What are the Causes and Consequences of Impaired Sleep Quality During and Following Extended Hospitalisation Amongst Older Adults?

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Bachelor of Occupational Therapy (Honours)

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To Sleep

William Wordsworth (1770–1850)

A flock of sheep that leisurely pass by
One after one; the sound of rain, and bees
Murmuring; the fall of rivers, winds and seas,
Smooth fields, white sheets of water, and pure sky;—

I've thought of all by turns, and still I lie
Sleepless; and soon the small birds' melodies
Must hear, first utter'd from my orchard trees,
And the first cuckoo's melancholy cry.

Even thus last night, and two nights more I lay,
And could not win thee, Sleep! by any stealth:
So do not let me wear to-night away:

Without Thee what is all the morning's wealth?
Come, blesséd barrier between day and day,
Dear mother of fresh thoughts and joyous health!

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ABSTRACT

Background: Impaired sleep is distressing and can negatively impact the physical and psychosocial functioning of older adults (Ancoli-Israel, 2009; Redeker, 2000). Central to this program of research is the prevalence of impaired sleep in older adults, which has been reported to occur in 30% to 43% of this segment of the population (Ancoli-Israel, 2009). Demography in developed nations internationally consistently demonstrates an increasing proportion of those aged 65 years and over for the coming years. Concurrent with this, the higher rate of hospital admissions by older adults compared with those aged less than 65 years of age and this will continue to increase in the coming years. This increases the importance of understanding whether there is a relationship between admission to hospital and sleep quality for adults 65 years of age and older.

Aim: The primary aim of this research is to investigate the causes and consequences of impaired sleep quality amongst older adults both during and after an extended period of hospitalisation.

Methods: This prospective, cohort study gathered data regarding the sleep quality, health outcomes, and activity participation of patients 65 years or older who had experienced an extended hospitalisation (14 days or more) in one of five hospitals located in metropolitan Melbourne, and urban Mornington Peninsula, Victoria, Australia.

We recruited participants who: (1) were aged 65 years or more; (2) had an extended period of hospitalisation of 14 days or longer; (3) were previously community-dwelling and were returning to community-dwelling post-discharge; (4) had sufficient cognitive skills to answer survey questions; and (5) had sufficient language ability to undertake interviews. Each participant was approached during their hospitalisation prior to their discharge and asked to complete standardised self-report measures, including the

Pittsburgh Sleep Quality Index, during their hospital stay (regarding pre-hospital and hospital admission experiences) and followed-up at home at three- and six-months post-discharge.

Results: There were 311 participants at baseline, 241 at three-month post-discharge, and 218 retained at the final six-month follow-up interview. This study identified that pre-hospital sleep quality was the singularly most important indicator of sleep quality experienced during and post-hospitalisation. To some degree, older adults who were potentially at greater risk for impaired sleep quality included those who had symptoms of depression and/or anxiety, higher levels of education, a 'conscientious' personality, not had a stroke, high levels of stoicism and fortitude regarding pain, and a bedtime post 8pm prior to their hospitalisation. Furthermore, sleep quality levels on average did not return to pre-hospital sleep quality level by three- or six-months post-hospitalisation.

The present approach to management of sleep quality for older adults is not systematic despite availability of evidence supporting non-pharmacological approaches to the management of impaired sleep. Poor sleep during hospital admission for older adults was not a predictor of poorer health outcomes related to quality of life, symptoms of depression and/or anxiety, social isolation, or household or recreational activity participation at three- and six-months post-discharge.

Conclusion: The studies presented within this doctoral thesis demonstrate the necessity for continued recognition and understanding of sleep quality of older adults and its potential short-and long-term mitigating factors, particularly those who are potentially at greater risk for impaired sleep quality.

GENERAL DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature: 

Print Name: Aislinn Lalor

Date: 29th May 2017

THESIS INCLUDING PUBLISHED WORKS DECLARATION

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes one original paper published in a peer reviewed journal and five unpublished publications currently under review. The core theme of the thesis is to explore the causes and consequences of impaired sleep quality of older adults following extended hospitalisation. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Faculty of Medicine, Nursing and Health Sciences (Department of Physiotherapy) under the supervision of Professor Terry Haines.

The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research.

In the case of six chapters that contain publications (of a total of seven chapters), my contribution to the work involved the following:

Table of publications in thesis

Thesis Chapter & Section	Publication Title	Publication Status	Nature and extent of candidate's contribution	Co-author name(s) and extent of co-author's contribution	Co-authors, Monash student Y/N
1	Impact of hospitalisation on sleep of older adults during and after hospitalisation: A systematic review and meta-analysis	Under review *Sleep Medicine Reviews*	Conception of the study, undertook data collection, led data analysis and synthesis,	O'Brien, L.: Contributed independent data extraction 2.5% Brown, T.: Contributed to the conception of the study and assisted in drafting of the	N N

Thesis Chapter & Section	Publication Title	Publication Status	Nature and extent of candidate's contribution	Co-author name(s) and extent of co-author's contribution	Co-authors, Monash student Y/N
			drafted and prepared the manuscript for publication 75%	manuscript 7.5% Haines, T.P.: Contributed to the conception of the study, undertook data analysis, assisted in drafting of the manuscript 15%	N
2	Anxiety and Depression during Transition from Hospital to Community in Older Adults: Concepts of a Study to Explain Late Age Onset Depression	Published *Healthcare*	Concept and drafted and prepared the manuscript for publication: 65%	Robins, L.: Input into manuscript 2.5% Lee, D-C.A.: Input into manuscript 2.5% Brown, T.: Concept and input into manuscript 7.5% O'Connor, D.: Concept and input into manuscript 2.5% Russell, G.: Concept and input into manuscript 2.5% Stolwyk, R.: Concept and input into manuscript 2.5% McDermott, F.: Concept and input into manuscript 2.5% Johnson, C.: Concept and input into manuscript 2.5% Haines, T.P.: Concept and input into manuscript 10%	Y Y N N N N N N N

Thesis Chapter & Section	Publication Title	Publication Status	Nature and extent of candidate's contribution	Co-author name(s) and extent of co-author's contribution	Co-authors, Monash student Y/N
3	Factors of impaired sleep quality of hospitalised older adults	Under review *Research on Aging*	Conception of the study, undertook data collection, led data analysis and synthesis, drafted and prepared the manuscript for publication 70%	Brown, T.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Stolwyk, R.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% McDermott, F.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Russell, G.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Haines, T.P.: Contributed to the conception of the study, undertook data analysis, assisted in drafting of the manuscript 15%	N N N N N
4	Factors of impaired sleep quality post-hospitalisation of older adults	Under review *Research on Aging*	Conception of the study, undertook data collection, led data analysis and synthesis,	Brown, T.: Contributed to the conception of the study and assisted in drafting of the manuscript 7.5% McDermott, F.: Contributed to the conception of the	N N

Thesis Chapter & Section	Publication Title	Publication Status	Nature and extent of candidate's contribution	Co-author name(s) and extent of co-author's contribution	Co-authors, Monash student Y/N
			drafted and prepared the manuscript for publication 70%	study and assisted in drafting of the manuscript 2.5% Stolwyk, R.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Russell, G.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Haines, T.P.: Contributed to the conception of the study, undertook data analysis, assisted in drafting of the manuscript 15%	N N N
5	Management of older adults' sleep following hospitalisation: Are health professional consultations working?	Under review *Behavioural Sleep Medicine*	Conception of the study, undertook data collection, led data analysis and synthesis, drafted and prepared the manuscript for publication 70%	Brown, T.: Contributed to the conception of the study and assisted in drafting of the manuscript 7.5% McDermott, F.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Stolwyk, R.: Contributed to the conception of the study and assisted in drafting of the	N N N

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				manuscript 2.5% Russell, G.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Haines, T.P.: Contributed to the conception of the study, undertook data analysis, assisted in drafting of the manuscript 15%	N N
6	Could losing sleep quality in hospital be good for your health?: Results of a prospective cohort study	Under review *Age and Ageing*	Conception of the study, undertook data collection, led data analysis and synthesis, drafted and prepared the manuscript for publication 70%	Brown, T.: Contributed to the conception of the study and assisted in drafting of the manuscript 7.5% McDermott, F.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Stolwyk, R.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Russell, G.: Contributed to the conception of the study and assisted in drafting of the manuscript 2.5% Haines, T.P.: Contributed to the	N N N N

Thesis Chapter & Section	Publication Title	Publication Status	Nature and extent of candidate's contribution	Co-author name(s) and extent of co-author's contribution	Co-authors, Monash student Y/N
				conception of the study, undertook data analysis, assisted in drafting of the manuscript 15%	

I have renumbered sections and reformatted referencing style of submitted or published papers in order to generate a consistent presentation as well as a consolidated reference list within the this doctoral thesis.

Student signature: [redacted] Date: 29th May 2017

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student's and co-authors' contributions to this work. In instances where I am not the responsible author I have consulted with the responsible author to agree on the respective contributions of the authors.

Main Supervisor signature: [redacted] Date: 29th May 2017

PUBLICATIONS DURING ENROLMENT

Peer reviewed publications arising from this thesis

Lalor, A. F., Brown, T., Robins, L., Lee, D-C. A., O'Connor, D., Russell, G., Stolwyk, R., McDermott, F., Johnson, C., & Haines, T. P. (2015). Anxiety and depression during transition from hospital to community in older adults: Concepts of a study to explain late age onset depression. *Healthcare, 3*(3), 478-502. doi:10.3390/healthcare3030478

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Lalor, A. F., Brown, T., McDermott, F., Stolwyk, R., Russell, G., Haines, T. P. (2017, under review).Management of older adults' sleep following hospitalisation: Are health professional consultations working? *Behavioural Sleep Medicine.*

Lalor, A. F., Brown, T., McDermott, F., Stolwyk, R., Russell, G., Haines, T. P. (2017, under review).Could losing sleep quality in hospital be good for your health?: Results of a prospective cohort study. *Age and Ageing.*

Components of thesis presented at National and International conferences

Lalor, A. F., Brown, T., Russell, G., & Haines, T. P. (2017). Factors associated with impaired sleep quality of older adults during and following hospitalisation: A potential role for occupational therapists? Occupational Therapy Australia 27th National Conference & Exhibition 2017, Perth, July 19-21 (Oral presentation)

Lalor, A. F., Brown, T., Russell, G., & Haines, T. P. (2017). The management of older adult's sleep following hospitalisation: Are health professional consultations working? Occupational Therapy Australia 27th National Conference & Exhibition 2017, Perth, July 19-21 (E-poster presentation)

Lalor, A. F., Brown, T., Russell, G., & Haines, T. P. (2017). Association of impaired sleep quality on health outcomes post-hospitalisation for older adults: Issues for occupational therapists to consider. Occupational Therapy Australia 27th National Conference & Exhibition 2017, Perth, July 19-21 (E-poster presentation)

Lalor, A. F., Brown, T., Russell, G., & Haines, T. P. (2017). Older adult's sleep management post-hospitalisation: Are health professional consultations working? Canadian Association of Occupational Therapists National Conference 2017, Charlottetown, Prince Edward Island, June 21-24 (Oral presentation)

Lalor, A. F., Brown, T., Russell, G., & Haines, T. P. (2017). Older adult's sleep quality: A potential role for occupational therapists? Canadian Association of Occupational Therapists National Conference 2017, Charlottetown, Prince Edward Island, June 21-24 (Oral presentation)

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Lalor, A. F., Brown, T., Russell, G., & Haines, T. P. (2017). Management of older adult's sleep post-hospitalisation: Are health professional consultations working? Victorian Allied Health Research Conference, Melbourne, March 31 (Oral presentation)

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Melbourne, March 31 (E-poster presentation)

Lalor, A. F. (2016). Sleep quality of older adults: BeyondBlue Project Results Dissemination. Knowledge Translation Workshop examining depression and anxiety in older adults recently discharged from hospital in conjunction with BeyondBlue, Monash Health, Peninsula Health, and Monash University, Melbourne, August 15 (Oral Presentation)

Lalor, A. F. (2016). Impaired sleep quality and extended hospitalisation amongst older adults. Department of Occupational Therapy, Monash University, Research Meeting, June 21 (Oral Presentation)

Lalor, A. F. (2013). Sleep as a self-care occupation in older adults: Implications for occupational therapy. 25th National conference for OT Australia 2013, Adelaide, July 24-26 (Oral Presentation)

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ABBREVIATIONS

6-CIT	6-item Cognitive Inventory Test
AIHW	Australian Institute of Health and Welfare
ABS	Australian Bureau of Statistics
AOTA	American Occupational Therapy Association
APA	American Psychiatric Association
BRCS	Brief Resilient Coping Scale
CPAP	Continuous Positive Airway Pressure therapy
CTT	Color Trails Test
DAQ	Death Anxiety Questionnaire
DSM-V	Diagnostic and Statistical Manual of Mental Disorders (Fifth edition)
DST	Dynamic Systems Theory
EEG	Electroencephalogram
ESS	Epworth Sleepiness Scale.
EQ-5D-5L	EuroQol-5 Dimensions-5 Levels
FITT	Frequency, Intensity, Time, and Type
FSS	Friendship Scale
GAI	Geriatric Anxiety Inventory
GDS-SF	Geriatric Depression Scale – Short Form (sometimes abbreviated as GDS15 as it has 15 items, however more commonly abbreviated as GDS-SF as will be used throughout this thesis)
GP	General Practice.
ICF	International Classification of Functioning, Disability and Health
ISS	Intrinsic Spirituality Scale
LSNS-6	Lubben Social Network Scale Abbreviated (six items)
MOHO	Model of Human Occupation
N1	Stage 1 of NREM sleep
N2	Stage 2 of NREM sleep
N3	Stage 3 of NREM sleep
NREM	Non Rapid Eye Movement or non-REM sleep
OTPF-III	Occupational Therapy Practice Framework (Third edition)
PAQ-R	Pain Attitudes Questionnaire (Revised)
PLMD	Periodic Limb Movement Disorder
PSQI	Pittsburgh Sleep Quality Index

PSG	Polysomnography
QoL	Quality of Life
REM	Rapid Eye Movement sleep
RSL	Restless Leg Syndrome
SC	Sleep continuity
SE	Sleep efficiency
SWS	Slow-Wave Sleep or Stage 3 of NREM sleep (N3)
TIB	Time in Bed
TIPI	Ten-Item Personality Inventory
TST	Total Sleep Time
UDI-6	Urogenital Distress Inventory (six items)
WASO	Wakefulness After Sleep Onset
WHO	World Health Organization

GLOSSARY

EEG Electroencephalogram, is the recording of brain activity.

