Care Built Environment Audit Tool followed by EVOLVE as the preferred tools to pilot at a residential aged care facility preparing to undergo minor refurbishment interventions. The findings from this study 3 informed local stakeholder decision making when selecting the pilot tool in the next study (4). Chapter 6 outlines the process adopted in Study 4 for stakeholder focus group participants to review and select a single tool to pilot through the use of nominal group technique. The review process by a resident participant group is also described.

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Chapter 6

Chapter 6: Refurbishing Residential Aged Care Facilities Using a Consumer Focused Approach

Preface

Residential aged care stakeholders reviewed assessment tool information and expert opinion to determine one tool to select for piloting at a residential aged care facility preparing to undergo minor refurbishment interventions. This chapter describes Study 4 which outlines the process of a stakeholder focus group using nominal group technique to reach consensus and a resident participation group to corroborate the findings. It is based on a submitted manuscript (see Appendix H):

Neylon, S., Bulsara, C., Hampson, R. & Hill, A. (2019). Refurbishing residential aged care facilities using a consumer focused approach. Submitted to peer reviewed journal and under review.

The author's own version of the manuscript is presented with slight modifications to facilitate flow in the style and format of this thesis.

6.1 Abstract

As part of a sequential mixed methods research project, this study facilitated consumer selection of an environment assessment tool to pilot prior to minor refurbishment of a residential aged care facility. Stakeholder and resident groups independently examined the tools through an adapted nominal group technique. The data was analysed using inductive content analysis. Stakeholders examined four tools and selected Evaluation of Older People's Living Environments tool due to components, ease of use, addressing resident functionality and facilitating refurbishment priorities. Residents explored two tools through a more personal lens and concurred to pilot EVOLVE. Whilst consensus was reached, the approach differed. Engaging consumers is important to ensure appropriate refurbishments are undertaken.

6.2 Introduction

Four environment assessment tools meeting minor refurbishment criteria have been explored in Chapters 3 and 4. Given that experts are perceived to have related knowledge, experience and insights to assist with critical analysis (Chi, 2006; Skulmoski, Hartman, & Krahn, 2007), the four tools were surveyed by international experts using an adapted e-Delphi process as described in Chapter 5. The expert views and subsequent ranking of the tools using a weighted scoring system, (Neylon, Bulsara, & Hill, 2019a) were summarised as a resource for a local stakeholder focus group. The tools were ranked in the following order of preference to be piloted in a minor refurbishment context:

1) Residential Aged Care Built Environment Audit Tool (Department Health, 2012)
2) Evaluation of Older People's Living Environments (Lewis, Torrington, Barnes, & Darton, 2010)
3) Sheffield Care Environment Assessment Matrix (Parker et al., 2004)
4) DesignSmart (Cunningham, McIntosh, Thorne, & Gresham, 2015)

To select the appropriate tool to pilot in a RACF, a collaborative approach which involved researchers, industry representatives and consumers was used (Hinchcliff, Greenfield, & Braithwaite, 2014). This approach aimed to enhance the quality of the research and the implementation of outcomes (Brett et al., 2012) and has been reported to be more responsive to the requirements of the consumers (Janamian, Crossland, & Wells, 2016).

The purpose of this study was to facilitate stakeholder and resident selection of an environment assessment tool to pilot prior to minor refurbishment of a residential aged care facility. The processes and outcomes for the two groups were explored and compared.

6.3 Methods

6.3.1 Design

Due to the different characteristics of the stakeholder and resident groups, a sequential two-phase mixed methods design was used (Creswell & Plano Clark, 2011). Phase one consisted of a stakeholder focus group to review all four environment assessment tools. Focus groups are used to gather data on a specific topic from multiple participants in an interactive forum (Braun & Clarke, 2013). As the desired outcome was to reach consensus on a single tool to pilot in a RACF, the Nominal Group Technique (NGT) was selected as the most appropriate method (Harvey & Holmes, 2012). NGT is a structured and facilitated technique adopted to elicit and prioritise responses to a question or issue from a group of people who have expertise in the area or subject under review (Søndergaard et al., 2018) and to explore the stakeholders and consumers' views (McMillan, King, & Tully, 2016). NGT is a highly adaptable method with variations occurring according to the circumstances (McMillan, King, & Tully, 2016).

Phase two used a participant experience approach (Agency for Clinical Innovation, 2016) with the resident group to review the top two tools recommended from phase one. Input from residents who would be the beneficiary of refurbishment initiatives was deemed by the authors as essential to enhance the quality of the study (Agency for Clinical Innovation, 2016) because of the unique perspective that these consumers can bring to a project (Brett et al., 2012). It has also been identified there can be clear differences in the views of staff and residents when it comes to the aged care facility environment (Popham & Orrell, 2012) so both perspectives need to be considered.

The NGT typically has four stages: individual generation of ideas, sharing of ideas (round robin), group discussion (clarification), and then ranking (McMillan, King, & Tully, 2016; Harvey & Holmes, 2012). In this study individuals were invited to provide their ideas regarding each tool before the group. Participants in both groups were also provided with an information pack a week prior to the focus group so that participants could read the research based material (as per Hickey & Chambers, 2014) and reflect and record their views. This adapted process is shown in Figure 6.1.

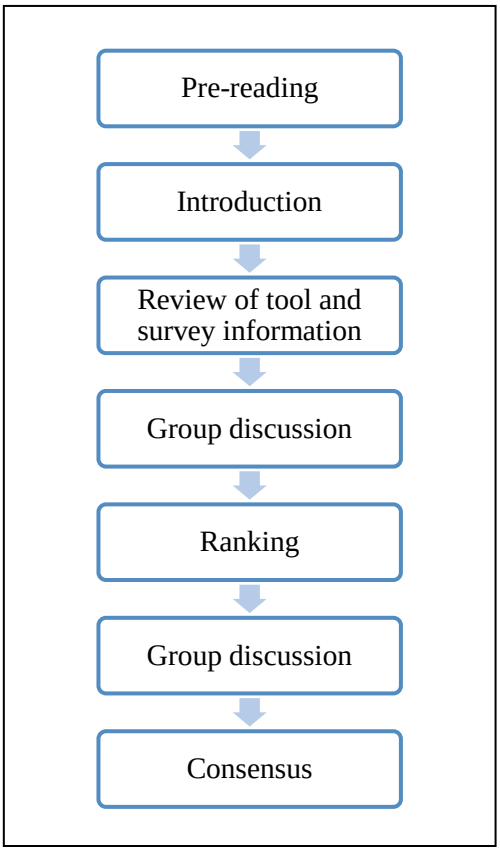

Figure 6. 1 Adapted NGT Process

6.3.2 Participants

Ethical approval for the study was obtained from The University of Notre Dame Australia (#017025F). Participant information sheet and consent forms were prepared for the stakeholder group and resident group participants. An email invitation and introduction to the study was sent to fourteen participants in the stakeholder group. For the resident group, an outline of the study and an invitation to participate were provided verbally by staff members to five residents of a RACF. The staff invited these residents based on their capacity to provide consent along with their knowledge of the residents' interest and prior involvement in improving their living environments. All participants provided written informed consent and the group sessions were audio-recorded.

Phase one participants (stakeholders) were purposively identified for their knowledge base and expertise in residential aged care environments (Søndergaard et al., 2018) whereas phase two participants (residents) were purposively identified for

their current residence in an aged care facility, their ability to consent and to participate in a discussion on the topic of environmental assessment tools.

6.3.3 Phase 1 Procedure (Stakeholder Group)

Each participant was provided with an information pack prior to the stakeholder focus group. This contained a synopsis of the four tools; a selection of questions from each tool pertaining to a private space (bedroom) and public space (lounge room); and expert comments on each tool, ranking of the tools; and reasons for tool selection (Neylon, Hill & Bulsara, 2019a). The four evaluation tools were presented in the pack in random order with the ranked order of the expert group revealed at the back of the information pack to try to minimise any bias that may occur during the pre-reading stage and allow more independent reflection by the stakeholders.

At the commencement of the focus group introductions were made, consent forms were collected, agenda and ranking forms were distributed and the process for the group was explained (Braun & Clarke, 2013). The group was moderated by the first researcher (SN) due to her expertise in RACF environments and involved the use of careful and limited responses to ensure they do not influence the group discussions or flow (Traynor, 2015; Braun & Clarke, 2013). The second researcher (AMH) acted as co-moderator taking written notes as the tools were discussed and the third (CB) acted as a co-moderator to observe interactions and to note any non-verbal cues to support the transcribed material (Traynor, 2015).

The moderator read a summary of each tool; a selection of questions from each tool pertaining to the public space (lounge) and a private space (bedroom). She then read a selection of expert reviewers' views on the tools in the following order:

1) DesignSmart (Cunningham et al., 2015) (T1)
2) Residential Aged Care Built Environment Audit Tool (RACBEAT) (Department Health, 2012) (T2)
3) Sheffield Care Environment Assessment Matrix (SCEAM) (Parker et al., 2004) (T3)
4) Evaluation of Older People's Living Environments (EVOLVE) (Lewis et al., 2010) (T4).

As the group discussed their views on each tool, the second researcher recorded their key points on paper mounted onto a large easel.

Subsequently the moderator presented the weighted rankings of the four tools and read a selection of the expert reviewers' responses for their reasons for selecting (or not) the tool for further study. The participants were then tasked to individually rank the tools (Harvey & Holmes, 2012) according to what they perceived to be the order of priority for testing at a residential aged care facility. The rankings were recorded and further group discussion encouraged for re-ranking to ensure a single tool emerged (McMillan, King, & Tully, 2016). The results were summarised and reported orally to the group for verification and to ensure their views were accurately represented (Braun & Clarke, 2013).

6.3.4 Phase 2 Procedure (Resident Group)

Due to an email received from a facility staff member prior to the session that the residents were feeling a little nervous about their first experience (and ability) in participating in a research study, the format of the session was revised to a more informal event, facilitated by a single moderator, and a review of only the top two tools from the stakeholder group as opposed to all four tools. Each participant in the resident group was provided with an information pack containing a selection of questions from the first and second ranked tools from the stakeholder group pertaining to a private space (bedroom) and public space (lounge room) along with a selection of expert review and stakeholder comments for each. The pack was provided one week before the scheduled group so that residents could read and review the material. Adaptations to the style, delivery and questions would occur during the session depending on how the participants were able to grasp the concepts and respond appropriately (Agency for Clinical Innovation, 2016).

The group started with an informal conversation over afternoon tea with two facility staff members present. Consent forms were gathered and a verbal explanation was provided about how the session would be run and what would be required of the participants. The format consisted of the moderator reading a selection of the tool questions from the booklet pertaining to a public space (lounge) and a private space (bedroom) and reading a random selection of stakeholders' views (Phase 1) from the booklet and then inviting the group to comment. The group was

then asked to identify their preferred tool from the two provided for testing at a residential aged care facility anticipating minor refurbishments in the future and the reason(s) why.

6.3.5 Data Analysis

Audio recordings for both groups were transcribed (by an independent transcribing service) and then reviewed by the research team to ensure accuracy. The qualitative content analysis used an inductive approach moving from the specific to the general which involved re-reading the data and classifying meaning units into codes (Elo & Kyngäs, 2008; Vaismoradi, Turunen, & Bondas, 2013). In addition, the contents of the transcripts were processed into content clouds (Cidell, 2010) to illustrate the information collected from the two groups. The research team used the coding and the cloud formations to triangulate the results from both phases to aid in merging analyses. The researchers then examined if they were divergent or convergent and used consensus to reach agreement on the synthesised analysis and representation (Creswell & Plano Clark, 2011). Representative quotations from the data were used to illustrate the key categories identified (Graneheim & Lundman, 2004) with stakeholders depicted as an S followed by an identifying number (e.g.S1). Residents were depicted as R followed by an identifying number (e.g. R1).

6.4 Results

6.4.1 Phase 1 - Stakeholders

Fourteen stakeholders responded to the email invitation and of these, 13 (93%) consented to participate in the study. Their professional backgrounds or interest in residential aged care refurbishments were diverse including: an aged care clinical consultant; an architect; two dementia care consultants; a family representative/next of kin; a residential aged care general manager; an interior designer; three occupational therapists; a physiotherapist; a property and procurement manager and a transition care and community manager.

The stakeholders all reported that the focus group had provided them with an opportunity to express their individual views on the four tools, listen to each other and then work as a group to reach a consensus and make a recommendation (similar to Sondergaard et al., 2018). The data from the stakeholder focus group, independent

transcription, easel paper notes and the moderator notes were all included in the content analysis. These data were coded into eleven subcategories within five main categories which are presented in Table 6.1 and illustrated by representative quotes. Two categories pertained to the tool itself (purchase costs, copyright/reliability), two to conducting the environment audit tool (time/ease of use, skills needed), two to context of use (culture, dementia specific), three to residents (quality of life, individualisation, functionality) and finally two categories pertained to the residential care environment (seven minor refurbishment elements, architectural/design).

Table 6. 1 Coding Process

Example Meaning Unit	Main Category	Sub Category
I can't see an organisation if they have 12 facilities, buying 12 copies of this (tool) (T2)	Assessment tool	Budget/costs – tools/refurbishment
There's a lot of – to me – unnecessary questions (T3)		Copyright/references/reliability/validity
It is rather lengthy but 3 to 4 hours, even 6 hours to spend on it, does that really matter how long it takes you to get the right result?(T1)	Conducting tool	Tool specific i.e. time taken/ease of use/ tool presentation
It is probably the most thorough. A lot of it is down to I think the expertise or skill of the people (T1)		Auditor/skills needed
If they're developed in the UK, would they be adaptable for Australian environments?(T3)	Context for use	Cultural context
I like the comment in the front that says that they have to have a sound understanding of aging and dementia and the specific needs (T1)		Dementia specific
What would add value to staff and the actual people living there? What would add the best to their quality of life?(T2)	Resident applicability	Quality of life
It has the potential to be individualised to whichever resident was in that particular room at that particular time (T2)		Individualisation/ resident demographics
This one tried to be a little bit of everything for everybody type of thing..but didn't, to me, get enough into the needs or functionality of people (T2)		Functionality
If you were doing it for minor renovations, you're certainly going to want to know a bit more about finishes and furniture and things like that (T4)	Environment	The seven minor refurbishment elements
I like the way it is set out…you've got your layout, your building elements, your environmental design…it makes sense to me (T4)		Architectural/ refurbishment/design

When examining the coding, the tool specific i.e. time taken/ease of use/ tool presentation, subcategory had the greatest number of attributable statements across all four tools followed by the auditor/skills needed subcategory with the functionality subcategory coming in third. The subcategories related to budget/costs and quality of life had the least number of attributed statements across all four tools. The cultural context subcategory was predominantly prevalent for tool three. Tool one had data coded into the most subcategories (n=9).

When discussing each tool, one stakeholder thought the Design Smart tool was very long and two others disagreed. S9 felt "it's probably the most thorough" as did S12 "It's got the most in-depth focus on design elements but it doesn't have anything from the people who live and work there". Two stakeholders commented on the purchase cost and one stated "I quite liked the bits of explanation that went with each one (question)..to actually help make it more consistent if different people did it" (S1).

S2 identified the RACBEAT tool to be "a pretty good pre-auditor tool…a good initial identifier…but needs refinement" with two stakeholders concurring and S6 summarising RACBEAT as a "good snapshot, easy to do, easy to deliver, easy to find out where the gaps are". The involvement of stakeholders – residents, family members and staff appealed to S5 as it has the "potential to be individualised…and raise the staff awareness..". S11 questioned the simplicity of the tool and whether it would provide sufficient detail to guide minor refurbishment as opposed to maintenance initiatives. S4 preferred the RACBEAT due to the supplementary information included.

S8 preferred SCEAM to the other tools as it "addresses a lot more sensory issues – like looking at a perspective from a person with cognitive issues, there's a lot more sensory input than anything else". However, three stakeholders concurred in their views that this tool would provide more information on the culture of care rather than for minor refurbishment priorities. An exchange occurred between 4 stakeholders on subjectivity and intepretation of questions such as adequate natural lighting with S7 expressing the view it is typically "for the staff's level of comfort, not for the residents". S3 felt that there are "a lot of questions that aren't asked in here that we would really need for refurbishment".

The simplicity and layout of the EVOLVE tool appealed to several stakeholders and S13 noted "I liked the weighting system on it..was objective…gave

you direction". S6 concurred "EVOLVE would generate the most information that I would need". Several stakeholders identified the ease of using EVOLVE as it is readily available in Excel format. Font size was identified by five stakeholders as needing to be increased for improved readability.

On completion of the round table commentary on the tools, the participants individually ranked their tools with first being the most preferred and fourth the least preferred for selection to pilot in the context of minor refurbishment at a RACF. For the first round of rankings, the participants shared their top two results as shown in Table 6.2. There was one point separating EVOLVE in first place and RACBEAT in second.

Table 6. 2 Results of Stakeholder Iterative Rounds

Round 1		**Round 2**
First Preference	Second Preference	First Preference
EVOLVE=7	EVOLVE=6	EVOLVE=11
RACBEAT = 6	RACBEAT=4	RACBEAT=2
	SCEAM=3	

When participants were asked to share their thoughts after the first round of iterations, there was similar comments amongst EVOLVE and RACBEAT supporters:

> "I chose EVOLVE … and the fact it was objective and with that weighting, you could then prioritise your areas of refurbishment. It gave you direction and the questions covered a broad scope" S13

> "My logical sense says EVOLVE because it gives me concrete data" S2

> "RACBEAT was the staff awareness because without staff awareness of why you are doing what you're doing and the benefits of it, any minor refurbishment is a waste of money" S12

"I thought the tips (in RACBEAT) were extremely helpful – because when you're asked a question, it kind of narrowed it for whoever was actually going to do it – to think about how they were going to answer it. I thought the resources were really good" S10

Further discussion followed and the second round of ranking had three participants change from their original first choice whereupon a clear consensus for the EVOLVE tool was reached.

"The layout probably is most comprehensive because if I can do all of those things, it's going to fit any need…that is what I like, it really did cover that. Thinking about whether its for one person or across the board". S4

6.4.2 Phase 2 - Residents

Five residents responded to the verbal invitation to participate and of these, three consented to participate in the study. They were all female and had resided at their current facility for an average of four and a half years. The residents perspectives focused primarily on their own refurbishment experiences and suggestions for how their particular facility should be refurbished. Some specific questioning was occasionally required to draw responses on using the tools to undertake minor refurbishment.

R1: "We badly, desperately need an activity room. If I win Lotto, that's the first thing I'm going to do…..One day a bloke here made a comment to me – the longer I stay here the more I get far away from the life I used to lead on the farm. I thought we need a Men's Shed.

Moderator: Do you think that from reading through your paper there that the tool (RACBEAT) picks up those things? Do you think that it picks up that sort of need?

R3: No. It just looks after what's pretty around the place and what sort of floor coverings you like. Are the curtains nice enough? Is the access to the outdoors alright?"

A question was framed in order to guide the conversation towards a comparative discussion:

> Moderator: "The first tool (RACBEAT) is actually intended to be done by a staff member who is employed by the facility. The other tool is to be done by anybody. What do you think about having an outside view versus an inside view?
>
> R2: I think outside views – they've got no idea. They walk in and they've got a piece of paper and they'll tick yes or no. But they don't actually know how the girls particularly feel about – you know, whether they want changes done. I know – this is just me – I think the staff here have got too much to do.
>
> Moderator: How would you feel about a person coming and doing an assessment?
>
> R3: Oh that wouldn't worry me at all….so long as they look at my room from the way I look at my room."

Discussion continued on how some of the RACBEAT elements such as flooring, lighting, temperature ("We can adjust our own room temperatures if we know how" R2) and personalisation ("When I first moved in two years, it was just all bland doors. Its only in the last few months…that we've had individual pictures and stuff put on our doors, and our name" R1) were incorporated into the residents' facility. Once the residents appeared to have exhausted their examples, the moderator once again asked specific questions to draw resident views on the EVOLVE tool such as:

> Moderator: "The reason this one (EVOLVE) is quite different to the one we've just talked about (RACBEAT) is because it doesn't just ask you if a particular thing exists, it also asks you - is it being used? Do you think it's important to know in your environment, what's actually being used?
>
> R1: Yes, I think so. Just having it there and it's not working… (proceeds to read out four EVOLVE questions and answer them from her perspective of her facility). I can't see anything wrong there. Is there anything?
>
> Moderator: Is this tool asking you more specific questions?
>
> R1: Yes it is. Particularly where the doors are concerned. Also, this is a good one here…(reads and answers two more questions and identifies one that may

not be appropriate)…I supposed a lot of places do have phones in the lounge do they? Because mainly all of us have got a phone in our bedroom."

Discussion progressed to how some of the EVOLVE elements such as natural and artificial lighting ("The lighting is very good…nice big windows in the living rooms. Also the bedrooms have beautiful big windows" R3), bedroom layout ("No, there's no space in my bedroom to turn around in my wheelchair" R2) and furniture ("It's very important to have my bedside table – the reading light goes on that, and the glass of water, and then you have your remote controls" R3) were incorporated into the residents' facility or their bedrooms. Once the residents appeared to have exhausted their facility examples, the moderator once again asked specific questions to consider a comparison such as:

Moderator: "Ladies, do you find that this second tool (EVOLVE) was asking you more specific questions?

R1: The first ones were more general. This was more straight to the point….This one is more structured.

R3: Yes, definitely.

Moderator: If I was to do renovations here, would it be more helpful for me to have the answers from this one (EVOLVE) or the first one (RACBEAT)?

R2: The answers to the second one (EVOLVE)

R1: Yeah I think the specific questions really (pointing to EVOLVE)…that would be more helpful. It's actually saying what we want."

When the residents were asked their thoughts or comments on the questions asked in the discussion, R3 responded with "I think they're very helpful. At least we've been able to say how we feel because we live here".

When exploring the coding, the resident responses showed 6 subcategories to be the same as the stakeholders: tool specific i.e. time taken/ease of use/ tool presentation, auditor/skills needed, individualisation/resident demographics, minor refurbishment elements, cultural context and architectural/refurbishment. However, this was limited in the context of the environment assessment tools as the resident codes predominantly pertained to current environment and personal preferences.