N1 Otherwise referred to as Stage 1 sleep, is the lightest stage of sleep.

N2 Otherwise referred to as Stage 2 sleep, is a light stage of sleep in which most adults spend approximately half the night sleeping.

N3 Stage 3 of NREM sleep, also referred to as *slow-wave sleep* (SWS), is the deep stage of sleep and is believed to be the most restorative stage of sleep.

NREM *Non Rapid Eye Movement*, or non-REM sleep, is a recurring phase of sleep during which rapid eye movements do not occur and dreaming does not occur. A person moves from lighter stages of sleep (N1 and N2) to deeper sleep (N3, *slow-wave sleep* (SWS)) prior to entering the *Rapid Eye Movement* (REM) sleep phase.

Older Adult Any adult of chronological age 65 years or more.

REM *Rapid Eye Movement*, a phase of sleep characterised by rapid eye movements, dreaming, bodily movement, faster breathing and increased pulse and occurs at intervals during the night following NREM sleep.

Sleep A natural, periodic state of immobility where the individual is relatively unaware of the environment and unresponsive to external sensory stimuli (Paterson, 2012).

Sleep Architecture Visual representation of the way sleep stages are organised throughout a polysomnographically recorded sleep interval (Insana, 2013).

Sleep Continuity or Efficiency Amount and distribution of sleep versus wakefulness in a given sleep period; it includes both sleep initiation and sleep maintenance (Hall, Greeson, & Mezik, in press, as cited in Mezik, 2013). It relates to the ease of falling asleep and also returning to sleep if woken (Buysse, 2014).

Sleep Duration Total amount of sleep obtained, either during the nocturnal sleep episode or across the 24-h period (Kline, 2013).

Sleep Latency Amount of time needed to fall asleep (Hall, 2013).

Sleep Quality A subjective aspect of sleep and refers to ones' perceptions of tiredness on waking, daytime fatigue, feelings of being rested and

restored on waking, subjective adequacy of sleep, or the subjective frequency of night-time awakenings (Kucharczyk, Morgan, & Hall, 2012) or “one’s satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening” (Kline, 2013, p. 1811).

Slow-Wave Sleep Stage 3 (N3) of NREM sleep (deep sleep), so called due to the pattern recorded of it on an EEG.

Time in Bed the total hours elapsed between getting into bed to go to sleep at night and waking up in the morning (Hall, 2013).

Total Sleep Time is the amount of Time in Bed (TIB) minus Sleep Latency and Wakefulness after Sleep Onset (WASO) (Hall, 2013).

Wakefulness After Sleep Onset is the amount of time spent awake during the night (Hall, 2013).

CHAPTER 1

INTRODUCTION & BACKGROUND

Sleep is the best meditation.

(DALAI LAMA)

CHAPTER 1 INTRODUCTION & BACKGROUND

1.1. Outline of candidature

This thesis was undertaken to fulfil the requirements of the Doctor of Philosophy at Monash University, Melbourne, Victoria, Australia. This thesis contains published and unpublished manuscripts, presented in a traditional format. Supporting information discussed in the thesis are provided in the relevant appendices.

Overall increasing research highlights the frequent and negative effects of impaired sleep. Central to this doctoral research is the experiences of sleep of community-dwelling older adults who have been hospitalised, during and following their hospitalisation. This thesis is divided into seven chapters. This thesis considers the interface of two major issues: poor sleep quality and hospitalised older adults. In this chapter, the doctoral research is contextualised and a rationale given for examining the experience of poor sleep for older adults. Firstly, a comprehensive background to the current study is outlined, including an overview of what sleep is and how it impacts wellbeing, particularly for older adults who have been hospitalised. The chapter focuses on the relevant literature and evidence that informs and guides the current study regarding sleep and its relation to older adults. Chapter 1 also provides a manuscript (currently under review) of a systematic review and meta-analysis of the existing literature regarding the impact of hospitalisation on the sleep of older adults, both during and following their hospitalisation, and an outline of the research aim and questions.

Chapter 2 presents the methodology and methods underpinning the research including a published manuscript. Chapters 3-6 present four manuscript publications (currently under review) arising from this doctoral research. Chapter 7 presents a summary of the results and a conclusion of the main findings, theoretical contextualisation, strengths and limitations of this research, implications for clinical

and professional practice, future recommendations, and final words of the doctoral candidate and primary researcher.

1.2. Context to this doctoral research

Impaired sleep is distressing and can impact physical and psychosocial functioning (Ancoli-Israel, 2009; Redeker, 2000). Self-reported sleep issues frequently reported include insomnia, restless leg syndrome, and obstructive sleep apnoea and occur in 10% to 48% of the general population (Ford & Kamerow, 1989; Ohayon & Paiva, 2005; Ohayon & Partinen, 2002; Ohayon & Zully, 2001). Central to this program of research is the prevalence of impaired sleep in older adults, which has been reported to occur in 30% to 43% of this population (Ancoli-Israel, 2009), and are most prevalent in this population (Bloom et al., 2009).

There is a growing interest in the impact of impaired sleep, which have been typically under-recognised worldwide. In an Australian context, Access Economics Pty Ltd (2004) explored the experiences and value of healthy sleep. There have been very few studies of the prevalence of disturbed sleep in Australia. In the absence of extensive data, this report estimated that 1.2 million Australians (6% of the population) experienced some form of sleep disorder (Access Economics Pty Ltd, 2004) and that 90% of people will suffer from a sleep disorder at some time in their lives (Boston Consulting Group, 2003). In addition, it was identified that sleep disorders within Australia are associated with development of other diseases (e.g. depression, diabetes, kidney and cardiovascular disease) (Access Economics Pty Ltd, 2004). Most recently, Deloitte Access Economics (2017) estimate 7.4 million Australian adults did not get regular needed sleep in 2016-17. These results concur with another recent large scale sleep health survey in Australia estimating that 20.7% Australians have insufficient sleep (Adams, Appleton, Taylor, Gill, et al., 2017). Furthermore, it was estimated there will be $40.1 billion lost in wellbeing in Australia

in 2016-17, equating to 228,162 disability adjusted life years (DALYs) incurred, and financial costs or losses to the health system ($1.8 billion), productivity ($17.9 billion), informal care ($0.6 billion), and other costs ($5.9 billion) (Deloitte Access Economics, 2017). Overall, the total cost of inadequate sleep in Australia in 2016-17 was estimated to be $66.3 billion and equates to financial and wellbeing costs of $8,968 per person affected by inadequate sleep (Deloitte Access Economics, 2017).

1.3. Part I: What is sleep?

Sleep has been defined as “a natural, periodic state of immobility where the individual is relatively unaware of the environment and unresponsive to external sensory stimuli” (Paterson, 2012, p. 18). Importantly, during this state of being, an individual’s brain remains active while the metabolic rate reduces and most voluntary muscles become inactive. Many studies have identified that sleep is important to our health (Lichtenstein, 2015), and within America, insufficient sleep has been identified as an unmet public health problem (Institute of Medicine [US] Committee on Sleep Medicine and Research, Colten, & Altevogt, 2006; Centers for Disease Control and Prevention, 2015). Previous studies by the National Heart, Lung, and Blood Institute, have highlighted that people who experience sleep deficiency are at increased risk of many health complications, including diabetes, stroke, obesity, kidney disease, heart disease and high blood pressure (Lichtenstein, 2015).

1.4. Importance of sleep

Over the last few decades, there has been an exponential increase in the understanding of sleep. Until recently, sleep was considered a passive experience however, evidence now suggests that our brains are very active during sleep (Paterson, 2012), and sleep is a highly regulated and controlled process. Moreover, sleep affects daily functioning and physical and mental health in many ways that are only beginning to be understood (Ancoli-Israel, 2009; Redeker, 2000). There is

growing understanding that the function of sleep is multivariate and is crucial for health, wellbeing and brain functioning.

1.4.1. Stages of sleep

The typical nocturnal sleep period for healthy adults cycles between two types of sleep: *non rapid eye movement* (non-REM) sleep and *rapid eye movement* (REM) sleep (Kryger, Roth, & Dement, 2011). Non-REM sleep is a recurring phase of sleep during which rapid eye movements and dreaming do not usually occur. Non-REM sleep has three further stages in relation to depth of sleep at that stage. A person moves from lighter stages of sleep (N1 and N2) to deeper sleep (N3) prior to entering REM sleep phase. Stages of sleep are referred to as *light* or *deep* depending on how difficult or easy it is to rouse someone and for them to become fully orientated to their surroundings. Stage 3 (N3) is also referred to as *slow-wave sleep*. Non-REM sleep accounts for approximately 75% of the sleep period in a healthy adult and is more prevalent during the first third of the sleeping period. Following non-REM sleep, a person usually transitions into REM sleep, which is a phase of sleep characterised by rapid eye movements, dreaming, bodily movement, faster breathing and increased pulse. REM sleep is more prevalent in the last third of sleep and individual non-REM - REM cycles tend to last approximately 90 minutes.

1.4.2. How is sleep described?

Sleep architecture and *sleep quality* are common terms used to describe sleep.

1.4.2.1. Sleep architecture

Sleep architecture is the visual representation of the way sleep stages are organised throughout a polysomnographically recorded sleep interval (Insana, 2013). Polysomnography (PSG) is a multi-parametric test used to study sleep and assist

with diagnosis of sleep impairments. An example of sleep architecture of a typical younger adult is depicted in the hypnogram presented in Figure 1.1a.

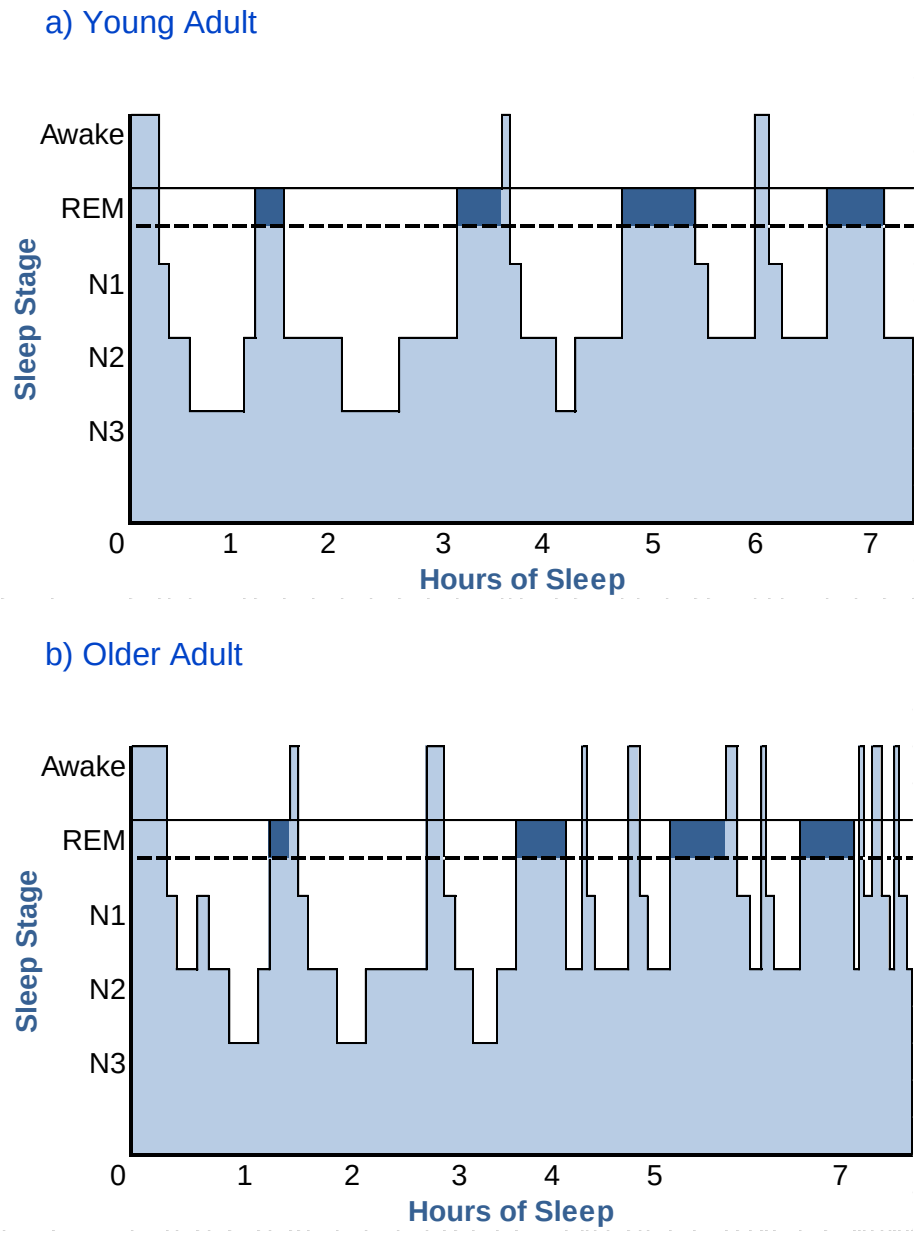

Figure 1.1. Hypnograms of polysomnography of sleep architecture for typical younger adult (a) and older adult (b). *Note. Horizontal lines indicate time spent in each sleep stage. Vertical lines indicate transitions between sleep stages.*

Across the lifespan, there is a change in the stages of sleep and sleep architecture varies accordingly. With increasing age, Stage 1 (N1; 'lighter' sleep) increases in length, whilst Stage 3 (N3; 'deeper' sleep) and REM sleep both reduce. This variation of sleep architecture over the lifespan is evident when comparing the

hypnograms of a typical younger adult with that of a typical older adult in Figure 1.1a and b. While sleep tends to become fragmented, shallow and variable in duration for older adults compared to younger adults, sleep problems are often independent to these normal changes in sleep architecture associated with age (Ancoli-Israel, 2006).

A comparison of two large studies by Ohayon, Carskadon, Guilleminault, and Vitiello (2004) and Redline et al. (2004), showed that the "bulk of age-related sleep changes occurs in early and middle adulthood (years 19-60)" (Vitiello, 2012, p. 173) and that "further age-related sleep changes are modest" (Vitiello, 2012, p. 173). Additionally, older adults tend to have increased daytime napping and decreased total night-time sleep (Woodward, 2012). They also tend to spend more time in bed at night, although the amount of this time spent asleep is reduced (Unruh et al., 2008). Therefore, it is generally agreed that the ability to sleep decreases with age, not as a result of aging per se, but usually as a result of an exacerbation of other factors in life as one ages, including multi-morbidities, psychological distress (depression and/or anxiety), and reduced physical function and capacity (Ancoli-Israel, 2006; Bloom et al., 2009).

1.4.2.2. Sleep quality

Sleep quality is a subjective aspect of sleep and refers to ones' perceptions of tiredness on waking, daytime fatigue, feelings of being rested and restored on waking, subjective adequacy of sleep, or the subjective frequency of night-time awakenings (Kucharczyk, Morgan, & Hall, 2012). The dimension of *sleep quality* varies amongst individuals. Characteristics of *sleep quality* can:

1. vary across the life span (Colten & Altevogt, 2006; Ohayon, et al., 2004),
2. be further moderated by gender (Thomas, Lichstein, Taylor, Riedel, & Bush, 2014; Carrier, Land, Buysse, Kupfer, & Monk, 2001),
3. be affected by ethnicity (Ancoli-Israel, 2010; Blazer, Hays, & Foley, 1995;

Ruiter, DeCoster, Jacobs, & Lichstein, 2010),

4. be affected by level of physical activity (Anand et al., 2013),
5. be affected by physical health conditions (Piccolo, Yang, Bliwise, Yaggi, & Araujo, 2013), and,
6. be affected by mental wellbeing (Anand et al., 2013).

Furthermore, changes in these dimensions can impact mortality. Research suggests an association between sleep duration (progressively shorter or longer sleep duration; <7h or >8h per night) with an increased risk of mortality (Cappuccio, D'Elia, Strazzullo, & Miller, 2010). Additional research however advises that these conclusions are premature as further attention regarding measurement, response bias, causation, and interpretations of associations between sleep duration and mortality are required (Kurina et al., 2013).

Sleep quality lacks a clear established definition (Krystal & Edinger, 2008). It can be conceptualised as a multidimensional construct with many underlying domains contributing to this. Existing literature is inconsistent in naming and measurement approaches of these underlying domains. Harvey, Stinson, Whitaker, Moskovitz, and Virk (2008) reported that a preliminary definition of sleep quality based on views of participants with and without insomnia, should include "reference to tiredness on waking and throughout the day, feeling rested and restored on waking, and the number of awakenings in the night" (p. 392). Refer to Table 1.1 for a description of a range of domains that measure the broader construct of sleep quality that have been previously described and applied.

Wade (2011) noted that there has been a transition in the field of sleep medicine from a strong focus on sleep quantity towards the increased recognition of the importance of sleep quality, and therefore the importance of a unified definition of sleep quality. Buysse, Reynolds, Monk, Berman, and Kupfer (1989) stated that *sleep*

Table 1.1
Description of domains of sleep quality.

Domain	Description
Sleep continuity	Amount and distribution of sleep versus wakefulness in a given sleep period (Hall, Greeson, & Mezick, in press, as cited in Mezik, 2013). It includes both *sleep initiation* and *sleep maintenance*. Both objective and subjective instruments can be, and are, used to measure sleep continuity.
Sleep duration	Total amount of sleep obtained, either during the nocturnal sleep episode or across the 24-h period (Kline, 2013). The definition of 'short' or 'long' sleep duration is considerably variable as established by Cappuccio et al. (2010) in their systematic review of sleep duration and all-cause mortality.
Tiredness on waking	Tiredness is recognised as the state of wishing for sleep or rest; weariness. Tiredness on waking in relation to sleep quality is considered tiredness on 'waking and throughout the day' (Harvey et al., 2008).
Daytime fatigue	Fatigue is defined as "(a) a self-recognised phenomenon that is (b) subjective in nature and is (c) experienced as a feeling of weariness, tiredness, or lack of energy that varies in degree, frequency, and duration" (Irvine, Vincent, Graydon, Bubela, & Thompson, 1994, p. 368). Fatigue generally has a gradual onset and can be alleviated by periods of rest. Daytime fatigue is "generally associated with disruptions in sleep patterns that are the primary symptom of insomnia" (Donovan & Jacobsen, 2007, p. 129).
Feelings of being rested and restored on waking	According to the Cambridge Dictionary, rested means "healthy and active after a period spent relaxing". Similarly, restored means "to return something or someone to an earlier good condition or position". Thus, feelings of being rested and restored on waking indicate that one should feel healthy and active, as they have previously, upon waking.
Subjective adequacy of sleep	Adequacy is defined as "the quality of being good enough for a particular purpose" (Cambridge Dictionary). Subjective adequacy of sleep is not easily defined, however is considered to be the perception of sufficient sleep by a person upon waking.
Frequency of night-time awakenings	Night-time wakefulness is recognised as "a mean percentage of night-time sleep (time asleep over time monitored) of less than 80% over 2 nights" (Alessi et al., 2005). Frequency of night-time awakenings refers to the number and rate of awakenings over the period of sleeping.
Sleep quantity	"The amount of sleep needed to feel rested" (McNeil, 2016, p. 167). Insufficient sleep quantity is considered to be short sleep duration.

quality is a “complex phenomenon that is difficult to define and measure objectively” (p. 194). Furthermore, sleep quantity does not determine sleep quality as there is no direct link between the two (Harvey et al., 2008). Wade (2011), in his focus on the societal costs of insomnia, also acknowledged that “sleep quality is not synonymous with sleep quantity” (p. 3) and that the difficulty of defining and measuring sleep quality is ongoing. There are benefits in considering the quantitative and qualitative aspects of sleep. Quantitative aspects of sleep include the time a person usually goes to bed, the time they usually wake up in the morning, the frequency of night-time sleep disruptions, and the amount of time a person is asleep at night. Qualitative aspects of sleep include perceptions of sleep quality, feeling rested, feeling energetic upon waking, and feeling enthusiastic about completing daily activities. Winwood, Winefield, and Lushington (2006) define sleep quality simply as perceived deep sleep. Kline (2013) defines sleep quality as “one’s satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening” (p. 1811). Kucharczyk et al. (2012) however, formed a definition for their review on the occupational impact of sleep quality, based on the outcomes of a study by Harvey et al. (2008). Harvey et al. (2008) compared the subjective meaning of the term ‘sleep quality’ between individuals with and without insomnia. In this doctoral research, sleep quality, as per Kucharczyk et al. (2012), will be considered as the subjective aspect of sleep and refers to ones’ perceptions of tiredness on waking, daytime fatigue, feelings of being rested and restored on waking, subjective adequacy of sleep, or the subjective frequency of night-time awakenings.

1.4.3. Measurement of sleep quality

In recent years, the availability of sleep assessment tools has increased significantly to aid clinical practice (Gooneratne & Vitiello, 2015). Sleep quality is

measured either subjectively or inferred from objective measures.

1.4.3.1. Objective sleep quality measures

Objective means of measuring sleep quality primarily measure neurological, musculoskeletal or cardiovascular processes that take place while people are trying to fall asleep, are asleep, and upon wakening. These processes have previously been measured using polysomnography, oximetry, or actigraphy. The polysomnography (PSG) is a composite of tests monitoring the brain (electroencephalography (EEG)), eye movements (electrooculography), muscle activation (electromyography), and heart rhythm (electrocardiogram). Polysomnograms are generally conducted in a laboratory, hospital or sleep clinic. From these measurements it is possible to provide data regarding the time it takes for someone to fall asleep (*sleep latency*), their total sleep time, amount of *wakefulness after sleep onset*, and *sleep efficiency*. It is also possible to provide a temporal amount relating to the time a person spends in various stages of sleep.

Oximetry is a non-invasive method of monitoring a person's saturation of oxygen and is usually undertaken in the home environment. It measures the oxygen levels and heart rate and can provide an indication of breathing disorders whilst sleeping, which may then affect the quality of a person's sleep. An actigraph, on the other hand, is a small unit that measures activity as it monitors movement. Actigraphs assess a person's circadian rhythm and detect possible disruptions that may exist. While both methods provide information regarding a person's sleep pattern they are however only able to provide indicators of such and are usually used in conjunction with PSG or a self-report measure of sleep.

Polysomnography can be expensive. It is usually conducted in a non-familiar environment and can be considered invasive due to the number of pads that are attached to the body and head to undertake all necessary measurements. Increased

use of portable sleep studies to allow for a sleep recording at home have limitations as to the data they can collect and have difficulty in determining if a person is awake or asleep (Gooneratne & Vitiello, 2015). Portable sleep studies also reportedly are limited to diagnosis or exclusion of sleep apnoea and no other impairments of sleep (Gooneratne & Vitiello, 2015). Research has also shown that some people complain of impaired sleep quality yet their measurements from a polysomnogram are considered comparable to normal, non-complaining individuals (Krystal, Edinger, Wohlgemuth, & Marsh, 2002).

1.4.3.2. Subjective sleep quality measures

Subjective scales of sleep quality can consist of multi-attribute scales that include items across a range of domains of sleep quality, or they could be single item scales that make use of Likert or visual analogue scaled responses, or they may be a record of sleep factors over a period of time (i.e., sleep diaries). Sleep diaries are the most widely used measures of sleep in research and have been able to demonstrate treatment effects and have been validated concurrently with actigraphic measures (Monk et al., 1994; Smith & Wegener, 2003). However, they can be burdensome for participants to complete; they often rely on participants to complete wake-time and night-time questionnaires every day for 1-2 weeks or longer. In addition to sleep diaries, there are many subjective sleep quality measures available. Commonly used subjective sleep quality measures, with good to excellent psychometrics, include the Insomnia Severity Index (Bastien, Vallie'res, & Morin, 2000), the Medical Outcomes Study (MOS) Sleep Scale (Stewart, Ware, Brook, & Davies, 1978, as cited in Smith & Wegener, 2003), the Pittsburgh Sleep Diary (PSD; Monk et al., 1994), and the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989).