6.4.3 Visual Comparison between Stakeholder and Resident Groups

The transcribed data was imported into QSR NVivo Version 12.0 and stakeholder and resident panel transcipts were mapped as a word cloud with the frequently appearing words depicted in larger font to provide a visual summation of the analysis as per Cidell (2012) and shown in Figure 6.2. Words which were not relevant such as ‘with’ or ‘the’ were added to the stop words list as a function in developing the word cloud. The results differed in that the stakeholder group cloud was significantly more detailed and contained broader range of categories compared to the resident group. There was a strong focus on the environment, lighting, refurbishment domains and spaces. The resident group cloud had less words and more straightforward categories. There was a strong focus on light, bedroom, floor and environment showing that the two groups similarly overlapped in several areas.

Figure 6. 2 Content Cloud Comparison Between Stakeholder (on left) and Resident (on right) Groups

6.5 Discussion

The environment assessment tools examine the architectural elements or design of care homes and how this impacts on the varying physical and cognitive support needs and quality of life of residents (Kenkmann et al., 2017; Parker et al., 2004). However, one needs to consider how interventions impact meaningfully on the lives of residents and how they can be engaged in the process (Hampson, 2008; Jeon & Forsyth, 2016). As colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding were reported to have a role in supporting function and wellbeing (Marquardt, Bueter, & Motzek, 2014), these have been incorporated as features to consider addressing during minor refurbishment of residential aged care facilities (Neylon, Hill & Bulsara, 2019b). It is through this refurbishment lens that the examination of four environment assessment tools was undertaken by a residential aged care stakeholder group and two tools by a resident group. This study aimed to facilitate the selection of a single environment assessment tool to pilot with the processes and outcomes for the two groups explored and compared.

Both the stakeholder and resident groups concurred that an environment assessment tool for refurbishment requires targeted questions which will translate to relevant actions according to the needs of the residents. EVOLVE was seen to meet these requirements by the two groups and thus ranked first with RACBEAT second. Of interest to the stakeholder group was the broad cross section of elements to be considered in EVOLVE – universal domains, requirements specific to older people, the needs of staff as well as whether or not the aspect being examined was actually used in the manner it was intended (Orrell et al., 2013) Whilst EVOLVE was developed to evaluate the design of housing for older people with a focus on extra care housing (Lewis et al., 2010), the stakeholder group felt there were enough elements applicable to residential care refurbishment to warrant testing in this context.

Whilst the resident group did not identify specifically the advantages of the RACBEAT, several members of the stakeholder group appreciated the tool was developed to be completed by staff working within the facility as this formalised the opportunities for their input. Knowledge of existing environmental concerns, understanding of the strengths and weakness of the environment and the ability to champion change were identified as strengths of this approach (Moore et al., 2011).

The supplementary features and accompanying photographic examples were also exemplary features of the RACBEAT.

The coding of the stakeholder group data showed they examined the four tools under the five main categories of assessment tool, conducting the tool, context for tool use, resident applicability and environment. The eleven subcategories arising from these including budget/costs, auditor/skills needed, time taken/ease of use, refurbishment elements and functionality, demonstrated the breadth of the discussion. The resident group centred on the two tools in the context of their facility and how it might aid any future refurbishments. This was reflected in the responses e.g. whilst the resident coding showed they has six subcategories in common with the stakeholders, the greatest number of their statements pertained to current environment and personal preferences codes.

The stakeholders frequently reflected on the expert opinions provided on each of the tools, concurring with the experts in several instances whereas there was little reflection on these expert views by the residents. These results reflect the different analytical approaches and priorities of the stakeholder and resident groups and supported the use of the sequential two phase design adopted in order to facilitate maximum engagement with each group of participants. Divergence in views of stakeholders and residents has been previously identified in other areas including for example where residents identified different priorities for medication reduction in aged care to those formed by the health professionals (Turner et al., 2016) and whilst residents and nursing staff agreed on several aspects contributing to the feeling of being at home in an aged care facility, the residents identified the importance of connection with nature and the outdoors whereas the staff did not (van Hoof et al., 2016).

The word clouds provided a visual summation of the analysis, permitted a quick visual comparision (Cidell, 2010) and showed the physical environment and the associated refurbishment domains were key elements of both group discussions. This supports the findings that the physical environment was one of four key themes identified by over 4,000 Australian residents as being integral to quality of life (Harris, Grootjans, & Wenham, 2009) and is a key driver for selecting a residential aged care facility and determining its quality (Jeon & Forsyth, 2016). The physical environment impacted on the lives of the residents in another study where

refurbishment elements such as décor, colour and light were found to be important to residents (Cooney, 2011) .

Strengths of this study included the use of NGT in a face-to-face forum with stakeholders closely involved in a diversity of roles within the residential aged care sector who were able to capitalise on their breadth of experience (Harvey & Holmes, 2012). Advantages for participants included time and cost efficiency, conducive environment for discussion, and immediate dissemination of results (Harvey & Holmes, 2012). Having a well defined goal, clear introduction and having all participants read the background material prior to attending the group was crucial to the outcomes (Søndergaard et al., 2018).

The residents expressed gratitude for being invited to participate with the first researcher also receiving an email of appreciation from a participant's son after the session. This outcome aligns with the need for the residents to feel that their contributions are valued (Brett et al, 2012) and are thus extending their role beyond passive care recipients into being meaningfully involved in innovation (Janamian, Crossland, & Wells, 2016). Some of the challenges in resident involvement (such as time, cost, attrition, developing user friendly materials) can be avoided through clear planning from the outset (Brett et al 2012). The residents focused on their personal experiences of refurbishment and involvement in daily life at their RACF as the participant experience group process was adapted to allow for this (Agency for Clinical Innovation, 2016). However, there was a risk that leading questions were posed and this is a limitation of the study. A larger sample of eligible residents would have proffered more detail in the second phase of the study.

6.6 Conclusion

Refurbishment is an important opportunity to enhance the living environment for older people in residential aged care in order to provide functional and quality of life outcomes beyond aesthetics. It is a costly process and thus it is prudent to consider robust measures to address elements known to have direct benefits to residents. We found the connective process between researchers, industry representatives and residents while requiring considerable time, resources and emotional investment, to be invaluable. The use of the nominal group technique and participant experience approach allowed stakeholders and residents to express their

views in a facilitated and safe environment. Their mutual recommendation that EVOLVE be piloted at a residential aged care facility will provide the opportunity to determine the applicability of this UK tool in an Australian context and the extent to which it will inform and prioritise minor refurbishment initiatives to improve outcomes for residents. Future research or facility based projects should strongly consider seeking engagement of consumers, including residents, at each stage to increase the probability of a collaborative, meaningful, informed process directed towards better meeting the needs of the older person.

6.7 Summary of Chapter

This study outlined the process by which a residential aged care stakeholder focus group reviewed the content and expert opinion on four environment assessment tools and reached consensus on selecting a tool to pilot through the use of Nominal Group Technique. The process for the subsequent resident participant group was also described with the two groups compared. Both groups selected EVOLVE as the preferred tool to pilot in the next study (5). Chapter 7 outlines the preliminary testing of validity and reliability of EVOLVE in an Australian residential care context and the exploration of this against the minor refurbishment elements.

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Chapter 7

Chapter 7: Can a Modified Environment Assessment Tool Guide Priorities for Minor Refurbishments at a Residential Aged Care Facility?

Preface

Researchers need to ensure assessment tools appropriately assess the area(s) of interest with validity and reliability components addressed. This chapter describes Study 5 which examined the content validity of the EVOLVE assessment tool, the piloting of the tool at a residential aged care facility (RACF) and the concordance and correlation of the findings within raters and between raters. It is based on a submitted manuscript (see Appendix I):

Neylon, S., Bulsara, C., Bulsara, M., & Hill, A. (2019). Can a modified environment assessment tool guide priorities for minor refurbishments at a residential aged care facility? Submitted to peer reviewed journal and under review.

The author's own version of the manuscript is presented with slight modifications to facilitate flow in the style and format of this thesis.

7.1 Abstract

This pilot study aimed to examine EVOLVE UK extra care housing tool in an Australian residential aged care minor refurbishment context. The tool's item content validity was established with 34 subcategories (I-CVI ≥0.75) and 612 statements (n=509 I-CVI ≥0.75) relevant. A subsequent audit indicated high concordance (Rho-C=0.750 to 0.997) within four experts' ratings of the care facility and correlation (Kendall's τ-statistic) between raters ranged from strong (0.5 to 0.9) to very strong (0.9 to 1.0). Lighting was the highest refurbishment element represented (50.54%). Assessment can inform funding, demonstrate standards compliance, and the components of physical environment refurbishments which support resident function.

7.2 Introduction

The growth of ageing populations alongside increasing levels of chronic diseases such as dementia, has led to an expectation that demand for residential aged care, or long term care, will continue to increase internationally into the foreseeable future (Organisation for Economic Development and Cooperation, 2019). In the United Kingdom, the population of people over 85 years of age is expected to increase from 1.6 million in 2016 to 2.8 million by 2031, and yet the number of residential care beds has not increased to accommodate this (Smith et al., 2018). Similarly, in Australia the proportion of people 65 years or older is projected to increase from 15% of the total population in 2017 to between 21 and 23% in 2066 (Productivity Commission, 2019). This growth in Australia is reflected internationally with 60-80% of aged care expenditure going towards residential care (Milte et al., 2018). Subsequently, constraints in the financing of the sector along with rising consumer expectations have led to a need to evaluate effectiveness in meeting consumer outcomes (Milte et al., 2018). A survey of over 4,000 residents in one Australian state indicated the physical environment to be one of four key themes impacting on residents' quality of life (Harris, Grootjans, & Wenham, 2008). Additionally, an analysis of international studies demonstrated that the built environment is an important component of residential care (Joseph, Choi, & Quan, 2016).

As the building of new facilities is not always either viable (Vu, Davey, & Ansell, 2012) nor able to occur at the pace required (Smith et al., 2018), it becomes essential to identify, prioritise and implement minor improvement works that benefit the functional needs of older adults without necessarily incurring high costs (Pantzarzis, Price & Pascale, 2016). An earlier study distinguished minor refurbishments as finishes, furniture, fixtures and fittings as opposed to major refurbishments which were extensions or structural works (Neylon, Bulsara, & Hill, 2017). In Australia, the revised Aged Care Quality Standards now requires the service organisation's environment to specifically ensure that resident independence and functions are optimised (Department of Health, 2019). Whilst Australia has examined costings, best practice and the relationship between payment and performance in the health sector for informed decision making on efficiencies and

effectiveness of care, this is only beginning to emerge in the aged care sector (Eager, et al., 2019).

Using standardised environment assessment tools can assist with capital investment planning and decision making but researchers have suggested that several tools focus on general principles and may not "allow evaluation of specific impact and of the value of different interventions" (Pantzarzis, Price, & Pascale, 2016:7). Existing environment assessment tools have been explored previously and found to have limited application beyond the settings where they were developed (Elf et al., 2017) or do not capture all relevant elements of the building (Parker et al., 2004). These tools were not developed specifically for minor refurbishment purposes.

A recent study screened a range of these environment assessment tools (Neylon, Bulsara, & Hill, 2017) in the context of minor refurbishment elements. Seven elements found to be consistently important to include when planning refurbishments were colour/contrast, flooring, furniture, lighting, noise, signage, and wayfinding due to the impacts of these elements on quality or functional outcomes reported for residents (Neylon, Bulsara, & Hill, 2019a). The benefits of these elements for older people has been systematically reviewed with improved lighting, introduction of appropriate furniture, reduction of unnecessary noise some examples to positively support resident quality of life and safety outcomes (Joseph, Choi, & Quan, 2016).

National and international experts were surveyed on four environment assessment tools and their findings (Neylon, Bulsara, & Hill, 2019b) presented to a focus group of residential aged care stakeholders, including residents themselves, who subsequently selected the Evaluation of Older People's Living Environments (EVOLVE) assessment tool (Lewis et al., 2010) as the preferred tool to pilot at a Western Australian residential aged care facility (RACF) planning to undertake minor refurbishment (Refer to Chapter 6). EVOLVE is an established tool which has undergone testing as part of its development process with face validity and content validity established in UK extra care housing as well as inter-rater reliability (Lewis et al., 2010), however, there appear to be no studies which have sought to evaluate EVOLVE for its use in a refurbishment context. Whilst EVOLVE was developed in an extra care housing context (Lewis et al., 2010), it considers six domains of universal requirements and seven domains to support impairments associated with age. Therefore the stakeholder group felt there were sufficient elements applicable to

residential aged care refurbishment to warrant piloting in this context (as per Chapter 6).

The aim of the pilot study was to examine the Evaluation of Older People's Living Environments (EVOLVE) United Kingdom extra care housing assessment tool for its transferability and applicability in a Western Australian residential aged care context to determine minor refurbishment priorities.

7.3 Methods

7.3.1 Study Design

A sequential three-phase mixed methods design (Creswell, 2014) was utilised. Mixed methods facilitate a more holistic understanding and provide a more comprehensive answer to the research question than a singularly qualitative or quantitative approach (Creswell, 2013). The sequential approach occurs through three phases:

Phase 1: The Content Validity Index (CVI) which is the degree to which the items represent the construct of interest (Polit, Beck, & Owen, 2007) of the EVOLVE tool was examined in two steps. Step A determined which categories were applicable to residential aged care settings. Step B determined which statements were relevant when rated against the seven minor refurbishment elements of colour and contrast, flooring, furniture, lighting, noise, signage and wayfinding (Neylon, Bulsara, & Hill, 2019).

Phase 2: The reduced EVOLVE was then explored for its feasibility to be used by raters in a different context (namely Australian residential aged care) to its original setting (extra care housing). The raters' ability to use the tool, the agreement of their results between two rounds (concordance) and the measure of the association between raters (correlation) was determined (Landis et al., 2011; Liu et al., 2016).

Phase 3: Findings were subsequently synthesised to assist in answering the research question by creating a matrix which mapped the audit results against the framework of the seven minor refurbishment elements previously identified. This phase used a deductive content analysis approach (Vaismoradi, Turunen, & Bondas, 2013).

7.3.2 Ethical Considerations

Ethical approval for the study was obtained from the University of Notre Dame Australia (reference 019025F). All participants were invited to participate by email and provided written informed consent prior to commencement

7.3.3 Participants

For Phase 1 (determining CVI), a panel of experts in this field was identified from the Western Australian capital city and surrounds. Participants were recruited via convenience sampling to ensure a mix of experts including individuals with consumer experience in aged care environments; clinical research; or professional workers (similar to Zamanzadeh et al., 2015) with experience in resident function such as physiotherapy and occupational therapy. A sample size of eight experts was chosen based on previous work suggesting more than three but less than 10 experts (Polit & Beck, 2006) with a minimum of least seven (DeVon et al., 2007).

Participants for Phase 2 of the study were recruited via convenience sampling. Convenience sampling produces a sample population who are considered both easily accessible and have agreed to participate (Teddlie & Yu, 2007). The raters included those with expertise in assessing aged care environments and those with general experience in the residential aged care setting and were all from physiotherapy and occupational therapy professions. A more detailed reliability assessment would require a larger sample size with at least 30 proposed (Koo & Li, 2016) which was beyond the scope of this pilot thus a preliminary approach with 4 raters was adopted.

Selection criteria for both Phase 1 and Phase 2 included: proficiency in reading and comprehending English text; Tertiary qualification (health related for the content experts) from an English speaking institution; and familiarity (direct expertise for content experts) with residential aged care environments and/or research.

7.3.4 Setting

Phase 1 was conducted electronically. Participants carried out the Step A and Step B reviews at a time and location of their choosing with the responses returned by the designated date for each round. The audit for Phase 2 was conducted at a

metropolitan Western Australian residential aged care facility preparing to undergo refurbishment initiatives. The facility comprised 40 permanent bedrooms and two respite bedrooms distributed amongst six houses with gardens surrounding the buildings.

7.4 Data Collection Procedure

7.4.1 Phase 1 - Content Validity Index

The CVI was designed to be conducted in two stages. Step A examined the categories of EVOLVE for their relevance to residential aged care in an Australian context. Step B examined statements from the selected categories for their relevance to the seven minor refurbishment elements. Both steps were first piloted to gain perspective on the length of time taken to complete and any difficulties encountered. Subsequently, the instructional information for the panel was refined where required.

Step A commenced with identifying and defining the construct of interest (DeVon et al., 2007) which were the definitions of both assisted living and residential aged care environments and the typical features found in each (refer to Appendix J for details). A matrix was developed that listed all the categories of EVOLVE (n=50) for participants to rate the relevance of each one to residential aged care. Ratings were completed using a 4 point Likert response scale (1= not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant) to examine the content validity of individual items (I-CVI) which was defined as the proportion of experts providing a rating or 3 or 4 for the item (DeVon et al., 2007; Polit & Beck, 2006). Categories deemed to not be relevant to residential aged care were removed for Step B.

Step B also commenced with identifying and defining the constructs of interest (DeVon et al., 2007) which were the seven refurbishment elements of colour and contrast, flooring, furniture, lighting, noise, signage and wayfinding (Neylon, Hill, & Bulsara, 2019a). A matrix was developed which listed the relevant categories determined from Step A and the subsequent statements under each of those sections. Identical statements were grouped to avoid repetition and to reduce burden on the participants. For example, instead of listing the statement in multiple categories ‘The colour of the bedroom/laundry/office door contrasts with the colour of the surrounding walls’, the question was reframed to read: Applies to several rooms…

'The colour of (room) door contrasts with the colour of the surrounding walls' so it could be answered once rather than on several separate occasions.

Each participant was asked to review and rate the relevance of each statement in the matrix in terms of minor refurbishment also using the same 4 point Likert response scale as Step A to examine the I-CVI (DeVon et al., 2007; Polit & Beck, 2006). Statements not meeting the level of significance set were removed and finally a reduced EVOLVE was prepared for use in Phase 2 of the study.

7.4.2 Phase 2 – Rater Concordance and Correlation

For Phase 2, the 4 raters were provided with an information pack containing details of the aged care facility; floor plan; detailed notes on the review procedure; equipment such as measuring tape, light meter and temperature app link to download onto a smart phone; in addition to an electronic and hard copy of the reduced EVOLVE. Two raters had experience in working in residential aged care and two raters had this same experience in addition to environment assessment expertise. One of each type of rater independently completed the tool on day one while the remaining two completed the tool the following day (in both rounds) to ensure as similar conditions between them as possible.

The reduced EVOLVE tool was completed on-site using one of four tool scoring options for each item: a) Yes the statement is true e.g. 'the lounge has natural light' is to be marked 'yes' if a window is present in the room b) No the statement is not true e.g. 'the lounge lighting can be dimmed' is to be marked 'no' if there is no dimmer switch available c) A particular feature is present but not in use e.g. 'there is a small kitchen adjacent to the lounge' is to be marked 'not in use' if it was not equipped for use at the time of the assessment d) The statement is not applicable e.g. 'the reception desk is wheelchair accessible' is to be marked n/a if there is no reception desk (Lewis et al, 2010a).

The tool was then repeated two weeks later by the same raters. Data from both rounds were gathered and entered into an Excel Spreadsheet.

7.4.3 Phase 3 – Context Review

The data from Phase 2 was imported into a matrix (Miles, Huberman, & Saldana, 2014) which contained the seven refurbishment elements for coding and analysis in Phase 3.

7.5 Data Analysis

7.5.1 Phase 1 – Content Validity Index

Content validity index was calculated on an item level with I-CVI calculating the number of experts rating the item's relevancy as 3 or 4 divided by the number of experts (Zamanzadeh et al., 2015). As there were between six and eight experts in the panel, the I-CVI was set to 0.78 as per Polit & Beck (2006). I-CVI was determined in both Step A (category level) and in Step B (statement level).

Step A sought to determine which of the 50 categories of the EVOLVE were considered to be relevant to residential aged care under the Living Unit (n=12), Communal Facilities (n=20), Circulation (n=9), Staff and Services (n=5) and Site and Location (n=4) categories. As I-CVI of 0.78 is considered 'excellent' (Polit & Beck, 2006), categories with this value or higher were retained for Step B. Step B sought to determine which of the grouped and individual statements were considered to be relevant to seven minor refurbishment elements. I-CVI of 0.78 was also set in order for the statement to be retained for Phase 2.

7.5.2 Phase 2 – Rater Concordance and Correlation

All rater responses to the EVOLVE statements were recorded on an Excel spreadsheet and agreement/no agreement were identified between each raters' two assessments and also between all raters' overall assessments. Data from each category, including all the individual statements within, were subsequently summarised using descriptive statistics per category and per round and entered into Stata 15 for analysis (Stata Statistical Software, College Station, TX: StataCorp, LLC).

Levels of agreement between each raters' first and second assessment were evaluated by assessing the concordance between two assessments using Lin's concordance correlation coefficient (CCC) and Pearson's r with 95% confidence

intervals ($p>0.05$) considered significant (Lin, 1989; Watson & Petrie, 2010). The CCC result takes values whereby -1 means perfect disagreement and +1 perfect agreement and 0 indicates no concordance or random readings (Carrasco et al., 2013). Concordance results were also visually reported as graphs illustrating each raters' level of concordance where the scatter diagram for each rater show the results from the first round plotted against the results from the second round along the 45° degree line representing perfect agreement (Watson & Petrie, 2010).

Correlation between all four raters (8 measurement points) was evaluated using Kendall's τ-statistic (Brossart, Laird, & Armstrong, 2018) which is the probability any given pair of observations will have the same ordering of data (Arndt, Turvey, & Andreasen, 1999). Results were displayed as a matrix to demonstrate how similarly raters ordered a set of data points with +1.00 indicating ordering of data the same way and -1.00 indicating ordering the in the opposite way (Brossart, Laird, & Armstrong, 2018). A value close to 0 indicates weak or no association between variables (Liu, et al., 2016).

7.5.3 Phase 3 – Context Review

The statements which resulted in agreement by 3 or 4 raters were then extrapolated for Phase 3. These statements were populated into the category matrix (Miles, Huberman, & Saldana, 2014) alongside the seven minor refurbishment elements. Deductive content analysis was then used to review the statements and code each one against these elements (Vaismoradi, Turunen, & Bondas, 2013). Ongoing dialogue between the researchers with statement examples confirmed for each category facilitated the trustworthiness of this approach (Elo & Kyngäs, 2008).

7.6 Results

Eight experts were approached and participated in Phase 1 (100% conversion rate) with 2 having experience in aged care environments (lay experts) and 6 specifically working in a clinical and/or research capacity in residential aged care (content experts).

7.6.1 Phase 1- CVI Step A

Appendix K presents the results of the CVI Step A whereby 34 subcategories that were retained from the original 50 after Step A was completed. Twenty nine categories had an I-CVI of 0.78 or higher. Five categories had I-CVI of 0.75, which after adjudication, were also subsequently included. This approach is supported in Polit, Beck, & Owens (2007) who identified 0.75 with eight raters as good. The categories of EVOLVE not considered to be relevant to residential aged care largely related to the living unit (or personal space) as people in residential aged care facilities typically have a bedroom and ensuites rather than self-contained living quarters. These 34 subcategories contained 1345 individual statements. To reduce participant fatigue, identical statements were grouped to prevent repetition for Step B.

7.6.2 Phase 1- CVI Step B

In Step B, resultant 443 grouped and individual statements were presented to the participants with a subsequent 64 grouped and individual statements scoring an I-CVI of 0.78 or higher. Table 7.1 (refer to Appendix L for full results) shows examples of grouped statements, the number of participants ranking the statement as 3 (quite relevant) or 4 (highly relevant), and the designated refurbishment element. There were 36 instances where an I-CVI of at least 0.75 was not reached and yet the statement(s) pertained to a refurbishment element. In addition, there were four instances were an I-CVI of 0.75 was reached but the statement(s) did not pertain to a refurbishment element. Consequently, a lay participant and an expert participant were randomly selected to review those 40 instances and determine if they are to be included or removed from the final allocation of statements. When the included grouped statements were expanded back out to individual statements, the final reduced EVOLVE tool for undertaking the audit in Phase 2 had five main categories, 29 subcategories and 612 individual statements as outlined in Appendix M.

Table 7. 1 EVOLVE Statements Rated 3 or 4 on a 4 Point Relevance Scale to the Refurbishment Elements

Statements *Applies to several rooms…*	L1	L2	E1	E2	E3	E4	E5	E6	# agreed	I-CVI	To be Retained	Rationale	Refurb Element
The colour of (room) door contrasts with colour of surrounding walls	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Colour/ Contrast
(Room) door has a non-reflective satin or matt finish	1		1	1	1	1	1	1	7	0.875	Yes	Over 0.78	Colour/ Contrast
The (room) threshold is flush with general floor level	1	1	1		1	1		1	6	0.75	Will include	Border line	Flooring
The (room) door has a clear opening more than 800mm wide		1	1		1	1			4	0.5	No	-	-
The (room) has natural light	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Lighting
The (room) is dark at night		1	1		1	1		1	5	0.625	Should include	Relates to domain	Lighting

7.6.3 Phase 2 – Rater Concordance and Correlation

Four participants were approached and subsequently consented to participate in Phase 2 of the study (conversion rate of 100%). All four participants had worked in residential aged care previously and two also had specific residential aged care environment assessment experience. All raters completed two audits although one participant was unable to complete 3 of the categories in the first audit.

The first round of rating demonstrated that a number of categories (such as library, additional lounges, therapy room) were not located at the designated facility as indicated in Appendix M and thus statements (n=185) pertaining to those categories could not be assessed. Therefore 427 statements were rated for the facility in each round (n=854). All responses to the 427 statements within the 21 categories were recorded on an Excel spreadsheet for each of the four raters in each round. Of the available 854 statements available over two rounds, 727 in total were completed by the raters. Of these, 491 statements (68%) were answered the same way by all four raters (1.00) and 149 statements (20%) were answered the same way by three raters (0.75). The full results are presented in Appendix N.

When examining the statements responded the same way by each rater across both rounds, this consistency was averaged at 63.3% (rater 2) through to 91.7% (rater 4). Refer to Appendix O for the rater comparisons showing congruency between rounds. The Staff Room, Activity Room and Parking subcategories were subsequently removed as they did not have responses in both rounds with resultant n=18 subcategories and n=314 statements per round undergoing further analysis.

The mean scores and standard deviation of the raters within the Living Unit and Communal subcategories in each round are presented in Table 7.2 (refer to Appendix P for results in all subcategories) and the agreement within each rater's scores over the two rounds are presented in Table 7.3. There was significant concordance between all four raters' round one and round two scores.

Table 7. 2 Mean (Standard Deviation) Scores of Each Rater

Living Unit

Rater	Round	$\bar{x}$ Double Bedroom 1	SD Double Bedroom 1	$\bar{x}$ Single Bedroom 1	SD Single Bedroom 1	$\bar{x}$ Bathroom 1	SD Bathroom 1	$\bar{x}$ Bathroom 2	SD Bathroom 2
1	1	1.114	0.575	1.182	0.528	1.214	0.594	1.286	0.600
2	1	1.114	0.420	1.030	0.346	1.036	0.415	1.071	0.506
3	1	1.200	0.574	1.212	0.545	1.179	0.548	1.143	0.525
4	1	1.200	0.554	1.182	0.528	1.321	0.548	1.321	0.612
1	2	1.143	0.545	1.152	0.566	1.214	0.568	0.786	0.516
2	2	1.257	0.479	1.121	0.448	1.179	0.577	1.321	0.548
3	2	1.143	0.521	1.121	0.485	1.179	0.548	1.179	0.548
4	2	1.143	0.521	1.121	0.485	1.286	0.600	1.286	0.600

Communal

Rater	Round	$\bar{x}$ Main Lounge	SD Main Lounge	$\bar{x}$ Dining Room	SD Dining Room	$\bar{x}$ Laundry	SD Laundry	$\bar{x}$ Storage	SD Storage	$\bar{x}$ Garden	SD Garden
1	1	1.063	0.597	1.188	0.592	1.471	0.514	2.000	0.000	1.222	0.441
2	1	1.188	0.691	1.188	0.669	1.471	0.514	1.333	1.155	1.222	0.441
3	1	0.938	0.657	1.125	0.660	1.471	0.514	0.667	1.155	1.000	0.500
4	1	1.000	0.706	1.125	0.660	1.471	0.514	0.667	1.155	1.111	0.333
1	2	1.000	0.706	1.063	0.651	1.353	0.702	1.333	1.155	1.111	0.601
2	2	1.250	0.643	1.219	0.553	1.471	0.514	1.333	1.155	1.111	0.601
3	2	0.938	0.605	1.063	0.651	1.235	0.664	1.333	1.155	1.111	0.601
4	2	0.969	0.632	1.063	0.651	1.235	0.664	1.333	1.155	1.111	0.601

Table 7. 3 Raters' Concordance Between Rounds

Raters (n=4)	Rho C (Lin's CCC)	SE (rho_c)	95% CI	Pearson's r
R1R1 vs R1R2	0.972	0.009	0.955 0.989	0.972
			0.949 0.985	
R2R1 vs R2R2	0.750	0.064	0.624 0.877	0.786
			0.595 0.852	
R3R1 vs R3R2	0.996	0.001	0.995 0.999	0.997
			0.995 0.998	
R4R1 vs R4r2	0.997	0.001	0.995 0.999	0.998
			0.995 0.998	

Figure 7.1 displays scatterplots of all four raters' two rounds of rating plotted against the 45 degree line of best fit.

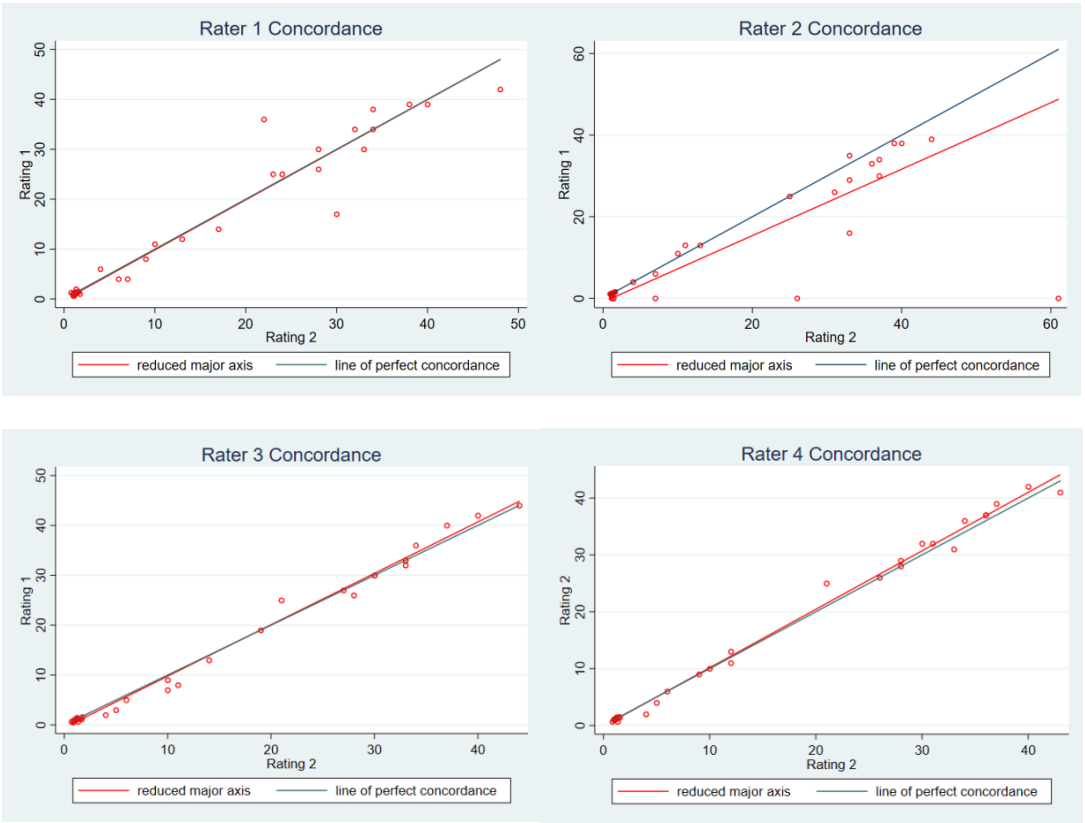

Figure 7. 1 Scatterplots of Results of the Two Rounds for Each Rater

The correlations between all four raters are presented in matrix form in Table 7.4. Kendall's τ-statistic scores indicated that the strength of association between the

raters ranged from Strong (0.5 to 0.9) to Very Strong (0.9 to 1.0) (Cohen, 1992) positive correlations from 42 observations.

Table 7. 4 Level of Association Between all Four Raters

	R1r1	R2r1	R3r1	R4r1	R1r2	R2r2	R3r2	R4r2
R1r1	0.9895							
	42							
R2r1	0.6005*	0.9698						
	42	42						
	0.0000							
R3r1	0.7956*	0.5064*	0.9907					
	42	42	42					
	0.0000	0.0000						
R4r1	0.8188*	0.5064*	0.8746*	0.9907				
	42	42	42	42				
	0.0000	0.0000	0.0000					
R1r2	0.7735*	0.5075*	0.7886*	0.7909*	0.9849			
	42	42	42	42	42			
	0.0000	0.0000	0.0000	0.0000				
R2r2	0.7573*	0.5807*	0.7422*	0.7166*	0.7247*	0.9872		
	42	42	42	42	42	42		
	0.0000	0.0000	0.0000	0.0000	0.0000			
R3r2	0.8479*	0.5308*	0.8827*	0.8525*	0.8269*	0.7642*	0.9895	
	42	42	42	42	42	42	42	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
R4r2	0.8339*	0.5226*	0.8583*	0.8920*	0.8502*	0.7712*	0.9315*	0.9849
	42	42	42	42	42	42	42	42
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

*denotes significant at 5%

7.6.4 Phase 3 – Context Review

The statements (n=628) answered by all four raters across both rounds were collated. The content of the 628 statements was subsequently coded against each of the seven refurbishment elements and grouped against each element with coding examples shown in Table 7.5.

Table 7. 5 Coding Process

Element	Definition	Statement Example
Colour/Contrast	Can refer to colour, toning, shade, contrast, reflection and relates to any part of the facility i.e. walls, floors, furniture, hardware	The bathroom is decorated in a light colour with a matt finish
Flooring	Can refer to carpet, vinyl, paving or anywhere that refers to floor, flooring, surface underfoot, non-slip, pile	Deep pile carpets are avoided on the circulation routes
Furniture	Can refer to seating, furnishings, chairs, window treatments (e.g. blinds, curtains), storage	The staff room is furnished with comfortable chairs.
Lighting	Can refer to light, light fittings, lux, wattage, natural light, artificial light, illuminance, dimming, task light	The artificial light is well distributed with no areas of shadow
Noise	Can refer to sound, acoustics, absorbency, wall materials, audible, decibels	There is acoustic privacy within the scheme manager's office
Signage	Can refer to sign, signpost, plaque, entry information	There are written instructions outside the building explaining how to access the building
Wayfinding	Can refer to direction, landmarks, distinctive features, navigate	There are distinctive internal landmarks at less than 30m along the travel routes

The statements were subsequently ordered according to level of congruency (≥0.75 or <0.75) to the seven refurbishment elements summarised in Table 7.6. The expanded results are presented in Appendix Q. Of the seven refurbishment elements, lighting was the most heavily represented element representing 50% or half of the 628 statements (n=314). Next was colour/contrast at 20.4% (n=128), followed by flooring at 13.4% (n=84), furniture at 8.3% (n=52), noise at 4.1% (n=26) followed by signage with 2.2% (n=14) and wayfinding 1.6% (n=10).

Table 7. 6 Statements Responded by all Raters in Each Round Ordered According to Refurbishment Element

Category	Colour/ Contrast		Flooring		Furniture		Lighting		Noise		Signage		Wayfinding		Total
	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	
Living Unit	42	12	16	2	20	-	88	6	5	3	-	-	-	-	97
Communal	32	2	29	3	7	1	87	7	10	2	-	-	-	-	90
Circulation	17	3	26	2	12	-	43	13	2	-	14	-	9	1	71
Staff & Services	18	2	5	1	12	-	65	5	1	3	-	-	-	-	79
Total	109	19	76	8	51	1	283	31	18	8	14	0	9	1	**628**

7.7 Discussion

The aim of this study was to examine EVOLVE which is an extra care housing assessment tool developed in the United Kingdom, for its transferability and applicability in a Western Australian residential aged care context to determine minor refurbishment priorities. Through a three phase mixed method study we found that a reduced EVOLVE was able be used with high concordance and correlation and included all seven minor refurbishment elements. As tools are not often used beyond the study for which they were developed for (Elf et al., 2017), it was considered important to examine existing tools prior to considering developing yet another tool. Environment assessment tools assist with evaluations to inform fiscal planning and decision making (Pantzarzis, Price, & Pascale, 2016) but also need to determine whether environment changes impact on resident function (Elf et al., 2017) and wellbeing (Nordin et al., 2015). Using data to measure resident needs and outcomes and predict demand is underway in Australia with the need for further assessment and costing studies in aged care to provide the necessary evidence for funding reform to drive improvements and value for money evaluations as in Eagar et al. (2019).

Of the original 50 categories in EVOLVE relating to extra care housing, the I-CVI determined that 34 (68%) of these categories were also applicable to residential aged care. Categories pertaining to Staff & Services (100%), Circulation (78%) and Site and Location (75%) had the highest retention. It was considered that these would have little difference in requirements regardless if they are in an extra care context or in a residential context. However the Communal Facilities (55%) and Living Unit (25%) categories had the lowest rates of transferability. These findings reflect the definitions provided to the raters whereby extra care housing was defined as private or self-contained properties within an estate containing communal facilities such as dining, laundry and hobby rooms and can also be termed retirement villages (Elderly Accommodation Counsel, 2019). Australian residential aged care was considered to be buildings consisting of predominantly communal areas from which to provide high levels of care with bedrooms being the private spaces for individuals (Department of Social Services, 2014).

The I-CVI results at statement level demonstrated that EVOLVE contained 612 statements that were relevant to the seven minor refurbishment elements (colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding) with the

majority of these being rated by experts as ≥0.75. This demonstrated that the validity or degree to which the tool items sufficiently represent the content under consideration is strong (Zamanzadeh et al., 2015). As the original EVOLVE tool was being examined in the context of a different setting through a refurbishment lens which resulted in a reduced version of the tool, the content validity of the overall scale (S-CVI) was not explored (Polit & Beck, 2006). I-CVI information is commonly used when researchers are revising or removing items (Polit & Beck, 2006).

The reduced EVOLVE had an estimated value of Lin's coefficient of 0.972 or higher for three raters, thereby indicating strong concordance between rounds. This demonstrates high levels of within-observer agreement and may be used as an index of reliability (Watson & Petrie, 2010). The Kendall's τ-statistic readings indicated a clear association between the raters with the strong positive result suggesting more replicable results (Arndt, Turvey, & Andreasen, 1999). Attaining these result from raters with different levels of expertise demonstrate that EVOLVE was able to be transferred from the UK extra care housing context to an Australian RACF context.

The study also aimed to ascertain if the reduced EVOLVE would provide sufficient information to a RACF preparing to undergo minor refurbishments. Whilst EVOLVE had statements pertaining to all seven elements of minor refurbishment under study, there were significantly more lighting statements (50%) than the other six elements. Furthermore, given that four elements (furniture, noise, signage and wayfinding) constituted less than 10% each of the total statements, it would suggest that the reduced EVOLVE would offer most guidance on lighting and colour/contrast during minor refurbishments of a residential care facility. An earlier review of the literature (Neylon, Bulsara, & Hill, 2019a) identified the importance of appropriate furniture in residential aged care settings in terms of functionality and familiarity (e.g. Jonsson et al., 2014). Noise can have a negative impact on resident function and wellbeing (e.g. Marquardt, Bueter, & Motzek, 2014) whilst signage supports orientation and visually accessible information (e.g. Marquardt, 2011). Wayfinding was found to be of increasing significance in the literature (Neylon, Bulsara, & Hill, 2019) particularly due to the increasing prevalence of cognitive impairments such as dementia whereby individuals rely on environmental

information to help them navigate their way around (e.g. Hadjri, Faith, & McManus, 2012).

7.8 Strengths and Limitations

It has been identified that there can be challenges with adapting or using a tool developed in another country or cultural setting as there can be distinctive differences between the original setting and context and the study setting and context (refer to Nordin et al., 2015 as an example). The raters did not find any statements requiring interpretation (EVOLVE does include a glossary of terms) and this may be due to some underlying similarities between the United Kingdom and Australia. It has been cautioned when using instruments developed for a specific purpose not to generalize the applicability into another setting without careful review and potential adaptation (Elf et al., 2017) which guided the study team to adopt this three phase approach outlined in order to pilot the EVOLVE. It is acknowledged that it may be more cost effective or efficient to undertake minor refurbishment and major refurbishment initiatives at the same time and that there may be tools for that purpose. The authors focused on minor refurbishment as it is a largely unexplored area.

Whilst the study adopted Polit and Beck's (2006) recommendations that I-CVI be set at 0.78 or higher which represents seven concordant ratings from nine raters (and adjudicated the items attaining 0.75), the study actually employed eight raters so it would have been simpler to set a criterion of 0.75 from the outset which represents a minimum of six concordant ratings out of eight.

We are not aware of any studies that have explored existing residential aged care environment assessment tools and examined them through a specific lens such as minor refurbishment and this study outlines the process of doing so in systematic detail. However, it is acknowledged that this pilot study is only a preliminary exploration of agreement and correlation exercise and greater numbers of rounds are required to determine reliability using Intraclass Coefficient calculations. In addition, extending the assessment to other care facilities to represent variability in physical environment characteristics would further increase confidence in agreement and reliability.

Findings demonstrate that despite differing levels of expertise, the raters' attained similar results which suggest EVOLVE is user friendly and does not require advanced rater training to conduct this reduced version in a RACF context.

A strength of the study was that experts had high levels of exposure to residential aged care and several had specific aged care environment design experience. Hence the CVI results and rater results were felt to be credible reflections of using the reduced EVOLVE in this situation.

There is support for the important role physical environments play in residential aged care for function, quality of life and well-being (Joseph, Choi, & Quan, 2016). Thus, given Australia's new focus on the service environment as one of its eight aged care quality standards (Department Health, 2019); it is valid to undertake independent assessment to identify refurbishment needs and to prioritise interventions. These findings also indicated that there is still a translational component that needs to occur post environmental assessment. Whilst the raters successfully assessed the environment and identified the refurbishment areas requiring intervention, specific knowledge and expertise is required to implement the appropriate measures to achieve the desired outcome. For example, an EVOLVE statement says: 'Doors to rooms off the travel routes are decorated in colours that contrast with the surrounding walls'. The facility manager may not be aware of what colours would be appropriate or what degree of contrast would be required whereas an interior designer or interior architect experienced in aged care would proffer specific examples. Another statement says 'Significant points along the travel route(s) are highlighted' but the facility manager may not be aware of the exact locations of the significant points and in what way they can be highlighted – and to which degree this highlighting needs to take place.

The facility manager of the residential aged care facility in the study was provided with an expert detailed report outlining the findings of the environment assessment and the recommended remediation interventions when implementing the minor refurbishment initiatives. The facility manager found this to be informative and provided clear direction and requested the report to be included in the thesis with full identification and this is in Appendix R.

7.9 Conclusion

This three phase sequential study set out to demonstrate the process by which an existing environment assessment tool (EVOLVE) can be examined to determine applicability in a different setting and with a different set of constructs. Preliminary reliability through concordance and correlation measures demonstrates at this initial stage that a reduced EVOLVE tool is able to be used in the study context. When exploring the rater results specifically against the minor refurbishment elements, EVOLVE offered the most information in the lighting and colour/contrast components.