The PSQI is the most widely used general measure of sleep quality for participants presenting with various medical diagnoses (Carpenter & Andrykowski,

1998; Fichtenberg, Putnam, Mann, Zafonte, & Millard, 2001), and is the measure that is used in the studies of this doctoral research. Respondents are asked to recall their sleep over the previous month. The 19-items measure seven equally-weighted component scores (0-3 each) of: (1) subjective sleep quality; (2) sleep latency; (3) sleep duration; (4) habitual sleep efficiency; (5) sleep disturbances; (6) use of sleep medication; and, (7) daytime dysfunction. The sum of the component scores provides a Global Score (range 0-21), where higher scores indicate poorer sleep quality. The original authors report a cut-off score of >5, which distinguishes poor sleepers from good sleepers (Buysse et al., 1989). The *PSQI* has been used and validated in a broad range of clinical populations (Smith & Wegener, 2003) and has high internal consistency (Cronbach's alpha=0.83) and adequate test-retest reliability (Buysse et al., 1989). Lau, Eskes, Morrison, Rajda, and Spurr (2013) established strong diagnostic sensitivity (89.6%) and specificity (86.5%) of the Global Score.

The tools listed previously provide subjective methods of report for the client and family and therefore tend to be more consistent in considering client-centred practice. Client- or patient-centred care incorporates a focus on the person's values as a priority – thus providing the opportunity for the therapeutic relationship to focus on the broader context and interests of the client. Forsyth et al. (2014) highlights that client-centred practice "must engage the client's volition" (p. 5). Volition, as reported in Chapter 2, is essentially a person's motivation for occupation (Kielhofner, 2008). However, it is imperative to connect with what motivates the client and determine what is important to them when reviewing sleep and planning an intervention. This understanding provides a broader perspective of a client in relation to what they do, how they do it, and why they do it. As a result, goals developed with a client reflect the client's preferences regarding their lifestyle. More research is required to explore older adult's experience of sleep, and the factors that enhance not only their sleep,

but also their lifestyle and wellbeing. This requires greater exploration of the qualitative aspects of sleep for an older adult. Hence, compared to objective measures of sleep, subjective measures provide a broader perspective of the occupation, routines, habits, and environment of sleep.

1.4.4. Sleep as an occupation

In occupational therapy, an occupation has been defined as “a specific individual’s personally constructed, nonrepeatable experience” (Pierce, 2001b, p. 139). Accordingly, Pierce and Summers (2011) highlight that sleep meets these conditions and is the “occupation without which we would soonest die” and “the foundation of all our waking occupations” (p. 736). As briefly mentioned, any disturbances in the occupation of sleep are clearly linked with changes in one’s health and wellbeing and can result from personal and environmental factors. The following sections provide a summary of disturbances of sleep, including the factors that cause sleep impairments and the consequences of sleep impairments. Limited extended knowledge exists in occupational therapy at present regarding the understanding of sleep and its basis for occupations upon waking (Pierce, 2001a). Theoretical models and frameworks are presented in Section 1.7 to extend the occupational understanding of sleep. As stated however, the environment can influence and impact sleep and further clarity regarding this will assist the understanding of sleep.

1.5. Role of environment on sleep

The role the environment can have on sleep is multifaceted and interconnected with the person. The environment not only consists of the physical space and objects within it, but also the social, cultural and temporal environments. The physical environment includes the space and objects within it but can significantly influence the experience, expectation and demands of sleep for an

individual.

1.5.1. Physical environment: temperature

Within the physical environment, various factors impact on sleep including air quality, sleeping equipment (i.e., bedding including mattress, linen, pillows, blankets, quilts, or doonas) in addition to three key components that need to be considered: temperature, noise and light. The core body temperature has an important part to play in relation to sleep. The production of melatonin in the body is promoted by a slight reduction in the core body temperature (Kräuchi, 2007; Kräuchi & Deboer, 2011). Initial evidence recommends bedrooms be cooler than warmer to optimise the core body temperature needed to aid sleep (Mindell & Owens, 2010). Lack et al. (2008) also highlight that the physiological processes required while sleeping in relation to the circadian rhythm can be disrupted if the core body temperature increases.

1.5.2. Physical environment: noise

Environmental noise from surroundings can impact sleep, as well as having negative effects on human health and wellbeing (World Health Organization [WHO], 2009). Background noises within a home including television, radio, electronic devices, and conversations, can interrupt the ability to fall asleep as well as remain asleep. Background noises within a hospital can include other patients, nursing and hospital staff, diagnostic procedures and equipment, and therapeutic procedures as part of the care routine (Kamdar, Needham, & Collop, 2012). Sleep disruption as a result of hospital noise influences both cardiovascular function and cortical brain activity (Buxton et al., 2012). Recommendations of the WHO (2009) suggest night noise levels should be under 30 decibels (dB) within the home, and should not exceed 35 dB (with a maximum of 40 dB) overnight within hospital environments. Where this is not possible, research suggests use of a constant or consistent sound

(like a fan) be used to block ambient noise (Berglund, Lindvall, & Schwela, 1999). Darbyshire and Young (2013) also recommend noise reduction mechanisms (like earplugs) on hospital wards where (like intensive care units [ICUs]) the WHO (2009) recommended levels are not achievable. More recently, Fillary et al. (2015) completed a scoping review of the literature regarding noise at night in hospitals and highlight little evidence to support effective intervention that reduces disturbance of night-time noise on hospital wards. Fillary et al. (2015) recommend a whole-systems approach to aid quality sleep and promote recovery.

1.5.3. Physical environment: light

The last physical environment factor to consider in relation to sleep is light. Burgess, Legasto, Fogg, and Smith (2013) highlighted that even small changes in exposure to light in the evening can negatively impact sleep quality and increase risk of misaligning the circadian rhythm. Use of electronic devices or equipment (like televisions, computers, laptops, or electronic devices or tablets) prior to bed also impact sleep as they emit blue-spectrum light which suppress the release of melatonin (Wood, Rea, Plitnick, & Figueiro, 2013). Additional exposure to night-time light (i.e., street lighting, nightlights, lights from devices within the room like alarm clocks) can also impact restorative sleep.

1.5.4. Sociocultural and temporal environments

In addition to the physical environment, social, cultural, and temporal environments or contexts can also interfere with sleep. Factors like socioeconomic status can impact on the sleeping arrangements within a home or even a hospital, where rooms may need to be shared. Adults and older adults may also share their bedroom and/or bed with their partner. Previous research has highlighted that bed partners can have their sleep disrupted to a level almost equivalent to that of their partner experiencing symptoms of snoring, restless leg syndrome, or sleep apnoea

(Pierce & Summers, 2011). Similarly, Rosenblatt (2006) highlighted that couples sharing a bed develop shared bed routines that are generally negotiated, bed-sharing skills, value of shared sleep, and the impact of ill health or sleep disorders generally impacts the sleep of both persons. Temporal factors within the home or hospital environment can also impact sleep. Routines of the individual and, where applicable, that of the partner or family, can support rhythm and balance of the day to aid restorative sleep. Without synchrony with the temporal context, sleep can be impaired. Within hospital environments, patients are expected to sleep at certain times and this may not always be reflective of their usual sleep times. Overall, the environment plays an important role in sleep and quality of sleep and if not optimised, can contribute to impairment of sleep.

1.6. Sleep impairments

Sleep impairments, or sleep disorders, are generally categorised into insomnias, hypersomnias (excessive sleepiness), circadian rhythm disorders (i.e., delayed sleep-phase), sleep-breathing disorders (i.e., obstructive sleep apnoea), narcolepsy (extreme tendency to fall asleep), parasomnias (i.e., nightmares), and sleep movement disorders (i.e., periodic limb movement disorder) (Gooneratne & Vitiello, 2015). Sleep impairments are common in the general adult population with 10% to 48% reported to experience some form of sleep impairment (Ohayon & Paiva, 2005). Furthermore, it is estimated that 90% of people will suffer some form of sleep impairment at some stage during their lives (Boston Consulting Group, 2003). Clinically, major concern exists due to the strong bidirectional relationship between sleep disorders and medical conditions including depression, cardiovascular disease and hypertension (Bloom et al., 2009). As a result, understanding the causes and consequences of sleep impairments can better assist with the diagnosis, treatment, and management of ones sleep impairments.

1.6.1. Factors that may cause sleep impairments

There are various factors that have been associated with reduced sleep quality in adult populations including, but not limited to, certain medications, neurologic disorders, general medical disorders, pain (vicious cycle factor), psychiatric disorders, mental health and wellbeing (vicious cycle factor), concurrent medical issues, behavioural or social issues, and the environment (Ancoli-Israel, 2006; Vitiello, 2012). Previous research examining impaired sleep quality in the general population has placed risk factors into categories of environmental, physiological, psychological, and behavioural.

1.6.1.1. Environmental

As Section 1.5 highlighted, factors within the environment have demonstrated an impact on sleep including noise, lighting, layout, and disruptions (Redeker, 2000). Park et al. (2014) identified patients within a hospital ward have increased sleep disturbances with increased number of patients within a room on a ward. Freedman, Gazendam, Levan, Pack, and Schwab (2001) highlighted critically ill patients receive up to 60 interruptions per night, from various environmental stimuli, impacting sleep and continually arousing patients from their sleep cycle. These interruptions can be due to noise, light, diagnostic procedures, and therapeutic procedures as part of the care routine (Kamdar et al., 2012).

Kamdar et al. (2012) do acknowledge however, that due to the underlying, unstable health issue of the patient requiring hospital treatment, this places them in a hospital setting where they can be affected by environmental factors. Halperin (2014) reviewed the literature regarding general environmental noise, particularly nocturnal noise, in relation to sleep disturbances and reported that noise can have direct and indirect influences on one's biological systems (including stress response, sleep architecture, subjective sleep quality, and impact the individual's wellbeing, cognition,

mood, and degree of sleepiness the following day). Similarly, Buxton et al. (2012) reviewed sleep disruption due to noise in hospitals and demonstrated the influence sounds during sleep have on both cardiovascular function and cortical brain activity.

1.6.1.2. Physiological

Sleep impairments have been significantly associated with many medical illnesses including cardiopulmonary diseases (Foley, Ancoli-Israel, Britz, & Walsh, 2004), osteoarthritis (Wilcox et al., 2000), and pain (Pilkington, 2013). Foley et al. (2004) reported data from the 2003 National Sleep Foundation's poll regarding sleep of Americans and highlighted poorer sleep (i.e., symptoms of insomnia, or increased daytime sleepiness) of patients with stroke, heart disease or pulmonary disease than in those without these illnesses. Wilcox et al. (2000) highlighted that poorer sleep was experienced in older adults with knee osteoarthritis and this was correlated with decreased self-rated health ($p<0.001$), greater knee pain ($p<0.05$), and poor functional status ($p<0.001$). Both acute and chronic pain have also been identified as contributing to poor sleep, particularly in hospitalised patients (Cole & Richards, 2007; Kamdar et al., 2012; Roehrs, Hyde, Blaisdell, Greenwald, & Roth, 2006). Pain has demonstrated to be both a cause and a consequence of poor sleep and it has been suggested that "lack of sleep quality is linked to a psychological process that influences the perception of physical symptoms such as pain" (Pilkington, 2013, p. 37; Smith & Haythornthwaite, 2004).

Medications used to treat underlying illnesses that older adults experience, including β-blockers, bronchodilators, decongestants, corticosteroids, anticholinerase inhibitors, diuretics, dopamine agonists, and selective serotonin reuptake inhibitors (SSRIs), have all been demonstrated to contribute to sleep impairment, insomnia, or excessive daytime sleepiness contributing to sleep problems at night (Ancoli-Israel, 2009; Cooke & Ancoli-Israel, 2006; Münch et al., 2005).

The circadian pacemaker of the body's biological rhythms (including the sleep-wake cycle and core body temperature) degenerates with age (Ancoli-Israel, 2009). This degeneration results in body systems either becoming weaker (i.e., decreased release of melatonin to assist regulation of the circadian rhythm makes the circadian rhythm weaker), or slower (i.e., rhythm amplitude contributing to less consistency of sleep-wake periods over a 24 hour period). Additionally, the circadian rhythm advances causing the phase of the sleep and wake times of a person to occur a number of hours earlier than usually expected. Older adults as a result tend to wake in the early hours of the morning and begin to feel sleepy in the early hours of the evening.

There is a significant relationship between physiological arousal and ongoing or accelerating sleep deficiency. Tang and Harvey (2004) highlighted that both "presleep cognitive arousal and preseleep physiological arousal contribute to distorted perception of sleep" (p. 69). The corticotropin-releasing hormone (CRH) system and the locus coeruleus-autonomic nervous system (LC-AN) both play a key role in physiological responses to stress. If prolonged arousal, despite the removal of the stressor or situation promoting stress, the dysfunctional arousal state could lead to anxiety or depression (Staner, 2003). This is of particular concern within older adults who are at increased risk of impaired sleep due to shallower sleep stages.