Whilst the reduced EVOLVE may not have captured all the seven refurbishment elements to the same detail, the key findings may nevertheless be extrapolated for use in planning minor refurbishments and some modifications may permit it to be rated in a further larger study. Assessing the elements of minor refurbishments which are needed to support functional abilities of older people in residential care as well as enhance the aesthetics of their living environs require an objective approach and the appropriate expertise to translate the findings into meaningful outcomes to the facility operators. They, in turn, can then discern what exactly needs to be done and the resultant benefits to residents which enable environment improvement decisions to be made in an informed and cost effective way.

7.10 References

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Chapter 8

Chapter 8: Synthesis and Conclusion

Preface

Minor refurbishment of residential aged care facilities has been largely unexplored to date. Thus this research contributes to formulating an evidence base for both researchers and providers regarding minor refurbishment considerations. This chapter summarises and synthesises the findings from the five research studies that were conducted as part of this thesis. The research strengths and limitations are discussed with recommendations made for residential aged care organisations and for future research.

8.1 Overview of the research

The rapidly growing ageing population (Australian Institute Health & Welfare, 2019), increasing proportions of aged care expenditure going towards residential care (Milte et al. 2018) and the demonstrated impact of the environment on care outcomes (Pantzarzis, Price, & Pascale, 2016) suggest it is timely to explore refurbishment initiatives to improve resident outcomes. Older people have identified the physical environment and its characteristics as the first determinant in selecting a residential aged care facility (Jeon & Forsyth, 2016) as well as being one of four determinants impacting on quality of life (Harris, Grootjans, & Wenham, 2008).

It is indicated that improving the physical environment is integral to supporting function, person centred care and quality of life for residents (Joseph, Choi, & Quan, 2016). Thus it is essential to identify and prioritise environmental interventions that benefit the end users whilst delivering value for money (Pantzarzis, Price, & Pascale, 2016).

The purpose of this research was to determine how minor refurbishment of residential aged care facilities (RACFs) could be undertaken in a prioritised, consistent and sustainable manner to ensure the outcomes enhance the abilities and wellbeing of the people who live within them. This work sought to contribute to the

future development of a resource for providers who are planning minor refurbishments at RACFs. Minor refurbishments have been defined in this research as undertaking redecoration and repair works to update or improve functional suitability of a space without any major changes to structure or interior layout (Giebler et al., 2009) and specifically to residential aged care facilities as improvements to finishes, furniture, fixtures and fittings to provide quality or functional benefits to residents beyond aesthetics (Department Social Services, 2014).

A mixed methods design was adopted for this study due to the focus on pragmatic, real-life applications. Specifically, this approach drew upon both the qualitative elements to provide contextual information and a depth of understanding of concepts and the quantitative elements to gather numeric data which can be analysed statistically to provide comparisons and understanding of the breadth of experiences (Creswell et al., 2011).

8.2 Synthesis of the research

Due to the paucity of research of minor refurbishment of residential aged care facilities, this research was designed to be a step wise sequential process where the collection of data for Study 1 serves as the basis for the collection and analysis of data for Study 2 and so on (Onwuegbuzie & Combs, 2010; Office of Behavioural and Social Sciences, 2018).

8.2.1 Study 1: Elements of Minor Refurbishment

The aim of Study 1 (Chapter 3) was to identify and describe commonly occurring elements pertaining to minor refurbishments of residential aged care facilities and how these impact on residents.

A narrative review synthesised the evidence base and seven commonly occurring elements which appeared to support the minor refurbishment parameters set were found using inductive content analysis (Elo & Kyngäs, 2008). The elements appeared in the literature in the following order of frequency: lighting (85%), furniture (72%), colour/contrast (70%), wayfinding (65%), noise (60%), signage (57%) and flooring (50%). These elements subsequently formed a framework on which to base the synthesis of the subsequent four studies.

Inadequate ambient lighting in RACF has been identified (Calkins, 2009) with a need to cater better for the needs of residents (Shikder, Mourshed, & Price, 2012) with even and increased light levels, controlled night time lighting and increased levels of natural light cited to support vision, perception, task performance, sleep and behaviour (Davis, et al., 2009; Falk, Wijk, & Persson, 2009; Garre-Olmo et al., 2012; Hadjri, Faith, & McManus, 2012; Joosse, 2012; Marquardt, Bueter, & Motzek, 2014).

The arrangement, type of furniture (Leung, Chan, & Olomolaiye, 2012; Morgan et al., 2004) and features (Jonsson et al., 2014) need to promote independence and comfort (Bakker, 2000) whilst reflecting the purpose of the room (Marquardt & Schmieg, 2009; Zeisel, 2013) and to reduce falls risk (Wang & Kuo, 2006) and hazards (Lee et al., 2012).

Colour/contrast is important in residential aged care as it assists with the visual and perceptual changes that are associated with ageing (Wang & Kuo, 2006) with contrasts of significant features enabling them to be seen and comprehended (Shikder, Mourshed, & Price, 2012). The health benefits of colour have been reported (Codinhoto et al., 2009) and can assist facilities to appear less clinical (van Hoof et al., 2014) with consideration to certain colours and contrasts in common areas to increase levels of energy and alertness (Jonsson et al., 2014).

As people with cognitive impairments such as dementia are increasingly represented in RACF, wayfinding is important to assist with environmental navigation (Hadjri, Faith, & McManus, 2012). Accessible information includes defined architectural features (Davis et al., 2009) and landmarks (Innes, Kelly & Dincarslan, 2011). Memorable reference points such as fittings, fixtures or furniture can support orientation – particularly at junctions where direction changes (Marquardt, Bueter, & Motzek, 2014; Marquardt & Schmieg, 2009). Clear and available space for freedom of movement aids wayfinding also (van Hoof et al., 2014).

Noise can impact on communication (Bakker, 2003), behaviour (Garcia et al., 2012), function and health (Codinhoto et al., 2009; Leung, Chan, & Olomolaiye, 2013; Leung, Yu, & Yu, 2012) and quality of life (Garre-Olmo et al., 2012) and needs to be managed. Noise mitigating design features (ceiling and wall products), noise reducing adaptations (window treatment and soft furnishings) and scheduling

intrusive noises from tasks (cleaning and maintenance) can reduce impact on residents (Benbow, 2013; Jonsson et al., 2014; Wang & Kuo, 2006).

In relation to signage, appropriate use of signage can aid orientation (Leung, Yu, & Yu, 2013) and wayfinding (Falk, Wijk, & Persson, 2009) particularly in the absence of architectural features (Marquardt, 2011). Whilst signs contribute to visually accessible information, the position and height needs to be considered for residents with visual fields closer to the ground (Calkins, 2009; Marquardt, 2011). The image, text, contrast, spacing, background, pictograms are all to be carefully selected to optimise support to residents (Davis et al., 2009; Wang & Kuo, 2006; Gross et al., 2004; Brush et al., 2015).

Flooring needs to consider visual and perceptual changes in people living with dementia in particular with patterns, dark borders or contrast and significant change in materials to be avoided (Calkins, 2009; Torrington & Tregenza, 2007) as falls risk, agitation and confusion can be the outcomes of poorly selected flooring (Brawley, 2009; Shikder, Mourshed, & Price, 2012).

In summary, if the seven elements of lighting, furniture, colour and contrast, wayfinding, noise, signage and flooring were applied to a minor refurbishment of a RACF, the refurbishment could enhance the abilities, enable positive behaviour and support the needs of many residents.

8.2.2 Study 2: Environment Assessment Tools

The aim of Study 2 (Chapter 4) was to identify and examine aged care environment assessment tools that would be applicable to use for minor refurbishment initiatives.

As objective evaluations of the minor refurbishment elements at a residential aged care facility would assist providers to prioritise interventions, a systematic review synthesised the evidence base and ten environment assessment tools were found in the literature in the context of these elements.

The primary results indicated that five environment assessment tools addressed all seven minor refurbishment elements. Further analysis revealed the EHE Environmental Assessment Tool (The Kings Fund, 2014) had limited information on the scoring or specifications for improvement and the UK developed Dementia Design Audit Tool (Cunningham et al., 2008) to be very similar to its

Australian counterpart with the latter having more detailed information pertaining to refurbishment and thus were not subjected to further review.

The resultant three tools which addressed all seven minor refurbishment were DesignSmart (Cunningham et al., 2015), Residential Aged Care Built Environment Audit Tool (Department Health, 2012) and Sheffield Care Environment Assessment Matrix (SCEAM) (Barnes et al., 2004) and thus were selected as candidates for additional studies. Although not detected in the original literature search which may indicate a limitation with the search strategy adopted, one of the SCEAM authors proposed the consideration of the EVOLVE (Evaluation of Older People's Living Environments) (Lewis et al., 2010) and subsequent review using the same critical appraisal screen also deemed this tool appropriate to be put forward for further examination. These four tools either had no or partial reliability and validity established.

In summary, four environment assessment tools were found that address the minor refurbishment elements but all four tools required further examination to determine suitability for use in assessing Australian RACFs preparing to undergo minor refurbishment.

8.2.3 Study 3: Expert Review of Assessment Tools

The aim of Study 3 (Chapter 5) was to explore and evaluate national and international expert opinion and ranking of four aged care environment assessment tools in the context of minor refurbishments with resident based outcomes in order to inform local stakeholder review and decision making in the next study.

A purposive sample (n=18) of experts from eight countries critically reviewed the four assessment tools and used their personal experience to appraise the tools and provide feedback. The study was conducted using the e-Delphi survey technique, a widely used consensus reaching method in health research (Shariff, 2015) undertaken via the internet due to the international location of the experts (Donohoe, Stellefson, & Tennant, 2012).

Residential Aged Care Built Environment Audit Tool (Department Health, 2012) was agreed or strongly agreed by the experts in the majority of instances (72%) to be most useful in identifying minor refrubishment needs whereas SCEAM (Parker et al., 2004) was found to be mose useful in prioritising (67%) the same

needs. Both the Residential Aged Care Built Environment Audit Tool (Department Health, 2012) and EVOLVE (Lewis et al., 2010) rated equally highest (56%) to undergo further examination. The experts concurred in the priorities they identified when reviewing the tools namely thoroughness, cultural specificity, accessibility, ease of use and time taken to complete. Studies have found that when planning recommendations for design interventions the expertise from a range of professional groups is recommended to be included (Marquardt, Bueter, & Motzek, 2014) which could be a limiting factor for Residential Aged Care Built Environment Audit Tool as this tool as designed to be completed by facility staff (Department Health, 2012).

In summary, a comprehensive range of views on the advantages and challenges of each tool were identified by national and international experts in residential aged care environments. The four tools were then ranked in order of recommendation for testing with all the findings summarised as a resource for Study 4.

8.2.4 Study 4: Stakeholder Review of Assessment Tools

The aim of Study 4 (Chapter 6) was to describe the engagement of aged care stakeholders and residents in reviewing expert opinion and determining a single environment assessment tool to pilot at a RACF preparing to undergo minor refurbishment.

A sequential two phase design (Creswell & Plano Clark, 2011) was used for this study due to the different characteristics of the two groups. Phase one involved an aged care stakeholder focus group (Braun & Clarke, 2013) reviewing all four assessment tools (including the expert review resource) and using a modified Nominal Group Technique (Harvey & Holmes, 2012) reached consensus on EVOLVE (Lewis et al., 2010) as the preferred tool to pilot in Study 5 followed by Residential Aged Care Built Environment Audit Tool (Department Health, 2012).

Whilst the environment assessment tools examine the impacts of architectural elements on the residents' physical and cognitive support needs and quality of life (Kenkmann et al., 2017), how interventions meaningfully impact on the lives of residents and how they can be engaged in the process needs to be considered also (Hampson, 2008; Jeon & Forsyth, 2016). Thus a participant experience approach (Agency for Clinical Innovation, 2016) was adopted for phase two with the resident

group reviewing the EVOLVE (Lewis et al., 2010) and Residential Aged Care Built Environment Audit Tool (Department Health, 2012) before also reaching consensus to pilot EVOLVE. Although EVOLVE was developed to assess extra care housing (Lewis et al., 2010), the stakeholder group determined the tool components to be applicable to RACF and thus it warranted testing in this context.

In summary, aged care stakeholders and residents reviewed the expert opinions and ranking of environment assessment tools and whilst their reasons differed, the two groups selected EVOLVE to be piloted in Study 5 at a RACF preparing to undergo minor refurbishment.

8.2.5 Study 5: Piloting of EVOLVE Assessment Tool

The aim of this final and fifth Study (Chapter 7) was to evaluate the content validity of the selected EVOLVE environment assessment tool (phase 1), implement the EVOLVE at a RACF to evaluate concordance and correlation of the tool (phase 2), and describe its applicability in a minor refurbishment context (phase 3).

As EVOLVE was developed for assisted living in the UK (similar to retirement living in Australia), the Content Validity Index phase underwent a two-step approach (DeVon et al., 2007; Polit & Beck, 2006). Step A examined the categories of EVOLVE for their relevance to residential aged care in an Australian context and 34 categories from the available 50 were retained with n=29 attaining I-CVI $\geq$ 0.78 and n=5 attaining I-CVI = 0.75. Step B examined the grouped statements of EVOLVE for their relevance to the seven minor refurbishment elements were examined and those scoring $\geq$ 0.75 or higher were retained. The resultant reduced EVOLVE for piloting consisted of 5 main categories (living unit, communal facilities, circulation, staff & services and site and location), 29 subcategories and 612 statements.

In the audit phase (2), four raters completed the tool twice at a metropolitan residential aged care facility and based on the sections applicable to the facility, the final number of subcategories n=21 and statements n=427 per round. Of the available 854 statements available over two rounds, 727 in total were completed by the raters. Of these, 491 statements (68%) were answered the same way by all four raters (1.00) and 149 statements (20%) were answered the same way by three raters (0.75). Three subcategories were subsequently removed as they did not have

responses in both rounds with resultant n=18 subcategories and n=314 statements per round undergoing further analysis.

The mean scores $\bar{x}$ and standard deviation SD of the raters within each subcategory in each round were entered in STATA and the pilot audit indicated high concordance (Rho C=0.750 to 0.997 CCC) for each of the raters two rounds (Lin, 1989). The strength of correlation (Kendall's τ-statistic) between the raters ranged from strong (0.5 to 0.9) to very strong (0.9 to 1.0) (Cohen, 1992).

Phase 3 synthesised audit results which were populated into a matrix (Miles, Huberman, & Saldana, 2014) and the audit results coded against the seven minor refurbishment elements using deductive content analysis (Vaismoradi, Turunen, & Bondas, 2013). Lighting was most frequently represented element appearing in 50% or half of the 628 statements (n=314). Colour/contrast at 20.4% (n=128) was followed by flooring at 13.4% (n=84), furniture at 8.3% (n=52), noise at 4.1% (n=26), signage at 2.2% (n=14) and wayfinding at 1.6% (n=10).

In summary, this three phase sequential study demonstrated a two-step validity process with a panel of independent experts, a preliminary reliability process through concordance and correlation measures, and examined the results against the minor refurbishment elements matrix.

8.3 Strength of the Research Findings

Mixed methods research draw upon real-life contexts (Creswell et al., 2011) and combines components of qualitative and quantitative methods (Schoonenboom & Johnson, 2017) to draw upon the strengths of each (Creswell et al., 2011) for increased breadth and depth of understanding (Schoonenboom & Johnson, 2017). This was particularly evident through the adoption of the pragmatic approach which aligns toward solving practical problems in real-life situations as opposed to theoretical assumptions (Hall, 2012). Professional practice experience is valued and pragmatic research is often translational to convert research findings into practical forms such as design guidelines (Moore & Geboy, 2010). Thus pragmatism befits studying interventions within a residential care environment requiring an outcome oriented line of inquiry (Onwuegbuzie & Combs, 2010).

As there was very limited research available regarding minor refurbishment of RACFs, the sequential exploratory approach involved the initial collection of data

for Study 1 serving as the basis for the collection and analysis of data for Study 2 and so on (Onwuegbuzie & Combs, 2010) in a stepwise fashion to ensure data was collected and analysed systematically as this data was used to inform the next study of the research (Schoonenboom & Johnson, 2017). The research was strengthened by using multiple methods from both the quantitative and qualitative approaches in the form of narrative review, systematic review, e-Delphi survey, focus groups, inductive and deductive content analysis, and descriptive, validity and reliability measures.

This residential aged care research is timely as the increase in ageing populations alongside increasing levels of chronic disease such as dementia, has led to an expectation that demand for residential aged care, or long term care, is expected to continue to increase internationally into the foreseeable future (Organisation for Economic Development & Cooperation, 2019). Australian residential aged care placements are distributed across 886 residential care organisations with nearly 3 in 5 of these organisations categorised as 'not for profit' (Australian Institute Health & Welfare, 2010). This growth in Australia is reflected internationally with 60-80% of aged care expenditure going towards residential care (Milte et al., 2018). Subsequently, any changes to the financing of the sector along with rising consumer expectations have led to a need to evaluate effectiveness in meeting consumer requirements (Milte et al., 2018). A review prepared for the Australian Aged Care Quality Agency identified the physical environment as the top domain that drives the choice of a residential aged care facility (RACF) and the third domain to determine quality of a residential care facility - all from a consumer's perspective (Jeon & Forsyth, 2016). This concurs with findings from a study where over 4,000 residents surveyed in one Australian state indicated the physical environment to be one of four key themes impacting on residents' quality of life (Harris, Grootjans, & Wenham, 2008). Additionally, an analysis of international studies demonstrated that the built environment is a crucial component of residential care (Joseph, Choi, & Quan, 2016).

This thesis is novel in exploring residential aged care refurbishment in ways that benefits residents beyond aesthetics and thus adds to the body of literature in this sector. As the building of modern new facilities is not always viable (Vu, Davey, & Ansell, 2012) or able to occur quickly (Smith et al., 2018), it becomes essential to identify, prioritise and implement minor improvement works which benefit the

functional needs of older adults without necessarily incurring high costs (Pantzarzis, Price & Pascale, 2016). In Australia, the revised Aged Care Quality Standards now specifically addresses the service organisation's environment to ensure resident independence and functions are optimised (Department Health, 2019).

Using standardised environment assessment tools can assist with capital investment planning and decision making but researchers have suggested that several tools focus on general principles and may not "allow evaluation of specific impact and of the value of different interventions" (Pantzarzis, Price & Pascale, 2016:7). Existing environment assessment tools have been explored previously and found to have limited application beyond the settings where they were developed, show weak empirical basis (Elf et al., 2017) or do not capture all relevant elements of the building (Parker et al., 2004). It is necessary for tools to identify and analyse specific building components in order to improve outcomes and quality of life for residents and appropriately inform the decision making and strategic expenditure process (Pantzarzis, Price, & Pascale, 2016). These tools were not developed specifically for minor refurbishment purposes. This research demonstrates the process by which existing tools can be assessed to determine their suitability in a slightly different context before introducing yet another tool.

To reduce potential bias, any participant involved in the development or implementation of an environment assessment tool was not eligible to participate. The participants were unique to each study so duplication or sampling fatigue did not occur. Whilst the research specifically focused on a residential aged care context (and a RACF in one state of Australia), the use of national and international experts may permit some degree of transferability.

8.4 Limitations of the Research

There is limited previous research and defined criteria relating to minor refurbishments of residential aged care facilities. Thus the research commenced with a broad investigation (Study 1) which conceivably may have resulted in some studies not being identified. The frequencies of commonly occurring minor refurbishment elements were examined and not the rigor of the individual studies – although this has been done previously (Fleming & Purandare, 2010; Marquardt, Bueter, & Motzek, 2014). Gitlin, Liebler, & Winter (2003) along with other publications, argue

for more rigorous testing of these minor refurbishment elements with larger sample sizes to assess their effects on residents' outcomes. The need for more detail on environmental characteristics being studied has been highlighted (Calkins, 2018) as has the need for further research to either refute or substantiate earlier findings (Chaudhury et al., 2018) and thorough descriptions of the research reports and the use of comparison groups (Day, Carreon, & Stump, 2000). The seven refurbishment elements identified are complex and interactive - with lighting and colour/contrast being one such example and the sector would benefit from in depth investigation of each element which was beyond the scope of this research. Whilst we retained elements that aligned with our minor refurbishment definition, this does not mean other elements associated with staff practice e.g. personalisation are not valuable. It is also noted that staff practice can impact on the elements (for example how and where the furniture is placed). It is acknowledged that although seven elements were identified, there may be more.

More detail could have been captured in the literature review (Study 2) and represented in the study flow chart to clearly represent the review process similar to PRISMA flow diagram (Moher et al., 2009). The majority of the environmental assessment tools systematically reviewed had not undergone any validity, reliability and quality studies and instances where these had been completed, there was limited application beyond the original study. Ease of access or availability was an important criterion for tool inclusion and the inability to source readily the Professional Environmental Assessment Protocol meant it was not subject to further review. The need to purchase DesignSmart for each occasion the audit tool is required detracted from its ranking in the expert review (Study 3) but the tool is comprehensive and informative which merits further examination. True statistical reliability is difficult to establish with the Delphi process used in the expert review (Hasson, Keeney, & McKenna, 2000). It was also stated in the background information sheet that the tools predominantly had not been tested in terms of reliability and validity and yet testing ranked third in the code frequency count which indicated that this needed to have been made more explicit. Due to the large numbers of countries represented which do not have English as the first language, this may have been a translational flaw. Additionally, one expert required the use of an interpreter to complete the survey which would have made participation in the study more onerous than intended. It is acknowledged there is a level of subjective

interpretation by the international experts regarding the review and ranking of the identified tools for testing in an Australian context.

A larger sample of eligible residents (Study 4) would have proffered more detail and improved the representation in the findings. Due to attempting to accommodate varying levels of comprehension, hearing and communciation, there was a risk that the facilitator posed leading questions. Some of the challenges of resident involvement in research (such as time, cost, attrition, developing user friendly materials) can be mitigated through clear planning from the beginning (Brett et al 2012).

Study 5 indicated to the researcher that a translational component is essential post environment assessment. Whilst the raters can assess the environment and identify the refurbishment areas requiring works, specific knowledge and expertise is still required to convey how or what to implement the appropriate intervention to reach the desired outcome. For example, an EVOLVE statement says: 'Doors to rooms off the travel routes are decorated in colours that contrast with the surrounding walls'. The type of colour and the extent of contrast suggest expert knowledge in interior designs or architecture. An additional statement says 'Significant points along the travel route(s) are highlighted' but the RACF manager may not be aware of the exact locations of the significant points, how they can be highlighted and to which degree this highlighting needs to take place. This suggests clinical knowledge of resident functionality in addition to design expertise may be required.