1.6.1.3. Psychological

Sleep impairments, both subjective and objective, have been significantly associated with negative affect (Vandekerckhove & Cluydts, 2010). However, negative affective states are believed to be prolonged by repetitive thought and therefore it is recognised as a critical contributor to the presence of disturbed sleep (Pillai & Drake, 2015). Repetitive thought has been defined as "prolonged cognitive focus on some important domain: oneself, one's emotions, or past or future life

events" (Segerstrom, Stanton, Alden, & Shortridge, 2003, p. 910). Within repetitive thought, the constructs of rumination and worry have been predominantly researched. Worry involves "recurrent, intrusive thoughts or images about the potential negative outcomes signalled by a perceived threat" (Pillai & Drake, 2015, p. 202) and is a fundamental aspect of anxiety disorders. Rumination refers to "passively and repetitively focusing attention on the self or on negative affect" (Pillai & Drake, 2015, p. 206). Both worry and rumination have been well researched and demonstrate strong association with sleep disturbance (Harvey, 2002; Harvey, 2005; Pillai et al., 2014; Zoccola et al., 2009), however more research is warranted regarding the mechanism by which sleep is disturbed by worry and/or rumination (Pillai & Drake, 2015).

Following this, many studies have confirmed that depression is a contributory factor to impaired sleep. Foley et al. (2004) highlighted that poorer sleep was experienced in older adults with depression than those without depression. Paudel et al. (2008) similarly demonstrated in the Osteoporotic Fractures in Men Study (MrOS) that older males with higher levels of depression experienced poorer sleep as measured by subjective (PSQI) and objective (wrist actigraphy) measures. Park and Kim (2016) identified depression as the most powerful predictor of sleep quality in 290 hospitalised older adults. Leblanc, Desjardins, and Desgagné (2015) identified associations between the probability of experiencing an anxiety disorder or a mood disorder if someone had increased awakenings at night or took longer than 30 minutes to fall asleep. Similarly, of 3,040 older women (mean age=83.6 years), symptoms of anxiety were associated with increased fragmented sleep and poor sleep efficiency (Spira, Stone, Beaudreau, Ancoli-Israel, & Yaffe, 2009).

1.6.1.4. Behavioural

Change in routines and lifestyle can impair sleep. Zisberg, Gur-Yaish, and

Shochat (2010) identified that the rate of insomnia reduces through increased stability and maintenance of daily routines. Findings from Moss, Carney, Haynes, and Harris (2015) have added to this research and report that when comparing people with clinical insomnia with healthy 'good' sleepers, people with insomnia have similar levels of activity as good sleepers, however were less regular in their activities. Moss et al. (2015) report that regularity of daytime activities is important for sleep. As mentioned, sleep involves a complex interaction of biopsychosocial elements, and therefore some of the potential causes of impaired sleep quality may be a consequence of impaired sleep quality.

1.6.2. Consequences of sleep impairments

There are a number of consequences of impaired sleep quality in the adult population. Nebes, Buysse, Halligan, Huock, and Monk (2009) reported sleep problems might contribute to cognitive performance variability on tests of working memory, attentional set shifting, and abstract problem solving for healthy older adults. Miyata et al. (2013), in their study of 78 adults aged 60 years and over, identified similar results, whereby poor sleep quality impaired cognitive performance. In a study by Breslau, Roth, Rosenthal, and Andreski (1996) patients with insomnia were nearly four times more likely to suffer major depression than those without. Breslau et al. (1996) also reported that patients with insomnia had similar increased risk for anxiety disorders, and drug and alcohol abuse and dependence.

Monk (2005) highlighted that shift workers experience less sleep, when compared to non-shift workers, and as a result experience more illness and more accidents (both at and away from work). Additional physiological consequences of poor or impaired sleep can include poor general health and wellbeing, decrease in physical functioning, fatigue, increased falls risk, impaired cognition particularly related to attention and concentration, and increased risk of mortality (Ancoli-Israel, 2009; Hawker

et al., 2010). Older adults experiencing sleep difficulties are at increased risk of falls, depression, and impaired concentration and memory (Ancoli-Israel & Ayalon, 2006; Harrington & Lee-Chiong, 2007). Further evidence identifies, if untreated, impaired sleep can impact daytime function, recovery, and overall health-related quality of life (Haimov & Vadas, 2009; LeBlanc et al., 2007). Martin, Jouldjian, Mitchell, Josephson, and Alessi (2012) also highlight that impaired sleep during hospitalisation for older adults has the potential to impact ability to regain previous levels of function and overall recovery. Furthermore, Martin et al. (2011) identified that mortality within one year of inpatient post-acute rehabilitation is predicted by poor self-reported sleep quality of older adults. Older patients (aged 65 years or more, n=245) who had been admitted for inpatient post-acute rehabilitation completed the PSQI and actigraphy at baseline. Patients were followed up at 12 months, during which time 57 participants (23%) had died. Poorer self-reported sleep quality as per the PSQI, but not objectively estimated sleep as per the actigraphy, was associated with shorter survival for older adults.

1.6.3. Conceptualisation of causes and consequences of impaired sleep

The focus of this doctoral research is to describe both the causes and consequences of impaired sleep quality amongst older adults during and after extended hospitalisation. To do this, the separation of causes and consequences needs to be conceptualised. Some factors identified may both *cause* impaired sleep quality and be a *consequence* of it. For example, an older adult who previously experienced good sleep quality yet develops a delirium for other reasons may then experience impaired sleep quality. Conversely, it is plausible that a person with impaired sleep quality may be more at risk of developing delirium. Hence, a vicious cycle between impaired sleep quality and delirium may be established. There are other factors likely to have a linear causal-consequence relationship with impaired sleep quality. For example, a linear cause may be a bright hospital environment at night, which may

lead to impaired sleep quality. A linear consequence may be non-genetic Fatal Familial Insomnia. This conceptualisation is visually presented in Figure 1.2. In using this conceptualisation to understand previous literature and through conducting this doctoral research it will be evident that some factors will be both a cause and a consequence. Where possible, the linear causes, linear consequences, and vicious cycle factors will be employed.

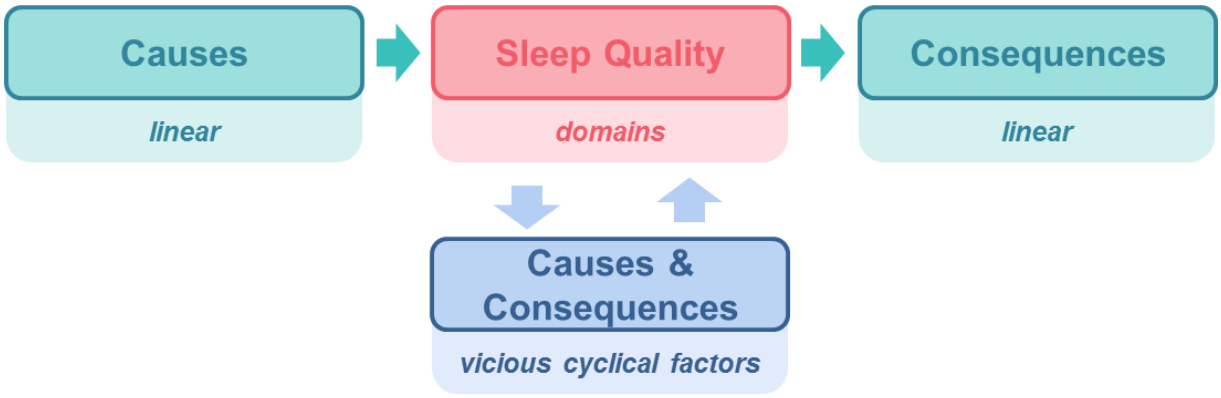

Figure 1.2. Conceptualisation of causes and consequences of impaired sleep quality.

1.6.4. Diagnosis of sleep impairments

Sleep impairments can be challenging to diagnose as presenting symptoms can sometimes be due, as highlighted, to other related health issues like depression or chronic pain (Gooneratne & Vitiello, 2015). Furthermore, the presence of more than one sleep disorder can increase the risk of functional impairments, while adding to the complexity of determining a diagnosis (Gooneratne et al., 2006). Various objective and subjective methods of assessment, like those mentioned previously, aid the evaluation of one's sleep and the diagnosis of a sleep impairment. For example, insomnia is diagnosed via a combination of medical and sleep history based on specific criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) (DSM-V; American Psychiatric Association [APA], 2013). Polysomnography is commonly used to diagnose or exclude sleep apnoea and Periodic Limb Movement Disorder (PLMD). Diagnosis of Restless Legs Syndrome

(RLS) is based on clinical history while a sleep diary on the other hand is generally used to explicate a person's sleep history to aid diagnosis of insufficient sleep syndrome. It is recommended that inquiries regarding sleep and wakefulness occur on a regular basis to aid monitoring and detection of changes in sleep for a person that may pre-empt the progression of a sleep impairment (Bloom et al., 2009).

1.6.5. Treatment of sleep impairments

Approaches for treatment of sleep impairments are generally *non-pharmacological* or *pharmacological.* Presently there is evidence to support various non-pharmacological approaches like exercise and cognitive behavioural therapy (CBT), particularly in the longer term (Riemann & Perlis, 2009; Sivertsen et al., 2006; Yang, Ho, Chen, & Chien, 2012).

1.6.5.1. Non-pharmacological approaches to sleep impairments

There are two commonly recognised evidence-based non-pharmacological options to treat sleep impairments, particularly insomnias. Sleep hygiene comprises a combination of interventions that aim to stabilise sleep patterns and optimise the environment to aid sleep (Bloom et al., 2009). Components of sleep hygiene are introduced progressively with recognition of the patient's sleep history and factors that are meaningful for them in order to optimise outcomes. While evidence suggests sleep hygiene is effective, it is more effective when combined with other approaches to treating sleep impairments (McCurry, Logsdon, Teri, & Vitiello, 2007).

CBT and Cognitive-Behavioural Therapy for Insomnia (CBT-I) are therapeutic approaches conducted by a trained therapist over a number of sessions focusing on behaviours and cognitive beliefs that are not conducive to sleep (Gooneratne & Vitiello, 2015). CBT and CBT-I have been evidenced to be effective not just with people with sleep impairments, but also for those experiencing pain (Jungquist, et al., 2010), or psychiatric illnesses (Jansson-Fröjmark & Norell-Clarke, 2016). Limited

evidence exists to support other non-pharmacological approaches including bright light therapy or exercise (Gooneratne & Vitiello, 2015).

1.6.5.2. Pharmacological approaches to sleep impairments

Pharmacotherapy options for sleep impairments vary however typically include benzodiazepine sedatives, non-benzodiazepine sedatives, anti-depressants, and melatonin-receptor agonists (Gooneratne & Vitiello, 2015). Sedation the following day, confusion and falls have been associated with sedative use (Gooneratne & Vitiello, 2015). Anti-depressants have demonstrated benefit to those who have symptoms of insomnia and an underlying depression however conflicting evidence reports effectiveness for symptoms of insomnia alone (Wiegand, 2008). Pharmacological approaches can be effective in the short term, however evidence to support such approaches are mixed and vary due to age, gender, or comorbidities (Lie, Tu, Shen, & Wong, 2015). Pharmacological options have been evidenced to benefit sleep when used in conjunction with non-pharmacological options and tapered off over time (Morin et al., 2009).

1.7. Relevant models and frameworks to sleep research

Current frameworks utilised by therapists to help understand sleep and sleep quality in relation to older adults include the *International Classification of Functioning, Disability and Health* (ICF; World Health Organization [WHO], 2001), and the *Occupational Therapy Practice Framework: Domain & Process 3rd Edition* (OTPF-III; American Occupational Therapy Association [AOTA], 2014). Current models utilised include the *3P Model* (Spielman, Caruso, & Glovinsky, 1987), *Model of Human Occupation* (MOHO; Kielhofner, 2008) and the *Two-Process Model of Sleep-Wake Regulation* (Borbély, 1982, as cited in Borbély, 1994). Theoretical frameworks and models provide a broad explanation of a number of concept relationships related to the present study. The 3P model provides a basis for better

understanding insomnia while the ICF, OTPF-III, MOHO, all provide a basis for the understanding of the inter-relation between the person, the occupation ("self-directed meaningful tasks and activities engaged in throughout a lifespan", Law et al, 1996, p. 16), and the environment within which the occupation is undertaken. Sleep models and theories provide a basis for proposed explanation of the necessity of sleep in addition to the purposes and functions of sleep. Underpinning all these models is the Dynamic Systems Theory which originates from general systems theory (Thelen, 2005; Thelen & Smith, 2006). Dynamic Systems Theory (DST) has expanded and been revised to propose that "action is performed on the basis of an interaction between multiple systems" (O'Brien & Kielhofner, 2017, p. 25). It recognises that change occurs in a non-linear fashion, and describes how biological systems arrange themselves and continually change and fluctuate (Thelen & Smith, 2006). It further recognises that an individual's actions are not based on strength or coordination alone, but are influenced by what motivates and drives an individual, as well as their habits, routines, and the environment within which they operate. The interaction between a person, their environment (i.e. home or hospital), and their occupation or activity (i.e. sleeping) results in occupational behaviour. Systems theory views the person as a system and the dynamic component is considered within DST given the person is constantly changing engagement and occupations. Each of the following frameworks or models provides a structure for organising the complexity of multiple systems that are influencing an individual's occupational performance.

1.7.1. International Classification of Functioning, Disability and Health (ICF)

The ICF is the World Health Organization (WHO) framework that assists with describing and organising information in relation to the disability and functioning of a person or group. Based on a bio-psychosocial model of health, the ICF provides a conceptual base for the understanding and measurement of health and disability, and

was approved and endorsed in 2001 at the 54th World Health Assembly. The ICF provides a comprehensive globally agreed-on framework of the components of health and health-related states. The framework, as can be seen in Figure 1.3, identifies three components within the functioning dimension: *body functions and structures, activities*, and *participation*. Conversely, limitations or problems in these components are referred to as *impairments, activity limitations*, and *participation restriction* respectively.

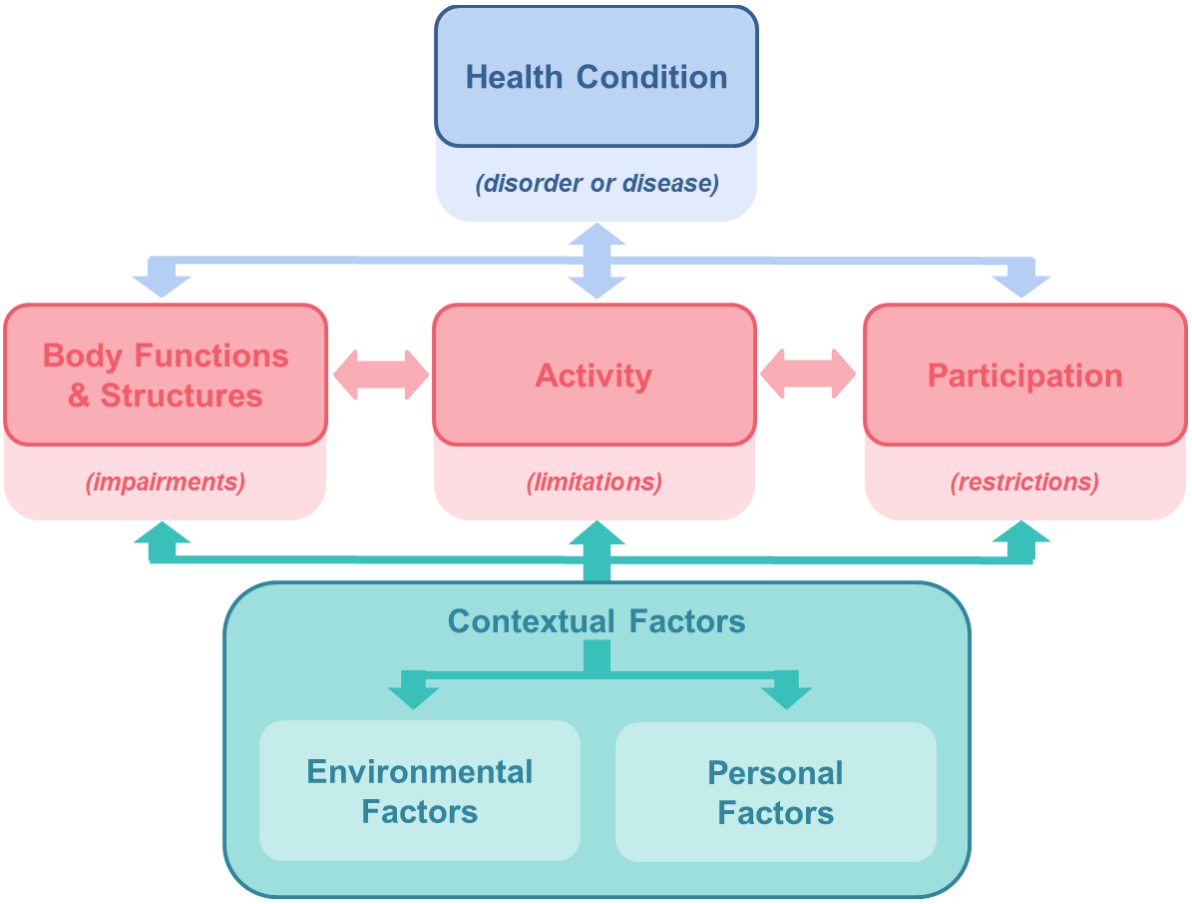

Figure 1.3. Interactions between the components of the ICF framework (WHO, 2001, p. 18).

Additional components depicted in the model include *Personal Factors* and *Environmental Factors*, which may affect the three core components. Personal factors represent influences on functioning that are specific to the individual and may include gender, race, age, ethnicity, behaviour patterns, and current and past experiences and life events (WHO, 2013). Environmental factors "refer to all aspects of the external or extrinsic world that form the context of an individual's life and, as

such, have an impact on that person's functioning" (WHO, 2001, p. 213) and may include built environment, noise level, geographic location, and social environment. These factors may be facilitators or barriers to the participation in the activity. This is evident in Figure 1.3 where the two-directional arrows illustrate the multi-directional influences that each of the components and factors may have on each other. This framework is relevant to this research project as a way to understand the various elements that may affect the sleep of older adults. For instance, the noise level of the environment when a person is attempting to sleep may impact on their ability to participate in the activity of sleeping. This in turn may affect their ability the following day to participate in social activities with their friends due to their sleep being impaired. Alternatively, someone may have a health condition that has symptoms of chronic pain. This may also affect the ability to sleep due to the pain that is experienced.

1.7.2. Occupational Therapy Practice Framework – third edition (OTPF-III)

The *Occupational Therapy Practice Framework – third edition* (OTPF-III; American Occupational Therapy Association [AOTA], 2014) is a professional framework developed by the American Occupational Therapy Association. Now in its third iteration, it includes the categories of sleep and rest as one of the eight main areas of occupations in which humans engage (refer to Figure 1.4). Accordingly, the OTPF-III jointly defines sleep and rest as "activities related to obtaining restorative rest and sleep to support healthy, active engagement in other occupations" (AOTA, 2014, p. S20).

Sleep in this context therefore differs from rest and refers to how one prepares for sleep, the activities undertaken during the day that may potentially impact on sleep, and the actual engagement in the occupation of sleeping. The OTPF-III further highlights that each aspect of the domain interacts in order to support participation,

engagement and overall health and wellbeing (refer to Figure 1.4). Therefore, the client factors, performance skills, performance patterns, context and environment, and activity demands all impact on the occupation of sleep for someone. Furthermore, the OTPF-III distinguishes sleep as an individual area of occupation beyond that of day-to-day occupations of productivity, leisure, and self-care as typically depicted in occupational therapy (AOTA, 2014, p. S4).

OCCUPATIONS	***CLIENT FACTORS***	***PERFORMANCE SKILLS***	***PERFORMANCE PATTERNS***	***CONTEXTS & ENVIRONMENTS***
Activities of daily living (ADLs)* Instrumental activities of daily living (IADLs) Rest and Sleep Education Work Play Leisure Social Participation	Values, beliefs, and spirituality Body functions Body structures	Motor skills Process skills Social interaction skills	Habits Routines Rituals Roles	Cultural Personal Physical Social Temporal Virtual
* Also referred to as *basic activities of daily living (BADLs)* or *personal activities of daily living (PADLs)*				

Figure 1.4. Aspects of the domain of Occupational Therapy. (Republished with permission of the American Occupational Therapy Association [AOTA], from "Occupational Therapy Practice Framework: Domain & Process 3rd Edition", AOTA, volume 68, supplement 1, p. S4, 2014; permission conveyed through Copyright Clearance Center, Inc. (see Appendix A)).

1.7.3. 3P Model (3P) (Spielman, Caruso, & Glovinsky, 1987)

The 3P model, also referred to as the 3P Behavioural Model, the three-factor model, or the Spielman model, provides an outline of how insomnia occurs in the acute phase and how acute insomnia can become a chronic and self-perpetuating issue. The model is formulated around the interaction of three 'P' factors:

1. *Predisposing* factors that include biological, psychological, environmental, or occasionally social;
2. *Precipitating* factors including life stresses; and,
3. *Perpetuating* factors

The model indicates that insomnia becomes a habit. The predisposing factors

including worry or excessive rumination, or hyperactivity, or requiring to go to bed early (i.e., in hospital) and the precipitating factors including stressors or triggers (i.e., like medical illness) conceptualise a stress-diathesis. The chronicity of insomnia is modulated by the behavioural considerations made, which represent the perpetuating factors (i.e., to stay in bed while awake, or spend extended periods in bed). This is represented visually in Figure 1.5 where the dotted line indicates the threshold.

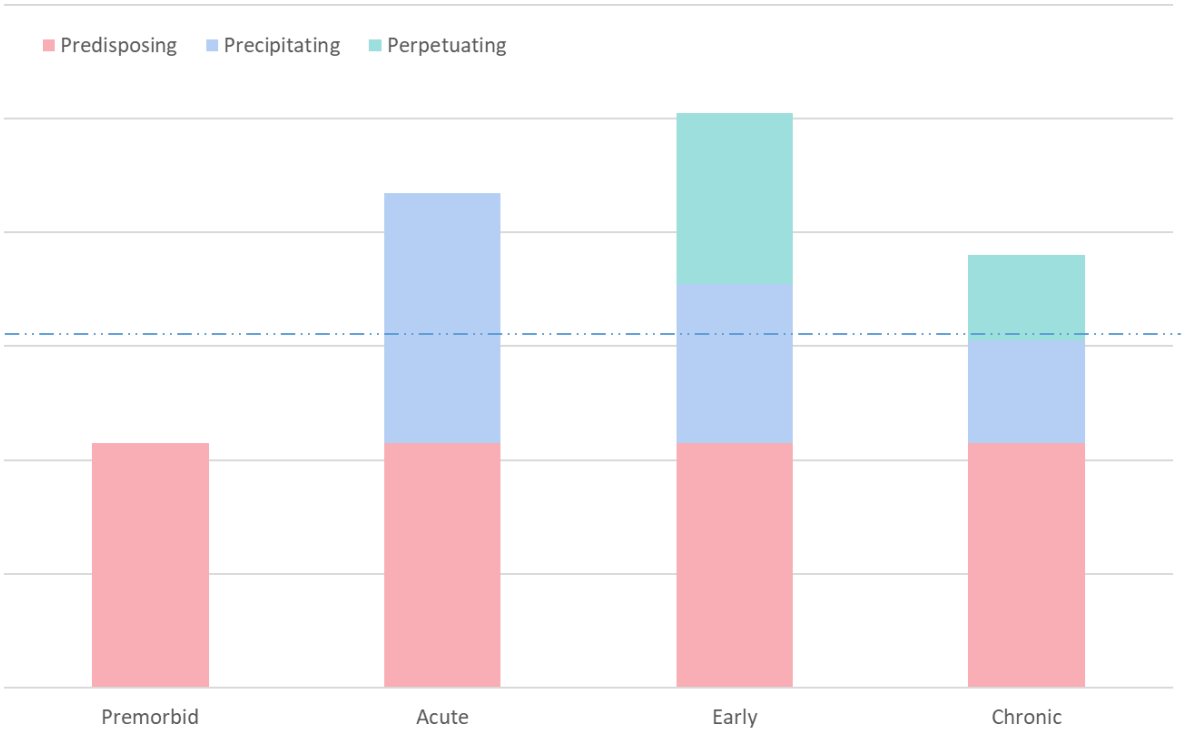

Figure 1.5. The 1987 representation of the 3P Model of Insomnia.

An example to better understand the 3P Model would be where an individual with insomnia spends longer and longer periods of time in bed to nap or attempt to sleep. This compensatory action to attempt to increase the potential for sleep reinforces the issue where it may initially appear to be beneficial however can be problematic whereby sleep opportunity and sleep ability become mismatched. As a result, the individual will experience extended periods of time awake during the time they would usually be asleep, regardless of the initial contributing factor (predisposing factor) to the experience of insomnia. The implications of this for

intervention and therapy are therefore impacted. Furthermore, factors like worry and rumination, may have contributed to impaired sleep or insomnia, are likely to also be a consequence of poor sleep for an individual, exacerbating the issue.

1.7.4. Model of Human Occupation (MOHO) (Kielhofner, 2008)

Unlike the OTPF-III, the Model of Human Occupation (MOHO; Kielhofner, 2008) does not specifically emphasise sleep as an occupation. However, the model is useful to assist with understanding the complexity of sleep in order to provide appropriate intervention. MOHO addresses how occupation is chosen, patterned and performed (Kielhofner, 2008). It considers the link between a person, their environment, their occupational performance, and the process of occupational adaptation. Occupational adaptation is "the process through which the person and the occupational environment interact when the person is faced with an occupational challenge calling for an occupational response reflecting an experience of relative mastery" (Schkade & Schultz, 1992, p. 831). Figure 1.6 presents the process of occupational adaptation according to MOHO. The model postulates three key points:

1. the environment and the person's characteristics are dynamically linked;
2. occupation reflects the interaction of the person and the environment;
3. characteristics of a person are maintained and changed through occupational engagement.