The research has drawn attention to the needs of people living with dementia as it is a growing population, and the importance of the physical environment in meeting their needs is becoming increasingly recognised (Chaudhury et al., 2018). It is acknowledged that a key consideration underpinning research in this arena is to provide opportunities for people living with dementia to contribute to studies on their physical environment given it can positively or negatively impact on their autonomy and quality of life (Hadjri, Faith, & McManus, 2012).

8.5 Recommendations of the Research

The introduction of Aged Care Quality Standards in Australia in July 2019 (Department of Health, 2019) with specific focus on the environment supporting resident functionality (see Standard 5 in Figure 8.1) means that this research into

minor refurbishment elements could contribute to RACF environment improvements in an informed and sustained way that supports their accreditation and subsequently federal government funding to operate.

This Standard is for organisations providing a physical service environment. It makes sure that the service environment, furniture and equipment support a consumer's quality of life, as well as their independence, ability and enjoyment. This means that the service environment suits the consumer's needs and is clean, comfortable, welcoming and well maintained. It includes how the safety and security, design, accessibility and layout of the service environment encourage a sense of belonging for consumers.

This Standard covers how an organisation's service environment:

- supports the consumer's ability to take part in the community and engage with others
- minimises confusion so consumers can recognise where they are and see where they want to go
- encourages consumers to make their living areas more personal
- welcomes consumers and their family or visitors and provides spaces for culturally safe interactions with others
- is safe, well maintained and clean
- helps consumers to move freely in the environment (including access to outdoor areas)
- subtly reduces risk where needed so safety features don't dominate the environment
- provides security arrangements in line with best practice to protect consumers when lawful and necessary

The furniture, fittings and equipment provided at the service are also covered by this Standard. It is expected that these are safe, clean, well maintained and suitable for the consumer.

Source: Department of Health (2019)

Figure 8.1 Standard 5: Organisation's Service Environment

More research is required on each of the minor refurbishment elements and on environmental assessment tools that are sensitive enough to detect these elements, particularly studies that utilise pre and post methodologies (as per Chaudhury et al., 2018). The importance of tool validity, reliability and quality should not be overlooked. If these processes have not been undertaken, then this would need to form part of the tool review in order to make informed recommendations on its applicability to the construct under review.

Facilities preparing to undergo minor refurbishment could collaborate with a researcher to identify the required elements, implement illustrative solutions and then

evaluate the outcomes – including real-life assessment of the environmental impacts on resident function and outcomes such as quality of life.

8.6 Conclusion

Minor refurbishment works represent a growth area in the sector due to the increasing demand for residential aged care places and potentially limited financial means to construct new buildings. Supported by accreditation standards and growing awareness of the need to consider an increasingly proactive and assertive consumer, the minor works need to be objectively assessed and prioritised. As one of our resident participants stated "…they've got no idea. They walk in and they've got a piece of paper and they'll tick yes or no. But they don't actually know how the girls feel about – you know, whether they want changes done". This research identified seven key elements for refurbishment and piloted an existing environment assessment tool to assess such elements. An environment assessment process is complex and whilst findings could guide refurbishment, expertise is required to translate the findings into meaningful outcomes to inform the facility operators' decision making on minor refurbishment initiatives. The contribution of experts in residential aged care sector is acknowledged and it is proposed that more research is undertaken on current works to improve sampling limitations, comprehensively examine minor refurbishment elements and confirm (or refute) assessment tools' applicability to new settings before introducing yet another potentially short lived assessment tool. Whilst this study adds to a growing body of work contributing to the future development of a resource for providers planning minor refurbishments at RACFs, researchers in this area may also wish to contemplate:

> *"Not all design guidance requires empirical research findings to justify its recommendations. For instance, design guides frequently call for enhanced quality of life in institutional settings (e.g. design strategies to increase homelikeness and autonomy for residents). Such values – essential qualities of dignity, privacy and so forth are arguably "inalienable rights" (Lawton, 1981:245) that do not require empirical research for validation" (Day, Carreon and Stump 2000:397).*

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Appendix A

Appendix A

Co-Author Signed Consent Forms

Anne-Marie Hill

RE: Published articles and articles under review in thesis

I consent to the inclusion of papers I co-authored in this thesis submitted by Samantha Neylon and accept the declaration made by the author.

Name of co-author: Professor Anne-Marie Hill

Signature of co-author:

Date: 7th January 2020

Caroline Bulsara

RE: Published articles and articles under review in thesis

I consent to the inclusion of papers I co-authored in this thesis submitted by Samantha Neylon and accept the declaration made by the author.

Name of co-author: Professor Caroline Bulsara

Signature of co-author:

Date: 2nd January 2020

Associate Professor Ralph Hampson

RE: Published articles and articles under review in thesis

I consent to the inclusion of papers I co-authored in this thesis submitted by Samantha Neylon and accept the declaration made by the author.

Name of co-author: Associate Professor Ralph Hampson

Signature of co-author:

Date: 14th January 2020

Professor Max K. Bulsara

RE: Published articles and articles under review in thesis

I consent to the inclusion of papers I co-authored in this thesis submitted by Samantha Neylon and accept the declaration made by the author.

Name of co-author: Professor Max Bulsara

Signature of co-author:

Date: 22nd January 2020

Appendix B

Published Manuscript
(Journal Housing for Elderly)
Contributing to Chapter 3

JOURNAL OF HOUSING FOR THE ELDERLY
https://doi.org/10.1080/02763893.2018.1561591

Routledge
Taylor & Francis Group

Check for updates

Improving Australian Residential Aged Care Facilities: A Review of Minor Refurbishment Elements

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ABSTRACT

The objective of this study is to identify elements pertaining to minor refurbishments of residential aged care facilities. A narrative review of relevant publications was conducted. Inductive content analysis was used to categorize coded data into major or minor refurbishment or staff practices. Further analysis identified minor refurbishment domains. There were 14 major refurbishment, seven minor refurbishment and two staff practices domains established. The minor refurbishment elements ($n = 7$) identified were lighting, furniture, color and contrast, wayfinding, noise, signage, and flooring. Assessing these elements would assist residential aged care providers to prioritize the provision of minor improvements to the environment for residents.

KEYWORDS

Residential facilities; nursing homes; facility design and construction; environmental design

Introduction

Provision of Australian residential aged care services is changing rapidly. Growing numbers of older persons, many with chronic conditions and physical and cognitive disabilities, require residential aged care facilities that not only are "fit for purpose" but also are attractive places to live out residents' later years. The boards and chief executive officers of these facilities then face complex funding and planning questions regarding whether to rebuild or refurbish. In many organizations, refurbishment of some facilities proceeds while the organization tracks the changing demands, needs, and expectations of consumers regarding the type and quality of accommodation (Productivity Commission, 2011) while also ensuring changes are cost-effective for the organization. There is a degree of uncertainty surrounding future profitability of a new facility when compared to an established and viable facility, given the impact of construction cost, construction timing,

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Supplemental data for this article is available online at at publisher's weblink.

Appendix C

Included Studies in the Narrative Review

Appendix C

Citation	Status
Bakker, R. (2000). Facility design: Getting it right the first time. *Nursing Homes: Long Term Care Management*, *49*(11), 68.	Included
Bakker, R. (2003). Sensory loss, dementia, and environments. *Generations, 27*(1), 46-51.	Included
Barnes, S. (2006). Space, choice and control, and quality of life in care settings for older people. *Environment and Behavior*, *38*(5), 589-604. doi.org/10.1177/0013916505281578	Removed after R1
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R1= Round 1

Citation	Status
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Citation	Status
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Appendix D

Appendix D

Published Manuscript
(Australasian Journal on Ageing)
Contributing to Chapter 4

DOI: 10.1111/ajag.12367

Australasian Journal on Ageing

Review Article

The effectiveness of environment assessment tools to guide refurbishment of Australian residential aged care facilities: A systematic review

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Objective: *To determine applicability of environment assessment tools in guiding minor refurbishments of Australian residential aged care facilities.*

Method: *Studies conducted in residential aged care settings using assessment tools which address the physical environment were eligible for inclusion in a systematic review. Given these studies are limited, tools which have not yet been utilised in research settings were also included. Tools were analysed using a critical appraisal screen.*

Results: *Forty-three publications met the inclusion criteria. Ten environment assessment tools were identified, of which four addressed all seven minor refurbishment domains of lighting, colour and contrast, sound, flooring, furniture, signage and way finding. Only one had undergone reliability and validity testing.*

Conclusion: *There are four tools which may be suitable to use for minor refurbishment of Australian residential aged care facilities. Data on their reliability, validity and quality are limited.*

Key words: *evidence-based facility design, facility design and construction, homes for the aged, nursing homes.*

Introduction

In 2011, there were 185 482 residential aged care beds in Australia distributed across 2760 facilities with 60% managed by 'not for profit' organisations [1]. Significant changes in both funding and regulations [2] challenge aged care industry responses in the face of demographic ageing, changing consumer expectations and levels of skilled care needed for older people with complex medical conditions including dementia [3]. Comparative economic modelling evaluating the cost of providing residential aged care services in Australia [2,4] illustrates a significant financial reach for organisations engaging in building new facilities. Longer term profitability is difficult to predict alongside other risks associated with construction cost, construction timing, occupancy and operating costs [2]. Consequently aged care providers, particularly not for profit organisations, need to compare the potential cost of, and returns from, redeveloping or modernising existing facilities [4].

Refurbishment may be major or minor. Major refurbishment includes additional buildings, extensions or structural improvements to the residential aged care facilities (RACFs) [5], and minor refurbishment include improvements to finishes, furniture, fixtures and fittings that provides a direct benefit in quality or functionality to residents' life that is beyond aesthetics [5,6]. Design elements of the newly built facility to accommodate various physical and cognitive impairments of this group have been researched in both Europe and North America [7–9]. Studies demonstrate positive findings for a range of design elements such as facility size [10], control of stimulation [11], lighting [12,13], signage [14,15], sound [16], visual access [10,11], colour/contrast [17] and way finding [18,19], in terms of impact on residents well-being or functional abilities. However, studies focusing on a single element (such as colour or décor) in isolation or omitting an assessment process or not incorporating the functional needs of occupants have not been successful in demonstrating a change in outcomes post interventions [20–22].

There are few guidelines for appropriate minor refurbishment of residential aged care facilities either internationally or in Australia. Well-researched guidelines to optimise the refurbishment outcomes for the RACF environment in the current financial and regulatory environment should mitigate, where possible, ageing-related impairments, and be maintenance friendly. The purpose of this systematic review was to identify and objectively evaluate environment assessment tools to determine which would be suitable for minor refurbishment of an RACF.

Methods

We searched the Cinahl, Cochrane Library, PubMed, Trove databases and a RACF organisation's resource collection in addition to Google Advanced Search between May and November 2015 for references which described or reviewed

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Appendix E

Appendix E

Search Strategy Used to Conduct Systematic Review

Cochrane	Cinahl	PubMed
Residential environment audit tools – 0	Residential + Environment + audit – 11 (10 N/A)	Residential Care Environment Assessments – 257 (253 N/A) with links to 11
Assessing residential care environments – 2 (both not applicable)	Assessment + Residential + Environments – 57 (52 N/A)	EAT – 11 (9 N/A)
Refurbishment residential care – 0	Refurbishment + Residential care - 1	PEAP – 26 (19 N/A)
Refurbishment care homes – 0	Refurbishment + Care Homes – 3 (1 N/A)	TESS – 4
Refurbishment nursing homes – 0	Refurbishment + Nursing homes - 3	DDAT - 1
Environment audit tools – 9 (all not applicable)	Environment + Audit + tool – 65 (62 N/A)	SCEAM – 2
Aged care environment audits – 10 (all not applicable)	Aged care + Environment + Audit – 3 (2 N/A)	MEAP - 0
Assessing physical environments of residential facilities – 1 (not applicable)	Assessing + Physical Environment + Residential Facilities - 1	Environmental indices Cutler – 3 (2 N/A)
Assessing physical environments of care homes – 1 (not applicable)	Assessing + Physical Environment + Care Homes - 0	Affordances of the care environment – 9 (8 N/A)
Assessing physical environments of nursing homes – 12 (all not applicable)	Assessing + Physical Environment + Nursing Homes – 2 (1 N/A)	Improving the environment for older people in health services - 0
	Refurbishment + Residential + Environments - 0	Residential aged care services built environment audit tool – 3 (3 N/A)
	Evaluation + Environment + Residential – 244 (236 N/A)	
	Assessment + Design + Dementia – 619 (612 N/A)	
	Design + Dementia – 1606 (1560 N/A)	
n sourced = 35	n sourced = 2615	n sourced = 316
n applicable = 0	n applicable = 79	n applicable = 22

These same terms or slight variations were also used to search Trove, Advanced Google Search and Australian government websites such as Department for Health & Human Services (Victoria), Queensland Health and Department Social Services (Canberra)

Appendix F

Appendix F

Published Manuscript *(The Journal of Aging and Social Change)* Contributing to Chapter 5

Expertise and e-Delphi: Assisting with Australian Aged Care Facility Refurbishment

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Caroline Bulsara, University of Notre Dame Australia, Australia
Anne-Marie Hill, Curtin University, Australia

Abstract: This article describes the process of an adapted e-Delphi technique and examines expert opinion on four aged care environment assessment tools in the context of minor refurbishments with resident based outcomes. A two round adapted e-Delphi survey was completed by professionals with expertise in aged care design and environments. Their evaluations on the content and applicability of the four tools were gathered. Ordinal responses were analysed using descriptive statistics and open ended responses analysed using content analysis. The four tools were subsequently ranked in order of recommendation to pilot using a weighting system. A 60% uptake rate resulted in a purposive sample (n=18 experts) from eight countries. The experts concurred in the priorities they identified when reviewing the tools, which included thoroughness, cultural specificity, accessibility, ease of use and time taken to complete. A range of advantages and challenges were presented for each tool in addition to application in a minor refurbishment context. Upon ranking, Residential Aged Care Audit Tool followed by Evaluation of Older People's Living Environments were prioritised as the top two tools to be piloted. It was concluded assessment of residential aged care environments using appropriate tools is necessary to ensure refurbishment works contribute to resident function and well-being. Expert perspectives through an adapted e-Delphi process facilitated local stakeholder decision making process to select a single tool to pilot for validity and reliability at a residential aged care facility preparing to undergo minor refurbishment. Using an adapted e-Delphi process in an international context may be useful for other aged care researchers seeking to gain expert input to a local problem.

Keywords: Assessment, Care Homes, Care of Older People, Environment

Introduction

The Australian residential aged care sector is challenged by the costs of providing facilities and services for increasing numbers of older Australians, particularly those with complex care needs (Access Economics 2010; Deloitte 2011; Vu, Davey, and Ansell 2012). Terms for residential aged care facilities vary between countries and may include nursing home, care home, or aged care home (Milte et al. 2018). A residential aged care facility in this study is described similarly as a care home—a place of residence where the resident has their own room and shares communal spaces such as dining rooms, lounge, activity or therapy rooms, and gardens (Kenkmann et al. 2017). Staff only spaces in these places are often include kitchen, laundry, meeting room and offices (Kenkmann et al. 2017). It is prudent for providers to consider the economics of refurbishments where building new facilities may not be possible (Vu, Davey, and Ansell 2012) and to ensure any works undertaken support older adults to live well with age-related impairments (Pantzartzis, Price, and Pascale 2016) as the physical environment can significantly impact on their lives (Cooney 2011). Refurbishments in this sector have been identified as major, which are structural improvements or additions, or minor, which are improvements to the interiors that directly benefit the residents in ways beyond aesthetics (Department Social Services 2014; NSW Building Committee 2014; Neylon, Bulsara, and Hill 2019).

Commonly occurring elements that could be useful to consider during minor refurbishment identified in a narrative review (Neylon, Bulsara, and Hill 2019) include colour/contrast, flooring, furniture, lighting, noise, signage, and wayfinding (Marquardt, Bueter, and Motzek

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Appendix G

Appendix G

Adapted e-Delphi Questionnaire

No.	Question
1.	What is your professional background/area of expertise in aged care environments?
2.	Are you currently working in or with the residential aged care sector?
3.	If you answered yes, please explain in what way or capacity you are working in the sector e.g. employment with an aged care provider, consultancy, research).
4.	Have you ever used any of these 4 tools?
5a.	Can you please share your thoughts on perspectives on Tool 1 based on either your experiences or the tool summary provided? Consider commenting on usefulness, relevance and ease of use.
5b.	Can you please share your thoughts on perspectives on Tool 2 based on either your experiences or the tool summary provided? Consider commenting on usefulness, relevance and ease of use.
5c.	Can you please share your thoughts on perspectives on Tool 3 based on either your experiences or the tool summary provided? Consider commenting on usefulness, relevance and ease of use.
5d.	Can you please share your thoughts on perspectives on Tool 4 based on either your experiences or the tool summary provided? Consider commenting on usefulness, relevance and ease of use.
6a.	Tool 1 would be useful tool to identify the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
6b.	Tool 2 would be useful tool to identify the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
6c.	Tool 3 would be useful tool to identify the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
6d.	Tool 4 would be useful tool to identify the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
7a.	Tool 1 would be useful tool to prioritise the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
7b.	Tool 2 would be useful tool to prioritise the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
7c.	Tool 3 would be useful tool to prioritise the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
7d.	Tool 4 would be useful tool to prioritise the minor refurbishment requirements (select from Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree).
8a.	Would you recommend Tool 1 be studied?
8b.	Would you recommend Tool 2 be studied?
8c.	Would you recommend Tool 3 be studied?
8d.	Would you recommend Tool 4 be studied?
8e.	Why did you answer this way for Tool 1?
8f.	Why did you answer this way for Tool 2?
8g.	Why did you answer this way for Tool 3?
8h.	Why did you answer this way for Tool 4?
9.	If you selected more than one tool in question 8, please rank your selections with 1 being the first preference
10.	Do you have any other comments you wish to make about the tools?

Appendix H

Appendix H

Submitted Manuscript Contributing to Chapter 6 *(Under Peer Review)*

Refurbishing residential aged care facilities using a consumer focused approach

This sequential mixed methods study facilitated consumer selection of an environment assessment tool to pilot prior to minor refurbishment of a residential aged care facility. Stakeholder and resident groups independently examined four tools through an adapted nominal group technique. The data was analysed using inductive content analysis. Stakeholders selected Evaluation of Older People's Living Environments tool pertaining to components, ease of use, addressing resident functionality and facilitating refurbishment priorities. Residents explored the tools through more personal lens and concurred to pilot EVOLVE. Whilst consensus was reached, the approached differed. Engaging consumers is important to ensure appropriate refurbishments are undertaken.

Key words: environment; focus group; residential aged care facility; refurbishment

Introduction

Australians are living longer and entering residential care with more complex needs and the costs of providing facilities and services is increasing (Deloitte, 2011). Increasingly, consumers of these services are being asked about their satisfaction with their living environment (Access Economics, 2010). The physical environment is identified as a key driver when selecting a residential aged care facility and subsequently as an indicator of quality once residing there (Jeon & Forsyth, 2016). For some Australian providers, refurbishment of their residential aged care facilities (RACF) may be more viable to improve the living environment in the face of the industry's economic challenges and consumer expectations than constructing a new facility (Vu, Davey, & Ansell, 2012). Resident functionality and wellbeing have found to be supported by seven minor refurbishment elements: colour/contrast, flooring, furniture, lighting, noise, signage and wayfinding (Hadjri, Rooney, & Faith, 2015; Marquardt, Bueter, & Motzek, 2014; Removed for blinding, 2018). To identify a means of objectively assessing these refurbishment elements, existing environment assessment tools were systematically reviewed (Removed for blinding, 2017). Four tools were identified which contained all seven refurbishment elements outlined above, however the evidence that informed the development of these tools was limited. Further investigation was required about the use of these tools in minor refurbishment projects before any recommendations could be made (Removed for blinding, 2017).

Appendix

I

Appendix I

Submitted Manuscript Contributing to Chapter 7 *(Under Peer Review)*

Can a modified environment assessment tool guide priorities for minor refurbishments at a residential aged care facility?

This pilot study aimed to examine EVOLVE UK extra care housing tool in an Australian residential aged care minor refurbishment context. The tool's content validity was established with 34 subcategories (I-CVI ≥0.75) and 612 statements (n=509 I-CVI ≥0.75) relevant. A subsequent audit indicated high concordance (Rho-C=0.750 to 0.997) within four experts' ratings of the care facility and correlation (Kendall's τ-statistic) between raters ranged from strong (0.5 to 0.9) to very strong (0.9 to 1.0). Lighting was the highest refurbishment element represented (50.54%). Assessment can inform funding, demonstrate standards compliance, and the components of physical environment refurbishments which support resident function.

Key words: minor refurbishment; environment; residential aged care; assessment; instrument adaptation; validity

Key points:

- Growing demand for residential aged care may require facilities to be refurbished
- Physical environment alterations need to prioritise resident function and wellbeing
- The reduced EVOLVE tool showed applicability and transferability to refurbishment
- Assessment aids objective decision making and funding allocations
- Further research exploring evaluation of minor refurbishment priorities is required

Introduction

The growth in ageing populations alongside increasing levels of chronic disease such as dementia, has led to an expectation that demand for residential aged care, or long term care, will continue to increase internationally into the foreseeable future (Organisation for Economic Development and Cooperation, 2019). In the United Kingdom, the population of people over 85 years of age is expected to increase from 1.6 million in 2016 to 2.8 million by 2031, and yet the number of residential care beds has not increased to accommodate this (Smith et al., 2018). Similarly, in Australia the proportion of people 65 years or older is projected to increase from 15% of the total population in 2017 to between 21 and 23% in 2066 (Productivity Commission, 2019). This growth in Australia is reflected internationally with 60-80% of aged care expenditure going towards residential care (Milte et al., 2018). Subsequently, constraints in the financing of the sector along with rising consumer expectations have led to a need to evaluate effectiveness in meeting consumer outcomes (Milte et al., 2018). A survey of over 4,000 residents in one Australian state indicated the physical environment to be one of four key themes impacting on residents' quality of life (Harris, Grootjans, & Wenham, 2008).

Appendix J

Appendix J
Terminology for Study 5

Extra care housing is considered to be private or self-contained properties within an estate containing communal facilities such as dining, laundry and hobby rooms and can also be termed retirement villages (Elderly Accommodation Counsel, 2019).

Australian residential aged care is considered to be communal facilities to provide high levels of care with bedrooms being the private spaces for individuals (Department of Social Services, 2014).

Terminology such as agreement, reliability, reproducibility and repeatability has been used inconsistently (Bartlett & Frost, 2008) so clarity is required to aid appropriate data collection and selection of analysis (Arndt, Turvey, & Andreasen, 1999).

This study adopted agreement to mean the degree of concordance in the results between two assessments (or rounds) (Liu et al., 2016) and correlation to focus on whether the variables have a significant relationship and if so, whether this is negative or positive (Coussement & Demoulin, 2017). As an index of reliability, Lin's Concordance Correlation Coefficient (CCC) evaluates the agreement between paired readings of the same sample by "measuring the variation from the 45° line through the origin (the concordance line)" (Lin, 1989:257). Kendall's Tau interprets the strength of relationship between two variables (Pillet, Duclos, & Pralus, 2010).

Appendix K

Appendix K

Results of CVI Step A

Category	L1	L2	E1	E2	E3	E4	E5	E6	# agreed	I-CVI	Area to be Retained ie I-CVI > 0.78
Living Unit											
Generic	1	1	1	1	1	1	1	1	8	1	Yes
Entrance		1			1	1	1		4	0.5	No
Alternative Ent.						1			1	0.125	No
Hall		1			1	1	1		4	0.5	No
Lounge		1				1			2	0.25	No
Kitchen		1					1		2	0.25	No
Double Bedroom	1	1	1		1	1	1		6	0.75	Borderline
Single Bedroom	1	1	1	1	1	1	1	1	8	1	Yes
Bathroom	1	1	1	1	1	1	1	1	8	1	Yes
Cupboards		1	1	1		1		1	5	0.625	No
General Items	1	1	1	1				1	5	0.625	No
Assistive Tech.			1			1		1	3	0.375	No
Communal Facilities											
Generic	1	1	1	1	1	1		1	7	0.875	Yes
Main Lounge	1	1	1	1	1	1	1	1	8	1	Yes
Dining Room	1	1	1	1	1	1	1	1	8	1	Yes
Small Lounge	1	1	1	1	1	1	1	1	8	1	Yes
Bar	1	1	1						3	0.375	No
Activity Room	1	1	1	1	1	1	1	1	8	1	Yes
IT Suite	1	1	1				1	1	5	0.625	No
Library	1	1	1			1	1	1	6	0.75	Borderline
Conservatory		1	1			1	1	1	5	0.625	No
Garden	1	1	1	1	1	1	1	1	8	1	Yes
Assisted Bathroom	1	1	1	1	1		1	1	7	0.875	Yes
WC or Toilets	1	1	1	1		1	1	1	7	0.875	Yes
Clinic	1	1	1	1	1	1	1	1	8	1	Yes
Therapy Room	1	1	1	1	1	1	1	1	8	1	Yes
Gym		1	1				1	1	4	0.5	No
Hairdresser			1		1	1	1	1	5	0.625	No
Shop		1	1				1		3	0.375	No
Laundry	1	1	1	1			1	1	6	0.75	Borderline
Storage		1	1	1	1	1	1	1	7	0.875	Yes
Refuse Store	1	1	1	1			1	1	6	0.75	Borderline
Circulation											
Generic	1	1	1	1	1	1	1	1	8	1	Yes
General Circulation	1	1	1		1	1	1	1	7	0.875	Yes
Main Entrance	1	1	1	1	1	1	1	1	8	1	Yes
Foyer	1	1	1	1	1	1	1	1	8	1	Yes
Internal	1	1	1	1		1	1	1	7	0.875	Yes
External Covered	1	1	1	1		1	1	1	7	0.875	Yes
External Uncov.		1	1	1	1		1	1	6	0.75	Borderline
Stairs		1	1	1				1	4	0.5	No
Lift	1	1	1	1	1	1	1	1	8	1	Yes
Staff and Services											
Generic	1	1	1	1	1	1	1	1	8	1	Yes
Scheme Mg. Office	1	1	1	1		1	1	1	7	0.875	Yes
Care Mg. Office	1	1	1		1	1	1	1	7	0.875	Yes
Staff Facilities	1	1	1	1	1	1	1	1	8	1	Yes
Catering Kitchen	1	1	1	1	1	1	1	1	8	1	Yes
Site and Location											
Scheme Location		1	1	1		1		1	5	0.625	No
Scheme Boundary	1	1	1	1	1	1	1	1	8	1	Yes
Entrance	1	1	1	1	1	1		1	7	0.875	Yes
Parking	1	1	1	1	1	1	1	1	8	1	Yes

Appendix

L

Appendix L: Results of CVI Step B

Statements	L1	L2	E 1	E 2	E 3	E 4	E 5	E 6	# agreed	I-CVI	To be Retained ie I-CVI > 0.78	Rationale	Relevant Domain	Research Agreemt	Peer Review E1	Peer Review L1	Final Result
Applies to several rooms…																	
The colour of (room) door contrasts with the colour of the surrounding walls	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Colour/ Contrast	Yes			In
(Room) door has a non-reflective satin or matt finish	1		1	1	1	1	1	1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
The colour of (room) door handles contrasts with the colour of the (room) door	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Colour/ Contrast	Yes			In
Door furniture (handle) on the (room) door has a non-reflective finish	1	1	1	1			1	1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
The (room) threshold is flush with general floor level	1	1	1		1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
The (room) has natural light	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
The (room) is dark at night [Glossary 4.18]		1	1		1	1		1	5	0.625	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
There are shading devices for S, E, W facing windows		1	1		1	1	1	1	6	0.75	Will include	Borderline	Lighting	Yes			In
Fitted lights closest to windows can be switched on and off independently of lights furthest from windows	1	1	1		1	1		1	6	0.75	Will include	Borderline	Lighting	Yes			In
The artificial light is well distributed with no areas of deep shadow	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
The (room) light fittings conceal the light source	1				1	1		1	4	0.5	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
The (room) light bulbs can be replaced from floor level	1	1			1			1	4	0.5	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In

The (room) lighting can be dimmed	1	1	1		1			1	5	0.625	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
The (room) has an alarm call		1	1			1			3	0.375	Needs to be included	Relates to domain	Noise	Yes	Include	Include	In
The (room) light switches are visible in the dark	1	1	1			1	1		5	0.625	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
The (room) light switches are more than 1000mm and less than 1200mm from floor level		1	1		1	1			4	0.5	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
The (room) is decorated in a light colour with a matt finish	1		1	1	1		1	1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
The (room) electric light illuminance is more than 200 lux	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
The (room) flooring is non-reflective	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
The (room) flooring is non-slip	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
The (room) floor materials are easy to clean	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
The direction of the (room) lighting can be controlled	1	1	1	1		1		1	6	0.75	Yes	Over 0.78	Lighting	Yes			In
Deep pile carpets are avoided in the (room)	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
The (room) furnishings (e.g. chairs and curtains) are sound absorbent	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Furniture	Yes			In
The (room) has additional task lighting	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
The (room) has informal seating arrangements	1	1	1		1	1	1		6	0.75	Yes	Over 0.78	Furniture	Yes			In
There is acoustic privacy within the (room)	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Noise	Yes			In
The (room) has seating for patients	1	1	1		1		1	1	6	0.75	Will include	Borderline	Furniture	Yes			In
The bedroom….																	
- The bed in the bedroom can be accommodated in more than one position		1	1		1	1	1	1	6	0.75	Will include	Borderline	Furniture	Yes			In
- Has space for a chair(s)	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In

- Has space for a bedside table either side of the bed	1	1	1		1			1	5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Has a free-standing wardrobe or built-in wardrobe	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Furniture	Yes			In
- Has space for a chest of drawers and/or a dressing table	1	1	1		1			1	5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Electric light illuminance is more than 150 lux	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Lighting				In
The bathroom….																	
- Has task lighting by the basin	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- Has task lighting over the shower/bath [Glossary 4.19]	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- Light switches are pull-cord or are located outside the room	1		1		1	1			4	0.5	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
- The floor is visually distinct from the bathroom fittings	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Flooring	Yes			In
- The walls are visually distinct from the bathroom floor	1		1	1	1	1	1	1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
- The fittings are visually distinct from the bathroom walls	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
- All walls are non-reflective [Glossary 6.02]	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Colour/ Contrast	Yes			In
- Floor is properly laid and sealed	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
The communal lounge….																	
- Threshold with the garden is flush	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
- Has an induction loop [Glossary 5.01]		1	1			1			3	0.375	Needs to be included	Relates to domain	Noise	Yes	Include	Include	In
The dining room….																	
The activity room….																	

- Has a sink for mixing/cleaning paints etc.	1	1	1		1	1	1		6	0.75	Needs to be removed	Does not relate to domain	None	Yes	Take out	Take out	Out
- Has an easel(s)/table for painting on	1		1		1	1	1		5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Has a table for writing/drawing on	1	1	1		1	1	1		6	0.75	Will include	Borderline	Furniture	Yes			In
- Has a workbench at which people can stand	1	1	1		1	1	1		6	0.75	Will include	Borderline	Furniture	Yes			In
- Has a workbench at which people can sit	1		1		1	1	1		5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Has storage space for work in progress	1	1	1		1	1		1	6	0.75	Needs to be removed	Does not relate to domain	None	Yes	Take out	Take out	Out
- Has storage space for cleaning equipment	1	1	1		1	1		1	6	0.75	Needs to be removed	Does not relate to domain	None	Yes	Take out	Take out	Out
- The electric light illuminance is more than 500 lux	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
The library																	
- Has shelving for different size books	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Take out	Include	In
- Has a magazine rack	1	1	1		1		1		5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Has a table(s) for reading on	1		1		1	1	1	1	6	0.75	Will include	Borderline	Furniture	Yes			In
- Has a desk for issuing and returning books	1	1	1		1		1	1	6	0.75	Will include	Borderline	Furniture	Yes			In
- Has headphones and equipment for listening to audio books		1	1		1	1			4	0.5	Needs to be included	Relates to domain	Noise	Yes	Include	Include	In

- Has seating with task lighting for reading	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Furniture /Lighting				In
The garden….																	
- Is equipped with garden furniture	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- Access to the garden is level or gently ramped (less than 1:20)	1	1	1			1	1	1	6	0.75	Will include	Borderline	Flooring	Yes			In
- The garden paths can accommodate two adjacent wheelchairs (more than 1.8m wide)	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
- The garden paths are level with a maximum gradient of 1:20	1	1	1			1	1	1	6	0.75	Will include	Borderline	Flooring	Yes			In
- The main garden paths and terraces have low-mounted down lighters	1	1	1		1	1	1		6	0.75	Will include	Borderline	Lighting	Yes			In
- The garden paths are made from firm and durable materials	1	1	1		1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- The garden paths have non-slip surfaces	1	1	1		1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- Garden paths are visually distinct from grass/ground cover	1	1	1		1	1		1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
The assisted bathroom….																	
The WC or toilet….																	
The clinic…..																	
- Has a chair and desk/table on which a clinician can use a tabletop PC or a laptop computer	1	1	1		1		1		5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Has room for secure document storage, such as storage cabinets and filing cabinets	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- Contains a treatment couch	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- The treatment couch can be screened off from the rest of the clinic	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Contains a practitioner's chair	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In

- There are wall blinds for the clinic window(s)	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
The therapy room….																	
- Has a massage table	1	1			1	1	1		5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Take out	Include	In
- Has shelving for therapy equipment	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
The laundry….																	
- Has comfortable seating	1		1		1	1	1		5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
Storage…																	
- There is communal space for residents to deposit furniture not currently used to furnish their living unit	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- There is communal space for residents to store their wheelchairs near the main entrance	1	1	1		1	1		1	6	0.75	Needs to be removed	Does not relate to domain	None	Yes	Take out	Take out	Out
The refuse store….																	
- The route(s) from all living units to the refuse store is level		1	1			1	1		4	0.5	Needs to be included	Relates to domain	Flooring	Yes	Include	Include	In
Circulation….																	
- Doors to rooms off the travel routes have a matt finish	1		1	1	1	1		1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
- Doors to rooms off the travel routes are decorated in colours that contrast with the surrounding walls	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
- All doors on travel routes have flush thresholds		1	1		1	1		1	5	0.625	Needs to be included	Relates to domain	Flooring	Yes	Include	Include	In
- Different colour schemes are used to distinguish separate zones	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In

- Different materials or textures are used to distinguish separate zones	1		1		1	1	1	1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
- Public areas are more brightly lit with natural light than private areas	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- Audible alarms are supplemented with flashing beacons	1	1	1	1	1	1			6	0.75	Will include	Borderline	Noise	Yes			In
The main entrance….																	
- There is outside seating in front of the building	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- Access is level or gently ramped (gradient less than 1:20)	1	1	1	1		1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- Doors are glazed with distinct markings to prevent people from walking into glass	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
- The main glazed entrance doors are distinct from other glazing	1	1	1		1	1		1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
- Is distinct from the surrounding walls	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
- The external entrance threshold is flush with the general floor level		1	1	1	1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- There are written instructions outside the building explaining how to access the building	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Way finding	Yes	Include	Include	In
- There are tactile instructions outside the building explaining how to access the building	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Way finding	Yes	Include	Include	In
- Doors have localised lighting	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting				In
- The travel route from the main entrance to the reception point is clear of obstructions	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Loose - Floor/ Furn	Yes			In
The foyer….																	
- The reception point is clearly signposted	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
- The travel route from the main entrance to the reception point is clearly signposted	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
- The lift and staircase are signposted from the reception desk	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In

- Signs are fixed more than 1.4m and less than 1.6m from finished floor level	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
- Lettering on signs has contrasting colour and tone from its background	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage Colour/ Contrast	Yes			In
- The main entrance is furnished with a recessed, flush-to-floor cleaning mat		1	1			1		1	4	0.5	Needs to be included	Relates to domain	Flooring	Yes	Include	Include	In
- Has a notice board	1	1	1		1	1		1	6	0.75	Will include	Borderline	Loose - Furniture	Yes			In
- Is illuminated at night	1	1	1		1	1	1	1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
- The reception desk has localised lighting	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- The notice board has localised lighting	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
Internal….																	
- The travel route from the communal facilities to the living units is level		1	1	1	1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- All fire exits on the ground floor have level access		1	1	1	1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- There are distinctive internal landmarks at less than 30m along the travel routes		1	1	1	1		1	1	6	0.75	Will include	Borderline	Way finding	Yes			In
- Significant points along the travel route(s) are highlighted	1	1	1	1	1		1	1	7	0.875	Yes	Over 0.78	Way finding	Yes			In
- The illuminance for daylighting measured at floor level in the darkest part of the circulation space is more than 10% of the electrical light illuminance	1	1	1	1		1	1	1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
- There are communal seating areas in circulation spaces	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Seating area 1 has a daylight factor more than 2			1			1		1	3	0.375	Needs to be included	Relates to domain	Lighting	Yes	Include	Include	In
- Shiny floor finishes are avoided along travel routes	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
External Covered….																	

- The signposts to the main entrance can be seen from all approaches to the communal facilities building	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
- Connecting pedestrian access routes from living units to communal facilities are well lit without creating contrasting pools of light and darkness	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- Security lighting is provided along the approach to the communal facilities building	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
- Safety lighting indicates paths, ramps and steps	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- The paths from living units to communal facilities are made from firm and durable materials	1		1	1	1	1		1	6	0.75	Will include	Borderline	Flooring	Yes			In
- The paths from living units to communal facilities have non-slip surfaces	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
The Lifts…																	
- There are seats provided immediately adjacent to the lift(s)	1	1	1			1			4	0.5	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- Has a good level of lighting inside	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- The waiting area for the main lift has localised lighting	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Lighting	Yes			In
- Call buttons are of contrasting colour and tone from their background	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Colour/ Contrast	Yes			In
- Call buttons have tactile reading systems	1	1	1	1		1		1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
- Lift controls inside the lift are of contrasting colour and tone from their background	1	1	1		1	1		1	6	0.75	Will include	Borderline	Colour/ Contrast	Yes			In
- There is a visible signal outside the lift indicating the location of the lift	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
- There is an audible signal outside the lift indicating the location of the lift	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Noise	Yes			In
- There is a visible signal inside the lift indicating the location of the lift	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
- There is an audible signal inside the lift indicating the location of the lift	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Noise	Yes			In

- The walls and floor inside the lift have non-reflective finishes	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Colour/ Contrast	Yes			In
- The lift doors are distinguishable in colour and tone and from their surroundings	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Colour/ Contrast	Yes			In
- The lift interior has a slip resistant floor	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Flooring	Yes			In
Managers' Office…																	
- There is space in the (title) manager's office for a desk	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- There is space in the (title) manager's office for a computer table and chair	1	1		1	1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- There is space in the (title) manager's office for two visitors' chairs	1	1			1	1		1	5	0.625	Needs to be included	Relates to domain	Furniture	Yes	Include	Include	In
- There are blinds for any internal office window(s)	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Lighting	Yes			In
Staff facilities…																	
- The staff room is provided with cupboard space suitable for storing food	1	1	1	1	1	1			6	0.75	Will include	Borderline	Furniture	Yes			In
- The staff room has a table	1	1	1		1	1		1	6	0.75	Will include	Borderline	Furniture	Yes			In
- The staff room is furnished with comfortable chairs	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Furniture	Yes			In
- Lockers are provided for staff to securely store their belongings and clothes	1	1	1	1	1	1		1	7	0.875	Yes	Over 0.78	Furniture	Yes			In
- The staff room is clearly signposted as a staff only area	1	1	1	1	1	1	1	1	8	1	Yes	Over 0.78	Signage	Yes			In
The catering kitchen…																	
The scheme boundary…																	
The scheme site and location: Entrance…																	
Parking…																	
- Individual parking spaces are easy to see with the bays signed on the surface and with vertical signs	1	1	1		1				4	0.5	Needs to be included	Relates to domain	Signage	Yes	Include	Include	In

- Private and public car parking spaces are clearly signed	1	1	1		1	1			5	0.625	Needs to be included	Relates to domain	Signage	Yes	Include	Include	In
- Traffic routes are clearly distinguishable from pedestrian routes through use of texture and colour	1	1	1			1		1	5	0.625	Needs to be included	Relates to domain	Colour/ Contrast	Yes	Include	Include	In
- Tactile indicator paving is used at the crossing points		1	1		1	1		1	5	0.625	Needs to be included	Relates to domain	Flooring	Yes	Include	Include	In
- Connecting pedestrian access routes from the car park to the building are well lit without creating contrasting pools of light and darkness	1	1	1		1	1		1	6	0.75	Will include	Borderline	Lighting	Yes			In

Appendix M

Reduced EVOLVE Categories and Statements

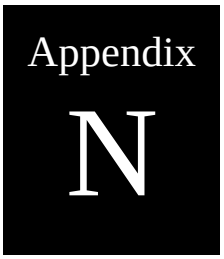
Appendix M

Category	# of Statements to be Included in Audit	# of Statements Applicable to Facility
Living Unit		
Double Bedroom*	35	35
Bathroom*	28	28
Single Bedroom*	33	33
Bathroom*	28	28
Communal Facilities		
Main Lounge	32	32
Dining Room	32	32
Small Lounge	30	-
Activity Room	43	43
Library	40	-
Garden	9	9
Assisted Bathroom*	24	-
WC or Toilets*	18	-
Clinic	31	-
Therapy Room	23	-
Laundry	17	17
Storage	3	3
Refuse Store	5	-
Circulation		
General Circulation	4	4
Main Entrance	12	12
Foyer	24	24
Internal	27	27
External Covered	6	6
External Uncovered	8	8
Lift	14	-
Staff and Services		
Scheme Mg. Office	28	28
Care Mg. Office	28	28
Staff Facilities	23	23
Catering Kitchen	1	1
Site and Location		
Parking	6	6
Total Statements	612	427

* Duplicate as required for additional bedrooms and bathrooms

Appendix N

Rater Responses by Round



Category	Round	# Q's Available	# Q's Completed	# Q's 1.00	# Q's 0.75	# Q's 0.50
Living Unit						
Double Bedroom	1	35	30	23	5	2
Double Bedroom	2	35	33	21	10	2
Bathroom	1	28	26	15	5	6
Bathroom	2	28	27	17	7	3
Single Bedroom	1	33	30	23	2	4
Single Bedroom	2	33	32	22	7	3
Bathroom	1	28	26	16	7	3
Bathroom	2	28	15	8	5	2
Communal						
Main Lounge	1	32	30	21	8	1
Main Lounge	2	32	31	22	7	2
Dining Room	1	32	31	21	9	1
Dining Room	2	32	31	17	11	3
Activity Room	1	43	0	-	-	-
Activity Room	2	43	42	25	8	9
Garden	1	9	9	7	1	1
Garden	2	9	9	9	0	0
Laundry	1	17	17	14	1	2
Laundry	2	17	17	10	5	2
Storage	1	3	3	1	1	1
Storage	2	3	3	3	0	0
Circulation						
General Circulation	1	4	3	1	1	1
General Circulation	2	4	4	1	3	0
Main Entrance	1	12	9	6	1	2
Main Entrance	2	12	10	7	2	1
Foyer	1	24	21	17	2	2
Foyer	2	24	24	17	7	0
Internal	1	27	20	12	2	6
Internal	2	27	25	12	4	10
External Covered	1	6	5	1	1	3
External Covered	2	6	6	4	1	1
External Uncovered	1	8	8	6	1	1
External Uncovered	2	8	8	5	2	1
Staff & Services						
Scheme Mgr Office	1	28	27	21	2	4
Scheme Mgr Office	2	28	28	23	3	2
Care Manager Office	1	28	28	17	7	4
Care Manager Office	2	28	28	20	6	2
Staff Facilities	1	23	0	-	-	-
Staff Facilities	2	23	23	20	3	0
Catering Kitchen	1	1	1	1	0	0
Catering Kitchen	2	1	1	1	0	0
Site & Location						
Parking	1	6	0	-	-	-
Parking	2	6	6	4	2	0
Total		854	727	491	149	87