MOHO conceptualises the interaction of inner characteristics of a person as being composed of three key elements: volition, habituation, and performance capacity (Kielhofner, 2008). Volition is considered the person's motivation for occupation and is shaped by life experiences. The thoughts and feeling that make up one's volition are referred to as personal causation, values, and interests. Personal causation considers "how capable and effective one feels" (Kielhofner, 2009, p. 150), values are "what one holds as important or meaningful" (Kielhofner, 2009, p. 150),

and interests are “what one finds enjoyable and satisfying” (Kielhofner, 2009, p. 150). These elements of a person are considered the motivators for the choices regarding occupation that a person makes when partaking in everyday life. Consideration of these elements are imperative when planning interventions with someone given change is motivated by values and beliefs and therefore volition can be a significant component to the success of the intervention (Boswell, Thai, & Brown, 2015).

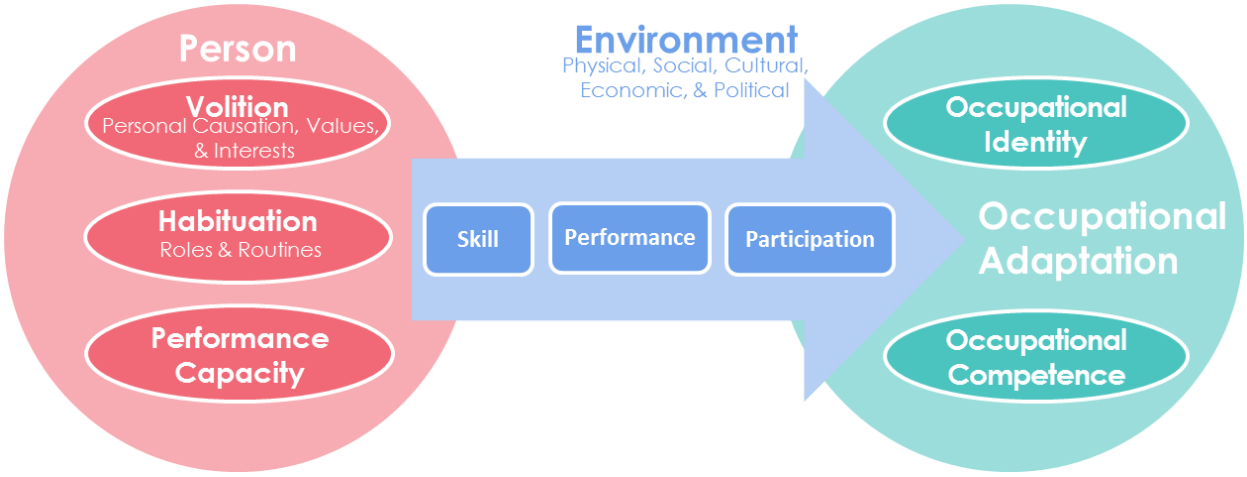

Figure 1.6. The process of occupational adaptation as per the Model of Human Occupation (adapted from Kielhofner, 2008, p.108). (Republished with permission of Wolters Kluwer Health, from “Model of Human Occupation: Theory and Application 4th Edition”, Philadelphia, PA: Lippincott, Williams and Wilkins; permission conveyed through Copyright Clearance Center, Inc. (see Appendix B)).

Habituation is how the person organises their occupational performance in relation to roles and routines. Habits are the things one learns to do that, with repetition, become familiar and automatic. Habits operate in conjunction with context (Kielhofner, 2008). Roles provide a person an identity and the social expectations and responsibilities associated with that identity.

Performance capacity is considered the person’s abilities for performance. It is a “person’s underlying mental and physical abilities and how those abilities are used and experienced in occupational performance” (Forsyth et al., 2014, p. 508). The execution of an occupation is dependent on the performance of bodily systems and

the person's subjective experience.

The environment is the context within which people engage in occupation. Components of the environment include physical, social, cultural, economic, and political; all of which may influence the motivation and performance of an occupation for someone (Kielhofner, 2009). The complex interaction between a person and their environment influences the occupation. The occupation of sleep can be impacted by various factors of the person (i.e., pain, comorbidities or impairments, beliefs regarding sleep, habits to prepare for sleep), and various factors of the environment (i.e., temperature of the room, comfort of the pillows or mattress, lighting, noise, familiarity with the bed and room, sleeping partner).

In relation to the topic of this doctoral research, application of the MOHO concepts can assist the understanding of sleep and an individual's engagement in sleep. For instance, a person's sleep habits may be associated with cultural expectations within their social environment, or their volition for sleep may be impacted by their motivation and preference to go to a theatre show instead of going to bed at their usual time. An individual's habits and routines may also impact a person's sleep. For example, a person may report sleeping better when they have a warm milk drink prior to going to bed, or they may have a preference for a particular type of pillow (i.e. plump v. flat, or memory foam v. feather) to sleep with, or they may shower at night prior to going to bed rather than in the morning when they wake up. Furthermore, a person may prefer their sleep environment to be a particular way; they may like to have the window open when they sleep, or heavy blankets over a fluffy quilt cover. If a person is not able to replicate their usual preferences or routines, this may contribute to impairment of their sleep. The interests, values, habits, and roles of a person therefore can affect the occupational engagement of sleep within their environment.

1.7.5. Two-Process Model of Sleep-Wake Regulation

An additional model is the *Two-Process Model of Sleep-Wake Regulation* (suggested by Borbély in 1982, as cited in Borbély, 1994) which recognises the regulation of two separate biological mechanisms of the body that interact together and balance each other. The two processes referred to in the model are the *Sleep-Wake Homeostasis* (referred to as Process S) and the *Circadian Rhythm* (referred to as Process C). Process S refers to the homeostatic sleep drive, which results from the accrual of hypnogenic (sleep-inducing) substances in the brain. Process C refers to the internal circadian clock, which governs the regulation of the body's alertness levels and internal processes. Figure 1.7 depicts graphically the interaction between the two processes.

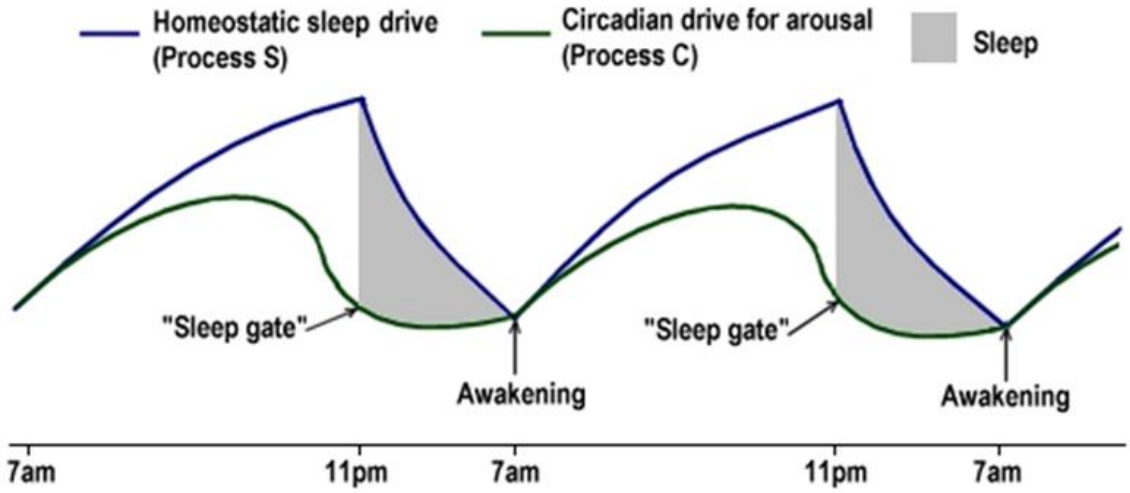

Figure 1.7. Graphical representation of the Sleep-Wake Cycle (Borbély, 1994).

This model also recognises that genetic makeup and external factors can have an effect on the individual's sleep-wake cycle. External factors may include environmental and behavioural factors that may affect the individual's sleep. The environment within which the person sleeps (including bedding), in addition to the temperature and noise within the environment, can impact on sleep. So too, medication, physical activity, meal times and food intake, day-to-day routines, and daytime napping can likewise affect sleep. Additional factors including medical

conditions, stress, psychological issues, amongst others, can also affect the sleep-wake cycle. A recent reappraisal of the two-process model of sleep regulation highlighted that it is still a prevalent conceptual model and has had a major impact on sleep research (Borbély, Daan, Wirz-Justice, & Deboer, 2016). This reappraisal also identified that "sleep appears to have not only a short-term, use-dependent function" (Borbély, et al., 2016, p. 131) but also supports the optimisation of metabolic processes within the 24-hour cycle by serving to enforce rest and fasting (Borbély, et al., 2016).

Overall, while each framework or theory is not directly related to sleep, each recognises the importance of aspects of life of which sleep is a part. Sleep provides restoration, consolidation of information, or conservation of energy, and these frameworks and theories assist in guiding further research regarding sleep. Likewise, the *ICF, OTPF-III, MOHO,* and *Two-Process Model of Sleep Regulation* all provide frameworks for understanding sleep, its importance, and the significant impact it can have on people. This is evident in their interactions with others and their ability to cope within their environment. These frameworks can also assist our understanding of the impact of a change in environment, such as that between hospital and home (unfamiliar vs. familiar environments, respectively). Further, they give us an important basis on which to develop supportive strategies for older adults as they transition from hospital to home following extended hospitalisation.

1.8. Theories of sleep

There are many published theories relating to different aspects of sleep however, they are not mutually exclusive. There are generally three accepted theories of sleep that have emerged within the research.

1.8.1. Restoration theory of sleep

The first major theory is the *Restoration Theory of Sleep*. According to this

theory, sleeping is essential for repair and restoration of the brain and body, and without it, the functioning of the brain and body would gradually deteriorate. Two theorists, Oswald (1980) and Horne (1988), have suggested that restoration of different biological functions is due to different types of sleep. Conversely, if a person experiences sleep deprivation there will be an associated negative effect on body function and deficits in psychological functioning. Recent research by Xie et al. (2013), with live mice, suggests that sleep provides a vital function in relation to the restoration theory of sleep. Their research demonstrated that during natural sleep, the interstitial space within the brain increases by 60%, thereby increasing the volume of space available for the cerebrospinal fluid (CSF) to flow. This allows for a significant increase in the convective exchange of the CSF with the interstitial fluid, thus enhancing the removal of waste products that accumulate during periods of wakefulness. The benefit of this removal of waste includes increased space for the CSF to flow and improve brain function and efficiency.

1.8.2. Adaptive theory of sleep (or evolutionary theory of sleep)

The *Adaptive Theory of Sleep* (or *Evolutionary Theory of Sleep*; Webb, 1974) suggests that all species have adapted their sleep periods to occur when least hazardous and that cycling between activity and inactivity evolved in order to conserve energy.

1.8.3. Consolidation theory of sleep

The *Consolidation Theory of Sleep* (Ellenbogen, Hulbert, Stickgold, Dinges, & Thompson-Schill, 2006), on the other hand, is based on cognitive research. This theory posits that sleep is necessary in order to process and consolidate information acquired during wakefulness. Furthermore, it suggests that this consolidation of information during sleep aids preparation of the brain for the next period of wakefulness. This theory has been supported by evidence demonstrating the impact

on cognitive ability (i.e., recall) resulting from sleep deprivation.

1.9. Part II: Ageing, Sleep, and Hospitalisation

Presently, the world population is experiencing a significant demographic change. Globally, the population of older adults is increasing, in both number and proportion, and is older than it has ever been in the past. According to the United Nations Department of Economic and Social Affairs, Population Division *World Population Prospects The 2015 Revision*, "countries need to anticipate and plan for population ageing and ensure the wellbeing of older persons" (2015, p. 11). In 2015, over 901 million people (12% of the population globally) were aged 60 years or more and it is projected by 2050 those aged 60 years or more will represent 22% (2.1 billion people) of the global population (UN, 2015). HelpAge International (2013) estimate that by 2030, the number of people aged 60 years and over will outnumber children under 10 years of age. The number and proportion of older adults is not just increasing because of fertility rates over the past 60 years but also as a result of the rising life expectancy within the population (National Institute on Aging, 2011).

The Australian population is reflective of the ageing trend of the global population. In Australia, the median age in 1964 was 28.5 years, less than 10% (948,100 people) were aged 65 years or more, and less than 0.5% (50,100 people) were aged 85 years or more (Australian Bureau of Statistics [ABS], 2014). As at 2014, adults aged 65 years or more, accounted for 15% (3,400,000 people) of the population, and nearly 2% (456,600 people) of the population are aged 85 years or more (ABS, 2015). According to the ABS (2013b) population projections, 9.6 million people will be aged 65 years or more (23% of the projected Australian population), and 1.9 million will be aged 85 years or more (5% of the projected Australian population), by 2064. As the first baby boomers of 1947 turned 65 in 2012, this generation is the basis for the predicted trend. In addition to this, life expectancy is

steadily increasing over time. Australian men and women who were 65 years old in 2013, could expect to live another 19 and 22 years respectively (to 84 and 87 years of age, respectively), yet their life expectancy at birth was only 67 and 73 years (Australian Institute of Health and Welfare [AIHW], 2014b).