Appendix O

Appendix O

Comparisons of Raters Between Rounds

Rater/Category	# Q's Available	# Q's Completed	# Same in R1 & R2	% Consistency
Rater 1				
Living Unit				
Double Bedroom	35	31	25	80.6
Bathroom	28	27	21	77.8
Single Bedroom	33	33	26	78.8
Bathroom	28	15	12	80.0
Communal				
Main Lounge	32	31	24	77.4
Dining Room	32	31	22	71.0
Activity Room	43	42	34	80.9
Garden	9	9	8	88.9
Laundry	17	17	13	76.5
Storage	3	3	2	66.7
Circulation				
General Circulation	4	4	1	25.0
Main Entrance	12	12	10	83.3
Foyer	24	24	21	87.5
Internal	27	25	15	60.0
External Covered	6	5	2	40.0
External Uncovered	8	8	7	87.5
Staff & Services				
Scheme Manager Office	28	27	26	96.3
Care Manager Office	28	28	26	92.9
Staff Facilities	23	23	22	95.7
Catering Kitchen	1	1	1	100
Site & Location				
Parking	6	5	4	80.0
Total Rater 1	**427**	**401**	**322**	**Av 77.5**
Rater 2				
Living Unit				
Double Bedroom	35	32	25	78.1
Bathroom	28	28	22	78.6
Single Bedroom	33	29	22	75.9
Bathroom	28	27	19	70.4
Communal				
Main Lounge	32	30	20	66.7
Dining Room	32	31	25	80.6
Activity Room	43	0	-	-
Garden	9	9	8	88.9
Laundry	17	17	15	88.2
Storage	3	3	3	100.0
Circulation				
General Circulation	4	4	2	50.0
Main Entrance	12	10	7	70.0
Foyer	24	22	18	81.8
Internal	27	23	12	52.2
External Covered	6	5	1	20.0
External Uncovered	8	8	6	75.0
Staff & Services				
Scheme Manager Office	28	28	23	82.1
Care Manager Office	28	28	20	71.4
Staff Facilities	23	0	-	-
Catering Kitchen	1	1	1	100
Site & Location				
Parking	6	0	-	-
Total Rater 2	**427**	**335**	**249**	**Av 63.3**

Rater 3				
Living Unit				
Double Bedroom	35	33	30	90.9
Bathroom	28	28	28	100.0
Single Bedroom	33	33	30	90.9
Bathroom	28	28	25	89.3
Communal				
Main Lounge	32	31	27	87.1
Dining Room	32	31	30	96.8
Activity Room	43	42	40	95.2
Garden	9	9	8	88.9
Laundry	17	17	15	88.2
Storage	3	3	2	66.7
Circulation				
General Circulation	4	4	3	75.0
Main Entrance	12	9	6	66.7
Foyer	24	24	22	91.7
Internal	27	27	27	100.0
External Covered	6	5	5	100.0
External Uncovered	8	8	7	87.5
Staff & Services				
Scheme Manager Office	28	28	26	92.9
Care Manager Office	28	28	26	92.9
Staff Facilities	23	23	22	95.7
Catering Kitchen	1	1	1	100.0
Site & Location				
Parking	6	5	4	80.0
Total Rater 3	**427**	**417**	**384**	**Av 89.4**
Rater 4				
Living Unit				
Double Bedroom	35	34	32	94.1
Bathroom	28	28	25	89.3
Single Bedroom	33	33	31	93.9
Bathroom	28	28	25	89.3
Communal				
Main Lounge	32	31	28	90.3
Dining Room	32	31	30	96.8
Activity Room	43	42	40	95.2
Garden	9	9	7	77.8
Laundry	17	17	15	88.2
Storage	3	3	2	66.7
Circulation				
General Circulation	4	4	4	100.0
Main Entrance	12	11	10	90.9
Foyer	24	24	24	100.0
Internal	27	27	26	96.3
External Covered	6	6	5	83.3
External Uncovered	8	8	7	87.5
Staff & Services				
Scheme Manager Office	28	28	26	92.9
Care Manager Office	28	28	26	92.9
Staff Facilities	23	23	23	100.0
Catering Kitchen	1	1	1	100.0
Site & Location				
Parking	6	6	6	100.0
Total Rater 4	**427**	**422**	**393**	**Av 91.7**

Appendix

P

Appendix P: Mean and Standard Deviation Scores of Each Rater

Living Unit

Rater	Round	x̄ Double Bedroom 1	SD Double Bedroom 1	x̄ Single Bedroom 1	SD Single Bedroom 1	x̄ Bathroom 1	SD Bathroom 1	x̄ Bathroom 2	SD Bathroom 2
1	1	1.114	0.575	1.182	0.528	1.214	0.594	1.286	0.600
2	1	1.114	0.420	1.030	0.346	1.036	0.415	1.071	0.506
3	1	1.200	0.574	1.212	0.545	1.179	0.548	1.143	0.525
4	1	1.200	0.554	1.182	0.528	1.321	0.548	1.321	0.612
1	2	1.143	0.545	1.152	0.566	1.214	0.568	0.786	0.516
2	2	1.257	0.479	1.121	0.448	1.179	0.577	1.321	0.548
3	2	1.143	0.521	1.121	0.485	1.179	0.548	1.179	0.548
4	2	1.143	0.521	1.121	0.485	1.286	0.600	1.286	0.600

Communal

Rater	Round	μ Main Lounge	SD Main Lounge	μ Dining Room	SD Dining Room	μ Laundry	SD Laundry	x̄ Storage	SD Storage	x̄ Garden	SD Garden
1	1	1.063	0.597	1.188	0.592	1.471	0.514	2.000	0.000	1.222	0.441
2	1	1.188	0.691	1.188	0.669	1.471	0.514	1.333	1.155	1.222	0.441
3	1	0.938	0.657	1.125	0.660	1.471	0.514	0.667	1.155	1.000	0.500
4	1	1.000	0.706	1.125	0.660	1.471	0.514	0.667	1.155	1.111	0.333
1	2	1.000	0.706	1.063	0.651	1.353	0.702	1.333	1.155	1.111	0.601
2	2	1.250	0.643	1.219	0.553	1.471	0.514	1.333	1.155	1.111	0.601
3	2	0.938	0.605	1.063	0.651	1.235	0.664	1.333	1.155	1.111	0.601
4	2	0.969	0.632	1.063	0.651	1.235	0.664	1.333	1.155	1.111	0.601

Circulation

Rater	Round	x̄ Main Entrance	SD Main Entrance	x̄ Foyer	SD Foyer	x̄ Internal	SD Internal	x̄ External Covered	SD External Covered	x̄ External Uncovered	SD External Uncovered	x̄ General Circulation	SD General Circulation
1	1	1.167	0.718	1.083	0.584	0.630	0.802	0.667	0.447	1.500	0.535	1.000	0.816
2	1	1.083	0.751	1.083	0.664	0.593	0.635	1.000	0.447	1.625	0.518	1.000	0.816
3	1	0.667	0.601	1.125	0.612	0.704	0.775	0.500	0.894	1.625	0.518	1.250	0.500
4	1	1.083	0.751	1.167	0.637	1.074	0.616	0.667	0.816	1.375	0.744	1.500	0.577
1	2	1.417	0.996	1.167	0.702	1.111	0.784	1.000	1.265	1.625	0.518	1.750	0.500
2	2	0.917	0.568	1.292	0.624	1.222	0.724	1.167	1.472	1.625	0.518	1.000	0.000
3	2	0.917	0.775	1.125	0.680	0.704	0.775	0.833	0.983	1.750	0.463	1.500	0.577
4	2	1.000	0.701	1.167	0.637	1.037	0.649	0.833	0.983	1.500	0.756	1.500	0.577

Staff & Services

Rater	Round	x̄ Scheme Manager Office	SD Scheme Manager Office	x̄ Care Manager Office	SD Care Manager Office	x̄ Catering Kitchen	SD Catering Kitchen
1	1	1.071	0.320	1.071	0.539	1	0
2	1	1.179	0.476	1.250	0.645	1	0
3	1	1.179	0.390	1.071	0.604	1	0
4	1	1.107	0.416	1.143	0.651	1	0
1	2	1.179	0.390	1.000	0.471	1	0
2	2	1.286	0.460	1.179	0.612	1	0
3	2	1.179	0.476	1.071	0.604	1	0
4	2	1.179	0.476	1.071	0.604	1	0

Site & Location Nil – Parking was removed for analysis as it did not have responses in both rounds

Appendix

Q

Appendix Q

Statements Across Two Rounds Coded According to Refurbishment Element

Category	Rnd	Colour/Contrast		Flooring		Furniture		Lighting		Noise		Signage		Wayfinding		Total
		≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	≥0.75	<0.75	
Living Unit																
Double Bedroom	1	3		1		5		19	1	1						30
Double Bedroom	2	3		1		5		19	1	1						30
Bathroom 1	1	6	3	3	1			9			1					23
Bathroom 1	2	6	3	4				9			1					23
Single Bedroom	1	4	1	1		5		14	3	1						29
Single Bedroom	2	3	2	1		5		16	1	1						29
Bathroom 2	1	9	1	2	1			1			1					15
Bathroom 2	2	8	2	3				1		1						15
Communal																
Main Lounge	1	5		2	1			17	2	3						30
Main Lounge	2	5		3				18	1	2	1					30
Dining Room	1	5		4				18	2	2						31
Dining Room	2	5		4				18	2	1	1					31
Garden	1	1		5	1	1		1								9
Garden	2	1		6		1		1								9
Laundry	1	5	1	3		1		6		1						17
Laundry	2	5	1	2	1	1		6		1						17
Storage	1					1	1	1								3
Storage	2					2		1								3

Circulation																
General Circulation	1	1	1						1	1						4
General Circulation	2	2						1		1						4
Main Entrance	1	3		2		2								1	1	9
Main Entrance	2	2	1	2		2								2		9
Foyer	1	1		2		4		7	2			6				22
Foyer	2	1		2		4		9				6				22
Internal	1	2		5				11	3					2		23
Internal	2	2		4	1			10	4					2		23
External Covered	1	1	1	1	1				1							5
External Covered	2	2		2				1								5
External Uncovered	1			3				2	1			1		1		8
External Uncovered	2			3				2	1			1		1		8
Staff & Services																
Scheme Man. Office	1	5		1		3		16	1	1						27
Scheme Man. Office	2	4	1	1		3		16	1		1					27
Care Manager Office	1	4	1		1	3		16	2		1					28
Care Manager Office	2	5		1		3		17	1		1					28
Catering Kitchen	1			1												1
Catering Kitchen	2			1												1
Total Statements		109	19	76	8	51	1	283	31	18	8	14	0	9	1	**628**

Appendix

R

Appendix R: Canning Lodge Report

Canning Lodge

Environmental Audit Report

Samantha Neylon

PhD Candidate University of Notre Dame Australia

Clinical Director de Fiddes

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

The contributions of the following are acknowledged and appreciated:

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Curtin University

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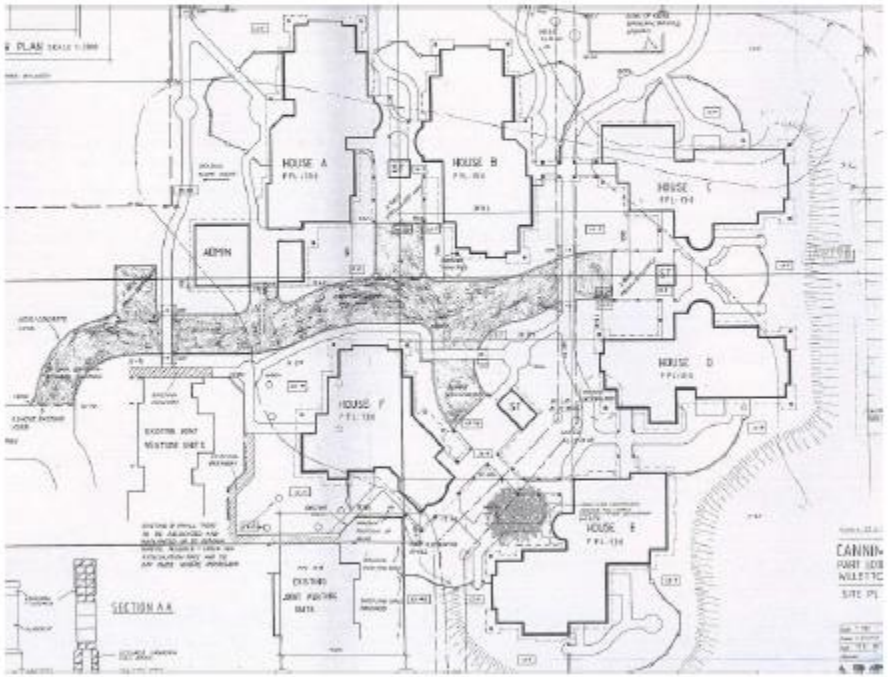
deFiddesign
DESIGNING ENABLING ENVIRONMENTS
Aged Care | Dementia | Retirement

1. Executive Summary

Canning Lodge was originally a low care facility (hostel) designed to meet the needs of people with vision impairment. It now operates as a government subsidised residential aged care facility offering 40 permanent rooms and 2 short term respite rooms. The rooms are distributed amongst 6 houses with each resident having a private bedroom and ensuite bathroom. Couples rooms are available also. The houses are known by numbers with A in the map below referring to House 1 through to F as House 6.



Canning Lodge participated in an environmental audit tool study conducted through the University of Notre Dame Australia as part of a PhD project. Alongside this audit tool study, a request was made for observations and recommendations to be provided for the management to consider when undertaking improvement works at the facility.

Due to the population aging in place and residents having more complex care needs; the need for equipment to assist with care increases. Storage of these items then becomes a challenge. Residents are encouraged to bring their own furniture and items to furnish their bedrooms and this is evident in the extent of the personalisation observed. However, balancing this with staff having sufficient room to partner in care activities (particularly if equipment is involved) can also present as a challenge.

There are not many aged care facilities of this size remaining and the small scale imparts a sense of intimacy and represents the domestic nature that is highly sought after. Opportunities abound to create engagement areas, storage and specific purpose rooms – particularly if enclosing and extending some of the carports could be considered. An architectural review is highly recommended to consider how to maximise these opportunities in the most cost effective manner. Having worked with Gary Batt on a number of similar initiatives, it is suggested that he be contacted. GBA only do aged care projects and specialise in creating spaces that are enabling and engaging for older people.

The audit tool study examined the components of the EVOLVE audit tool[1] which related to colour/contrast, flooring, furniture, light, noise, signage and wayfinding (these were key refurbishment elements identified in an earlier study)[2]. The findings of this study will be forwarded to the residential facility manager as a separate manuscript. This report details the observations and recommendations under the same categories as set in the EVOLVE tool. Images are included where possible to provide indicative examples of the recommendations. These are to aid the facility manager in identifying and prioritising refurbishment initiatives. Discussion points for potential changes to the facility to enhance service offerings to consolidate Canning Lodge's position as a provider of choice are also offered.

Samantha Neylon
17th August 2019

2. Context

Originally developed for assisted living in the UK, the EVOLVE audit tool was selected by a consumer group to pilot at a residential care facility considering refurbishment initiatives. A review group examined the categories of the tool and determined which of those categories would be applicable to residential care environs. The same group then reviewed the questions of the subsequent categories to determine which would be applicable to the constructs under study (colour/contrast, flooring, furniture, light, noise, signage and wayfinding). The resultant reduced categories of EVOLVE consisted of Main Entrance, Foyer, Lifts, Scheme Managers Office, Staff Facilities, Care Managers Office, Clinic, Therapy Room, Assisted Bathroom, WC, General Circulation, Internal, Main Lounge, Small Lounge, Dining Room, Kitchen, Laundry, Double Bedroom and Bathroom, Storage, Refuse Store, Single Bedroom and Bathroom, Activity Room, Library, Garden, External Uncovered and Covered and Parking.

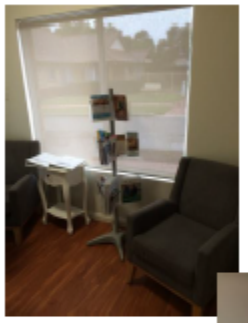
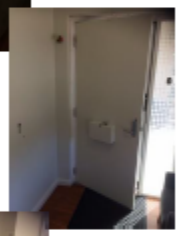
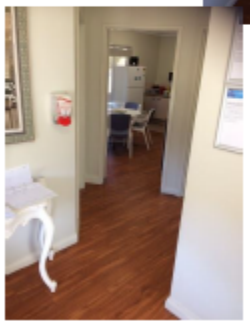
Four auditors (in pairs on two different days) completed the questions within these listed categories. As 8 categories (Lifts, Clinic, Therapy Room, Assisted Bathroom, WC, Small Lounge, Refuse Store, Library) were not present at Canning Lodge, these categories and associated questions were omitted from the second round. The second round involved the four auditors (again in pairs on two different days) completing the questions in a revised format relevant to the Canning Lodge layout: Main entrance, Admin Block (foyer, scheme manager's office, staff facilities), Staff Office Block (staff office, nurse manager's office, kitchen, bathroom), House 6 (entry, main lounge, dining room, bedroom, bathroom, general, garden). House 5 (laundry, double bedroom and bathroom), House 3 (single bedroom and bathroom), House 2 (activity room), external covered and uncovered and parking. Three residents kindly consented for the auditors to examine their double (couples) and single bedroom and bathroom.

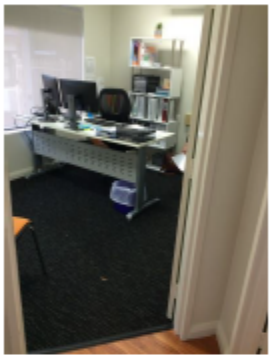
One auditor attended every audit session in the event questions or need for clarification arose. Photographs were taken with permission across all four sessions. The resultant answers to the questions and the photographs formed the basis of this observational report.

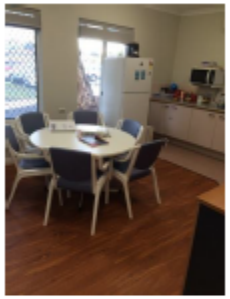
3. Findings

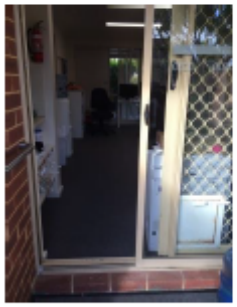
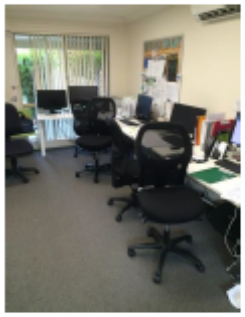
1. Main Entrance

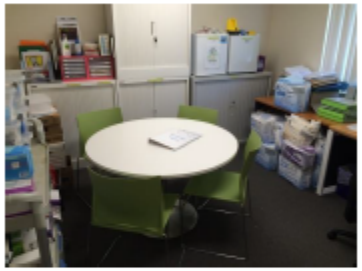
Image	Observations	Recommendations	Illustrative Examples
  	1). Entrance to the facility is via two pedestrian gates with safety catches or via central driveway which requires the driver of the vehicle to exit and press a buzzer to open the gates. 2). The reception area is not clearly designated and the screen door is heavy to open and hold - particularly if a person is using a walker. 3). The former carport currently stores goods being delivered or waiting for collection (or to be used). 4) Sign on door is impeded by screen door	1). Determine any required branding and create welcoming statement on arrival – including external seating as residents often like to sit near the comings and goings of the reception area. 2). Convert the carport into a reception area with automatic doors for easier and more visible access. 3) Equipment to be relocated to an equipment specific destination (refer to House 1 section below). 4) Implement signage following the design and installation guides and consider a site plan/map on an external wall.	  

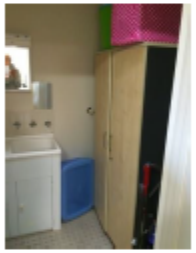
2.1 Administration Block – Foyer			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). Good and comfortable seating available but no room for a wheelchair with limited room for a walker. 2) There is no open reception so entrant has to walk a few steps around the corner to the door labelled administration office. 3). Good natural and artificial lighting with shading devices in windows. 4). Light colour on walls and non slip flooring in situ.	1). As in Section 1 – carport conversion to have a designated main entrance/foyer area. 2). Provision at reception desk and in sitting area for wheelchair users.	 

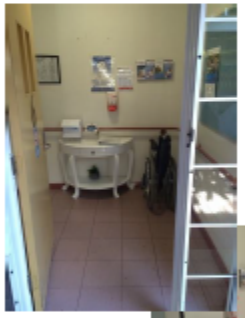
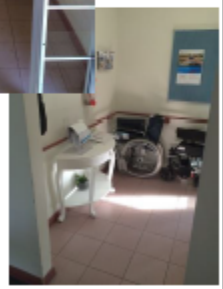
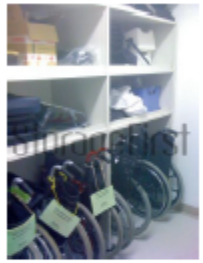
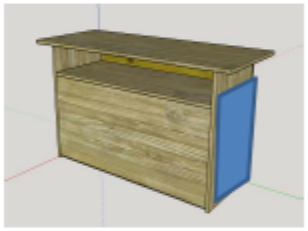
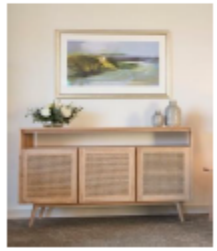
2.2 Administration Block - Facility Manager's Office			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
	1). Sufficient room for a desk, computer, storage and visitors chairs. 2). Good natural and artificial lighting with shading devices in windows. 3). Light colour on walls and non slip, flush flooring in situ. 4). The door, door frames and walls are similarly coloured which does not offer contrast to enable residents to easily identify the door when closed. 5). Full acoustic privacy does not occur when the door is closed.	1). Consider replacing door with solid core to offer more acoustic privacy. The door can be discretely highlighted through selected areas of contrast such as the door frame and the mouldings (where applicable) rather than fully repainted a different colour.	

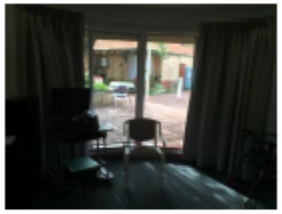
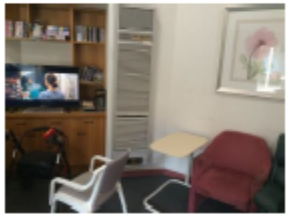
2.3 Administration Block – Staff Room			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). Whilst cupboards are provided, goods are on bench and fridge blocks natural light from window. 2). Sufficient room for a dining table and chairs but current set-up does not utilise the space effectively. 3). Good artificial lighting and light colour walls. 4). Raised lip at the transition between tiles and vinyl flooring which could pose a trip risk. 5). Storage requirements and whether staff lockers are needed is unknown.	1). Replace bench unit to include fridge recess. 2). Relocate outdoor table and chairs to one of the garden areas and provide stackable chairs with smaller footprints and narrow rectangular tables to improve clearance. 3). Extend vinyl flooring throughout. 4). Confirm storage requirements and then add/remove cabinetry as required. Are staff lockers needed?	  

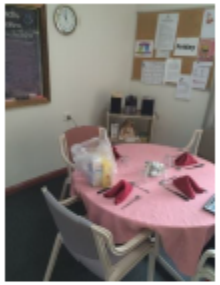
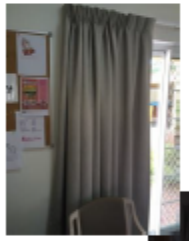
3.1 Staff Office Block – Staff Work Area			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
 	1). Access to staff office block is a step up and over a glass sliding door 2). Afternoon light would come through the sliding doors 3). Several work stations provided with desks fully occupied. A number of cables are visible. The wall surfaces have not been maximised.	1). Ramp to entry. 2). Confirm if this light impacts on staff working. If so, consider a privacy (decorative or plain) film which still permits light but reduces glare. 3). Insert either more GPOs to the wall behind desks or cable trays to the rear underside of desks to keep them off the floor. Confirm storage requirements and then install shelving as required.	  

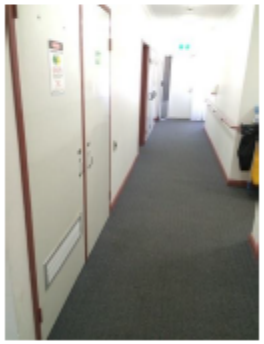
3.2 Staff Office Block – Nurse Manager's Office			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
	1). Sufficient room for a desk, computer, storage and visitors chairs when consumable supplies have been issued. 2). Good natural and artificial lighting with shading devices in windows. 3). Light colour on walls and non slip, flush flooring in situ. 4). The door, door frames and walls are similarly coloured which does not offer contrast to enable residents to easily identify the door when closed. 5). Full acoustic privacy does not occur when the door is closed.	1). Consider relocating the consumable supplies to a new area such as a converted carport? Include specific shelving (adjustable) to provide flexibility and trolleys to allow movement of products from one house to another. 2). Consider replacing door with solid core to offer more acoustic privacy. The door can be discretely highlighted through selected areas of contrast such as the door frame and the mouldings (where applicable) rather than fully repainted a different colour.	 

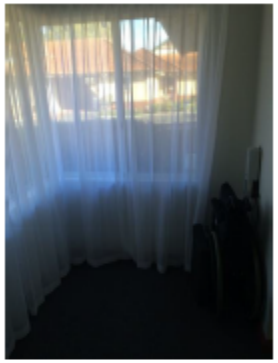
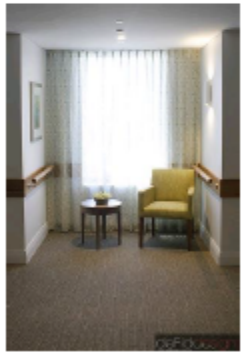
3.3 Staff Office Block – Kitchen/Bathroom			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). Kitchen has microwave and bar fridge external to kitchen cabinetry which increases congestion. The cupboards are used for storage. 2). The staff office block bathroom is used to store supplies. 3). Shower is not used and one toilet is available.	1). Reconfigure the cabinetry to have the microwave and bar fridge incorporated within then remove the stands these items are on to improve space. 2). Consider relocating the consumable supplies to a new area such as a converted carport as in section 3.2. 3). Confirm with staff if shower is not required and whether 1 toilet is sufficient. Thus could leave as shower and toilet, reconfigure to have 2 toilet cubicles or reconfigure to have one large accessible unisex toilet.	  

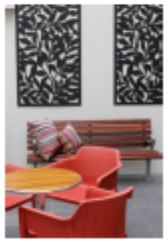
4.1 House 6 - Entry			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). On approach to House 6 (door is to the right of this location), the carport is currently being used as a storage area. 2). Entry into House 6 shows a hand rail that is inaccessible and not likely to be used. 3). Small entrance/foyer is congested with a small hall table and wheelchairs in situ. 4). Several notices and the hand sanitiser are on the wall directly in front of the open door. 5). Floor is tiled which could be more slippery in wet months.	1). Consider relocating equipment to a new area such as an enclosed carport with purpose built shelving. Dispose what is no longer required. 2). Remove hand rail. 3). Consider installing a custom made hall stand with the side cut-out so that a wheelchairs can be stored in here and easily accessed as required (ensuring one wheelchair per house is sufficient). 4). Install an attractive art piece to greet people upon entry. Relocate notices to notice board and shift sanitiser unit to the right of the wall so it is closer to the noticeboard. If need be, replace the noticeboard with a larger unit. 5). Replace the tiles with textured vinyl flooring for grip, warmth and softer feel.	  

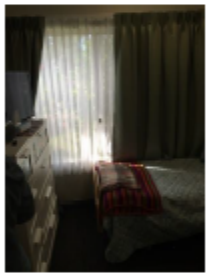
4.2 House 6 - Lounge			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). The lounge room has two large windows with opportunity for ample natural light but this is largely blocked by the curtains in situ. 2). The height and angle of the ceilings result in some darker corners of the lounge where light does not adequately reach. 3). There are a variety of furniture pieces with some plastic pieces in situ which do not harmonise with each other or the window treatments. The sofa is low and deep. 4). Lighting is more than 200lux but it cannot be dimmed so would still be bright in evenings.	1). Confirm extent of privacy required at night and consider the replacement of heavy drapes with semi sheers. Otherwise amend or replace drapes to frame the window to maximise the natural light and install sheer behind to minimise glare. 2). Install a reading lamp to the area near the piano. 3). Replace furniture in keeping with a scheme (ensure functionality) and remove any items no longer being used or required. 4). Install dimmer switches to be able to control the intensity of the lighting according to time of day/night to assist with circadian rhythms.	  

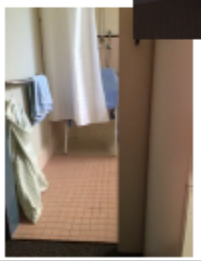
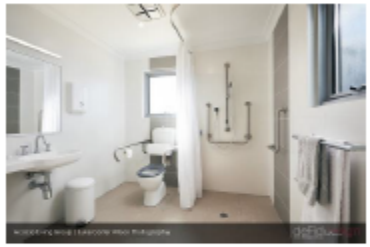
4.3 House 6 - Dining			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). The dining room is in front of a large sliding door with opportunity for ample natural light but this is largely blocked by the curtain in situ. 2). The dining setting in situ is plastic. 3). Plain noticeboard is a focal point and the shelving for the music unit is small. 4). Lighting is more than 200lux but it cannot be dimmed so would still be bright in evenings. 5). The same low pile carpet runs throughout the house – including the dining area.	1). Confirm extent of privacy required at night and consider the replacement of heavy drapes with semi sheers. Otherwise amend drapes to frame the window to maximise the natural light and install sheer to minimise glare. 2). Relocate dining setting to outdoors and replace with a timber setting for warm and domestic appearance. 3). Replace noticeboard with a statement item and install a narrow shelf on the wall for the music system. This will also free up the floor space and improve circulation around the dining table. 4). Install dimmer switches to be able to control the intensity of the lighting according to time of day/night to assist with circadian rhythms. 5). Install vinyl flooring in the dining room section for ease of cleaning after meals.	   

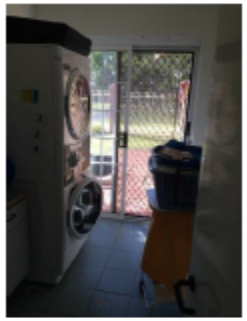
4.4 House 6 - General			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
 	1). Each house has its own kitchen to produce meals for the residents of the house. It is accessible and staff interact with residents. The kitchen has pink cabinetry which is open at the bottom and patterned flooring which contrasts too strongly with the carpet. There is not a great deal of bench top space. 2). The same low pile carpet runs throughout the house but staff report it can be difficult to push equipment on. 3). Storage cabinets containing chemicals or cleaning products are highlighted in the same way as the bedroom doorways. 4). There is a T junction but which rooms are along which corridor are unknown. 5). Lighting is more than 200lux but it cannot be dimmed so would still be bright in evenings.	1). Replace kitchen cabinets with ones which go to the floor and have integrated oven/cooktop, microwave recess and pull out pantry. All plumbing fixtures could remain same locations to reduce costs. Replace the flooring to a more domestic looking vinyl. 2). Install a thinner profile carpet when due for replacement. 3). Paint out the doorframes of the storage cabinets in same colour as the walls so they blend into the walls. Colour to bedroom frames does not need to be strong, just to have higher contrast to the walls. 4). Place wayfinding signage to indicate which bedrooms are where. 5). Install dimmer switches to be able to control the intensity of the lighting according to time of day/night to assist with circadian rhythms.	  

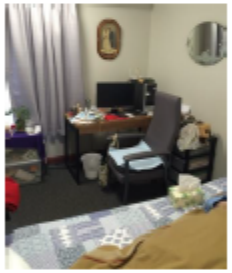
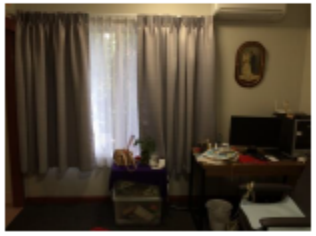
4.4 House 6 – General Continued			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
	1). At the end of the corridor is a storage space (for wheelchair and hoist battery charger) with a lovely outlook to the rest of the facility. 2). House 6 has one communal lounge and no other internal option for quiet space.	1). Explore other options for equipment storage within the house – or consider hoists which are concealed into cabinetry into resident's rooms. 2). Repurpose the end of corridor into private sitting area.	 

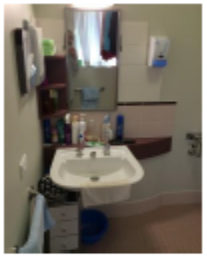
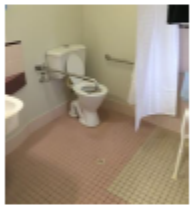
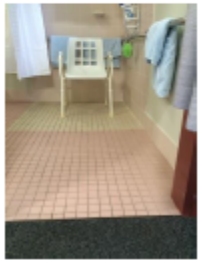
4.5 House 6 – Garden			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). There is a large garden area between houses 6 and 5 with raised garden beds and ground level garden beds. The beds have a variety of plants. The paths are level, non slip and in most areas can accommodate a wheelchair. 2). The garden furniture is not arranged in any particular way and predominantly all the seating is the same. 3). Most of the garden is exposed to the elements. Although the garden is shared between houses 5 and 6, the covered walkway between the two houses is fenced from the garden. 4). Garden lighting – feature and path – were not detected.	1). Consider reinvigorating the garden beds with some additional shrubs and dwarf fruit trees to include herbal and edible varieties for sensory experiences. Vegetables to be planted in the corrugated raised bed. 2). Replace some of the garden furniture with more sturdy and attractive pieces grouped around or near points of interest to invite the residents to sit there. 3). Shift the fencing to the other side of the walkway (thus the walkway would open into the garden) in order to make use of the undercover area which can also include a few chairs to provide protection from the elements. 4). Low mounted down lighters to be installed (there are several solar powered, electricity free, budget options available).	   

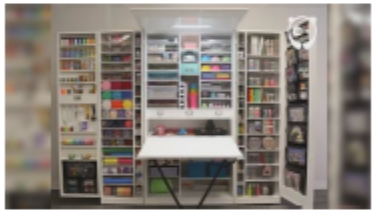
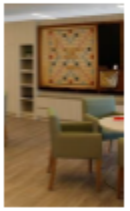
5.1 House 5 – Double Bedroom			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). The facility caters for couples with a lounge room, shared bedroom and two ensuite bathrooms. 2). Strong essence of personalisation in the bedrooms with own furniture and accessories. However, space is tight to access the occasional chair between the bed and the wardrobe with shoes stored on the floor. 3). It would be difficult to access the bottom two drawers of the chest of drawers due to the proximity to the bed. Manoeuvring in these confined spaces increase the falls risk to residents. 4). Lighting is more than 150lux but it cannot be dimmed so may still be bright in evenings. 5). The bedroom room has large window with opportunity for ample natural light but this is largely blocked by the curtains in situ.	1). Determine if there is a process by which the rooms are assessed and any items removed or altered space planning when access is limited or risks increase (to staff as well as resident) or use of equipment is required. 2). Introduce alternative options for personalisation such as fabric selections for approved chair, bed linen, side table contents. 3). Provide key furniture items as 'standard' along with the bed such as bedroom chair, bedside cabinet and overbed table. 4). Install dimmer switches to be able to control the intensity of the lighting according to time of day/night to assist with circadian rhythms. 5). Amend drapes to frame the window to maximise the natural light.	   

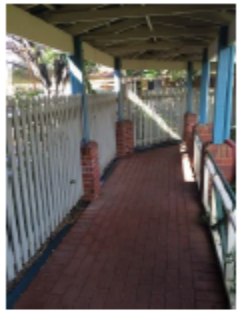
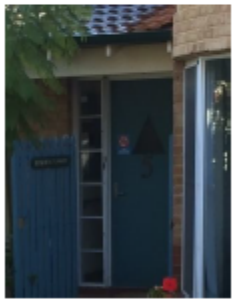
5.2 House 5 – Bathroom			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). The bathroom has a light wall colour with dark pink cabinetry and door trims and frosted window permitting natural light. 2). There is a ceiling light with additional task light above the basin. The dispersion of light is not even with some shadows near corners noted. 3). The pink flooring does not contrast with the pink border tiles and the small tiles have higher grout cleaning requirements. However it contrasts too strongly with the carpet colour. 4). The toilet is not high enough for the resident thus a toilet raiser is needed. 5). The nurse call system is halfway between the toilet and the shower and the over reach to access it may be of risk to resident balance. 6). The basin has limited storage for bathroom items.	1). Consider a bathroom renovation to include vinyl flooring and a neutral colour scheme with appropriate contrasts to the required features. 2). Review the overhead lighting to ensure sufficient coverage but also to include night lighting which is not as bright in order to maintain circadian rhythms. 3). Consider new toilets which are higher and have nurse call units integrated within the armrest such as: https://specify.caroma.com.au/products/toilet-suites/caravelle-easy-height/caravelle-easy-height-close-coupled-toilet-suite-with-nurse-call-armrests 4). Replace basins with units which have an integrated shelf or cabinetry above.	   

5.3 House 5 – Laundry			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
 	1). The laundry has good natural and artificial light with clear access to outdoors. Flooring is easy to maintain, non reflective and textured (reduced slip surface). Walls are painted in light colour and door frames are accentuated in mid blue. 2). Trolleys and linen baskets are in centre of room and goods are on top of the work bench.	1). Determine storage and workbench requirements with staff and workflow efficiencies and reconfigure laundry to suit. 2). Determine if residents are or will be involved in laundry duties and keep this in mind when reconfiguring laundry – including designated signage on door (indicates function of door when it is closed). If residents are not to be involved in laundry, consider painting out door frames to blend with walls so as not to draw attention to the laundry room. 3). Domestic appearance would increase if the trolleys had a designated space – or even concealed when not in use.	  

6.1 House 3 – Single Bedroom			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). The rooms have good proportions to allow personal furniture items (chest of drawers, desk and chair) and choice of location for bed. This will change if equipment is required to assist with care. 2). Lighting is more than 150lux but it cannot be dimmed so may still be bright in evenings. 3). The bedroom room has large window with opportunity for ample natural light but this is largely blocked by the curtains in situ. 4). The walls a light in colour with dark contrast provided with the door frames.	1). Determine if there is a process by which the rooms are assessed and any items removed or altered space planning when access is limited or risks increase (to staff as well as resident) or use of equipment is required. 2). Provide key furniture items as 'standard' along with the bed such as bedroom chair, bedside cabinet and overbed table. 3). Install a range of lighting options and dimmer switches to be able to control the intensity of the lighting according to time of day/night to assist with circadian rhythms. 4). Amend drapes to frame the window to maximise the natural light. 5). Lighten the door frames as contrast is crucial rather than strength of colour and this would create a softer and more domestic appearance.	  

6.2 House 3 – Bathroom			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	As per 5.2	As per 5.2	As per 5.2

7. House 2 – Activity			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
   	1). The lounge room in house 2 is also used as an activity room as there is not a designated activity room available at the facility. 2). Significant natural light coming through large windows on north and east sides is impacted by the positioning of the curtains. 3). The TV is hard to view during the day due to the glare from the windows. 4). There are a variety of furniture pieces with some plastic pieces in situ which do not harmonise with each other or the window treatments. 5). The room does not have the artificial lighting levels recommended for activities (400 to 500lux) but does for lounge room. Dispersion is inconsistent due to location and height of lights sources and lighting cannot be dimmed.	1). Consider relocating the activity room to a new area such as a converted carport? Activity specific units can then be installed to accommodate supplies – including cabinets with foldout tables and storage within the doors. Required lighting levels can be addressed also. 2). Amend or replace drapes to frame the window to maximise the natural light and install sheer behind to minimise glare. 3). Revert lounge room to such and replace furniture in keeping with a scheme (ensure functionality) and remove any items no longer being used or required. Due to the size of the room, consider separate sections for TV viewing and for reading/games. 4). Install dimmer switches to be able to control the intensity of the lighting according to time of day/night to assist with circadian rhythms and include reading lamps.	   

8. External			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
 	1). Refer to 4.5 regarding incorporating one side of covered walkways into gardens between houses to provide useable covered areas outdoors. 2). The route on the walkways is level but the lighting appears to be in the centre of the walkway only which would not provide adequate lighting at night time. 3). There are no signs to assist with navigation between houses. 4). House numbers do not easily stand out as the doors are recessed.	1). Refer to 4.5 2). Increase lighting options in walkways or consider see through sections (being aware of additional cleaning requirements though). 3). Install directional signage between houses and at junctions of walkways. 4). Improve house number visibility which can be through LED lit numbers to assist with low light or evening times. Add directional signage for people to easily identify the relevant house.	   

8. External - Continued			
Image	**Observations**	**Recommendations**	**Illustrative Examples**
  	1). Multiple rubbish bins lined up are in view when walking between the houses. 2). Some areas of the pavement are uneven which poses a trip risk. 3). There is designated parking directly in front of the gates and a large community car park approximately 20 meters to here providing ample parking. Navigation from carpark to reception is not clear.	1). Review whether all the bins are required and if there is an option to have either fewer bins or a larger volume bin that is taken away on a schedule. Either way, consider decorative panels to screen the bins. 2) Review the pavement and address the relevant sections as required. 3). Once the plan for the overall facility is confirmed including location/direction of reception, then implement directional signage to the key areas.	 

4. Conceptualisation

Bigger picture ideas were also requested and whilst these are certainly subject to architectural feedback and budget considerations, they may initiate discussion and thinking to identify opportunities for Canning Lodge in the short and longer term:

- Cars to no longer enter through the gates and park at the front instead. The gated entry is reconfigured to create an internal community that could potentially be for people living with a diagnosis of dementia. The scale, accessibility, potential for extensive connection to outdoors, smaller house model is ideal to support people living with cognitive impairment - particularly if they are ambulant. The wayfinding, cueing, sensory and engagement opportunities could be maximised. Canning Lodge could be a leading example of what is possible through sensitive and selective refurbishment!
- Cars to no longer enter through the gates and park at the front instead for this option also. The central area becomes a clubhouse/services block from which all houses can access and connect to. It would be the hub or the heart of Canning Lodge and offer opportunities for wellness, leisure and engagement.
- If cars are preferred to be able to enter the complex, then to close in the existing brick carports to maximise useable or habitable space and erect pole framed carports in front instead. This has been referred to in a number of instances in this report as several carports currently act in some form of storage capacity.

5. Conclusion

In conclusion, there are many exciting architectural and design innovations that are possible for Canning Lodge both internally and externally which provide opportunities for innovation and to expand on the domestic model which is the essence of the facility. If carport conversions are feasible and a more realistic budget initiative than other major works, then additional examples for use of this space are overleaf.

Canning Lodge's contribution to the environmental audit tool study is greatly appreciated and it is hoped that the information contained in this report is informative, provides a vision and direction for the way forward.

Physiotherapy or gym or fitness:

Garden centre:

Other internal suggestions include:

Whiteboard doors:

Pull out shelves:

6. References

1. Neylon, Samantha & Bulsara, Caroline & Hill, Anne-Marie. (2019). Improving Australian Residential Aged Care Facilities: A Review of Minor Refurbishment Elements. Journal of Housing For the Elderly. 1-17. 10.1080/02763893.2018.1561591.
2. Lewis, Alan & Torrington, Judith & Barnes, Sarah & Darton, Robin & Holder, Jacquetta & McKee, Kevin & Netten, Ann & Orrell, Alison. (2010). EVOLVE: A tool for evaluating the design of older people's housing. Housing, Care and Support. 13. 10.5042/hcs.2010.0709.