1.10. Sleep and ageing

Sleep disorders, whether medically or behaviourally driven, have a substantial negative impact on the mortality and morbidity of a person, and this is particularly evident in older adults (Ancoli-Israel & Cooke, 2005; Foley et al., 2004; Ohayon & Smirne, 2002; Rumble & Morgan, 1992). Symptoms of impaired sleep can include impairments in cognition (memory and concentration), decreased performance, decreased response time, and difficulty in sustaining attention. In older adults, misinterpretation of these symptoms may lead to false diagnoses of early cognitive impairments associated with aging like dementia (Ancoli-Israel, 2006). Additionally, these symptoms can impact on the daily functioning of older adults as they may affect the ability to drive, increase the risk of falls (Brassington, King, & Bliwise, 2000), and accelerate age-related changes in sleep architecture (Smagula et al., 2015). Impaired sleep quality may also increase the mortality rate twofold amongst older adults (Cappuccio et al., 2010; Morgan, Healey, & Healey, 1989).

1.11. Hospitalisation and older adults

Whilst most older Australian adults experience good health and wellbeing, with nearly 75% rating their health as good, very good or excellent in the 2011-2012 Australian Health Survey (ABS, 2013a), the prevalence of various health conditions increases with age. Specific conditions like arthritis, hypertension, heart, stroke and vascular diseases, diabetes and osteoporosis are also more likely to affect older adults (AIHW, 2014a). Furthermore, two in five older adults hospitalised in 2013-2014 accounted for 40% of all hospitalisations, yet only account for 13% of Australia's

population at that time (AIHW, 2016). This demonstrates the higher usage of hospitals by older adults than those aged less than 65 years of age and is significant given that the aged population, as previously mentioned, is likely to increase in coming years.

1.11.1. Sleep and hospitalisation

Sleep disturbances or fragmented sleep commonly occurs during hospitalisation (Delaney, Van Haren, & Lopez, 2015; Watson, Ceriana, & Fanfulla, 2013). Gellerstedt, Medin, and Karlsson (2014) conducted a qualitative study and highlighted four themes regarding patient sleep experiences while in hospital. These themes included: physical factors, being involved, bedside manner, and integrity. Gellerstedt et al.'s (2014) study reaffirms physical and psychologiocal factors previously highlighted as impacting sleep already presented in this literature review. Additional factors that have been reported in various research studies that impact the ability to get an adequate amount and quality of sleep include noise, pain, disruption of circadian rhythm and light/dark cycle, interventions and nursing care routines, as well as stress and anxiety associated with the hospitalisation (Delaney et al., 2015; Watson et al., 2013).

1.11.2. Relevance of sleep to older adults and the impact of hospitalisation

As briefly outlined in section 1.4.2.1., sleep varies across the lifespan, and is further challenged during hospitalisation. With increasing age, sleep becomes shallower and more variable for older adults when compared to younger adults. This variation in sleep impacts the health and wellbeing of older adults and their ability to function in everyday activities. If left untreated, sleep deficiencies or impaired sleep can increase risk of depression and impairment of health-related quality of life (Gooneratne & Vitiello, 2015). During hospital admissions sleep is commonly disturbed and hospitalised patients often experience difficulty initiating sleep,

fragmented sleep, early awakenings, and an overall decrease in total sleep time (Watson et al., 2013). Impaired sleep for older adults has a substantial negative impact on their mortality and morbidity (Ancoli-Israel & Cooke, 2005) including impaired cognition and decreased function. Hence, older adults who are hospitalised are likely to experience sleep impairments that can significantly impact their health and wellbeing, and may continue to experience negative consequences subsequent to their hospitalisation.

Older adults who are hospitalised are more susceptible to impaired sleep quality during hospitalisation, and furthermore have an increased vulnerability to the negative effects of impaired sleep than younger adults. Due to the age-related changes in sleep architecture, older adults are more easily aroused whilst sleeping. Additionally, older adults primarily present to hospital with medical conditions (like congestive heart failure or chronic obstructive pulmonary disease) that are associated with sleep disruption (AIHW, 2016; Institute of Medicine (US) Committee on Sleep Medicine and Research et al., 2006).

1.11.3. Potential impact of hospitalisation on sleep of older adults

The potential problems associated with hospitalisation may take a long time to resolve. Presently, there is little attention given to minimisation of impaired sleep quality while in hospital or following discharge. Despite the presence of guidelines to good sleep hygiene there has been little implementation. There are many possible reasons for this poor implementation. Previous research in the field of organisational change in health services has identified that relative advantage is a key factor in promoting practice change (Greenhalgh, 2002). Relative advantage describes the degree of benefit of a new model of care relative to the existing model in terms of clinical, economical or other intangible benefits. Hospital staff would need to understand the burden imposed on the individual and the health system by impaired

sleep quality, and the causative mechanisms of impaired sleep quality so that they could be confident that the proposed interventions would be effective in attaining a perception of relative advantage in this area. Knowledge of causative mechanisms would also help in developing future interventions to address this problem in this context.

1.12. Part III: Systematic literature review and meta-analysis

Given the aging population in Australia, the higher proportion of hospitalisations for this age range, and the increased risk associated with sleep issues whilst hospitalised, it is imperative that the impact of hospitalisation for older adults, as they transition from hospital to home, be investigated. This section of the introduction and background to this doctoral research presents the findings of a systematic review and meta-analysis regarding the effect hospitalisation has on the sleep quality of older adults both during and post inpatient admission to hospital in order to inform the proceedings of this doctoral research.

The following text is adapted from a manuscript currently under review with the journal titled *Sleep Medicine Reviews*. Initially completed in 2015, this review was recently updated in 2017 with no new additional studies included. The integrated findings of the systematic review and meta-analysis presented in this chapter further inform the background to the current thesis. The citation for this manuscript is:

> Lalor, A. F., O'Brien, L., Brown, T., & Haines, T. P. (2017, under review). Impact of hospitalisation on sleep of older adults during and after hospitalisation: A systematic review and meta-analysis. *Sleep Medicine Reviews.*

1.13. Manuscript I: Introduction

Sleep is a vital and necessary biological function. It is restorative, crucial for health and wellbeing, and vital for optimal brain functioning (Vandekerckhove &

Cluydts, 2010; Wong et al., 2013). Rather than being a passive process, it is a highly regulated, active and controlled process (Paterson, 2012). Sleep is particularly important to older adults because as we age there is a change in the stages of sleep: 'lighter' sleep increases in length, and 'deeper' and REM sleep both reduce in length (Ohayon et al., 2004). As sleep is shallow, it is more likely to fragment from night awakenings and be variable in duration. Additionally, older adults tend to have increased napping and decreased total night-time sleep (Woodward, 2012). It is generally agreed that the ability to sleep decreases with age, not as a result of aging per se, but usually as a result of an exacerbation of other factors in life as one ages, including physical or mental illness and the medications used to treat these disorders (Ancoli-Israel, 2006; Bloom et al., 2009).

Sleep quality refers to ones' perceptions of tiredness on waking, daytime fatigue, feelings of being rested and restored on waking, subjective adequacy of sleep, or the subjective frequency of night-time awakenings (Kucharczyk et al., 2012). While it is important to recognise that both quantitative and qualitative aspects of sleep need to be considered, "sleep quality is not synonymous with sleep quantity" (Wade, 2011, p. 3). Poor sleep quality or insufficient sleep has been linked to cardiac disease and immune system disorders as well as higher mortality rates. In older adults, it can result in decreased response times, falls, depression, and impaired memory, concentration and decision making (Ancoli-Israel & Cooke, 2005; Linton & Lach, 2007). Furthermore, behaviour resulting from sleep disturbances in older adults can be mistaken for cognitive impairment or dementia (Ancoli-Israel & Cooke, 2005), and can often influence the decision by family to place an older adult into a nursing home or aged care facility (Pollak & Perlick, 1991; Pollak, Perlick, Linsner, Wenston, & Hsieh, 1990).

Sleep patterns may be disturbed when people go to hospital because of the

nature of the illness or surgery that necessitated the admission and due to environmental factors (for example, light, sound, staff activity, or care routines) or the effects of medications commenced whilst in hospital. The relative contribution of each of these factors is unknown. It is also possible that once sleep habits/patterns have been disturbed they may not readily return to premorbid patterns once an older adult has left a hospital environment. Furthermore, disruption of circadian rhythms including hormonal secretion rhythms and the sleep/wake cycle can cause a misalignment between the circadian timing system and the external 24-hour environment (Bjorvatn & Pallesen, 2009). This misalignment can affect every day functioning and quality of life (Bjorvatn & Pallesen, 2009) and can result in an ongoing sleep disorder whereby physiological, behavioural and environmental factors persist in exacerbating the misalignment (Barion & Zee, 2007). If sleep patterns are disturbed, the benefits of sleep (as mentioned earlier) may not be attained in full and the delay of the recovery process may lead to poorer health outcomes for the older adult. Melatonin secretion, involved in the maintenance of the sleep/wake cycle, progressively declines with age. A large decrease in the melatonin circulating in one's body has also been observed in several neurological conditions, pain, endocrine and metabolic disorders (including diabetes type 2), and cardiovascular disease amongst others (Hardeland, 2012).

The degree, to which sleep quality is impaired amongst older adults during and after hospitalisation, and how long it takes these impairments to resolve following discharge, is currently unclear. In this review, the research team aimed to determine the:

1. impact of hospitalisation on sleep quality in older adults (before hospitalisation versus during);
2. impact of hospitalisation on sleep quality in older adults (during hospitalisation

versus after);

3. impact of hospitalisation on sleep quality in older adults (before and after, +/- during hospitalisation);
4. time course of recovery in sleep quality during the post-discharge period;
5. potential causative factors of sleep disturbance during transitions in and out of hospital;
6. sleep measures used in identified studies and investigate their sensitivity for assessment of sleep quality.

1.14. Methods

1.14.1. Data sources and study selection

An extensive search of nine databases included Medline, PubMed, PsycINFO, Embase, AMED, Scopus, and Web of Science. The following search terms were used in combinations specific for each database: (sleep (in title)) AND (hospital* NOT hospitality) AND (older adult* OR elder* OR retire* OR senior* OR aged) AND (interrupt* OR disrupt* OR disturb* OR fragment* OR chang*). Publication dates for the searches were restricted to 1988 to 2017, and all searches were limited to English text available and human studies. Additional possible citations were obtained via assessment of reference lists of retrieved studies and specific searches of authors known within the field of subjective sleep quality assessment. All study designs were considered for inclusion, with eligibility criteria for inclusion as follows:

1. Sleep was assessed as primary aspect of design and ‘sleep’ was in the title of the paper;
2. The sample had a mean age of 65 years or older;
3. Only community-dwelling older adults who had been hospitalised were included;
4. Subjective sleep quality was reported on at least two time points (either

before, during, or after hospital);

5. Participants did not have pre-existing Sleep Disorders (as the primary focus of the study; participants who had a sleep disorder, whether diagnosed or undiagnosed, included within a study focusing on the general older adult population rather than specific subgroups who had a particular sleeping disorder were included in this review);
6. Subjective sleep quality was self-reported by participants (in order to focus on the lived experience of the sleep quality of participant themselves rather than objective measurements of sleep duration and depth which do not provide a measure of the problem as experienced by the participant).

The primary author (AL) developed the inclusion/exclusion criteria and the last author (TH) reviewed them.

1.14.2. Assessment of risk of bias

The primary and last authors (AL, TH) used an assessment approach devised by Buckley et al. (2009) to assess the risk that included studies may present biased results. Table 1.2 lists the items within this approach and Table 1.3 the qualitative analysis of each paper included in this systematic review. In doing this the research team recognise the limitations that these checklists have in measuring the 'risk of bias' within the included studies.

1.14.3. Data extraction and synthesis

The primary author (AL) extracted data from each study including:

1. demographic statistics available (baseline and follow up where possible),
2. sample size at baseline and any follow up periods,
3. geographical location of the study,
4. response rate,

Table 1.2.

Quality analysis criteria items (Buckley et al., 2009).

Item	Criteria	Specific criteria
1	Research question	Is the research question(s) or hypothesis clearly stated?
2	Study subjects	Is the subject group appropriate for the study being carried out (number, characteristics, selection, and homogeneity)?
3	"Data" collection methods	Are the methods used (qualitative or quantitative) reliable and valid for the research question and context?
4	Completeness of "data"	Have subjects dropped out? Is the attrition rate less than 50%? For questionnaire based studies, is the response rate acceptable (60% or above)?
5	Confounding variables acknowledged	Have multiple factors / variables been removed or accounted for where possible?
6	Analysis of results	Are the statistical, or other methods of results analysis used, appropriate?
7	Conclusions	Is it clear that the data justify the conclusions drawn?
8	Reproducibility	Could the study be repeated by other researchers?
9	Prospective	Does the study look forwards in time (prospective) rather than backwards (retrospective)?
10	Ethical issues	Were all relevant ethical issues addressed?
11	Triangulation	Were results supported by data from more than one source?

5. study methodology (including participant recruitment and data collection methods),
6. sleep measures and data collected by said measures,
7. outcome variables,
8. statistical analyses undertaken,
9. results and their interpretation,
10. study conclusions,
11. potential biases, limitations reported, and,
12. review of cited articles for potentially relevant studies for consideration for this systematic review.

Table 1.3.

Qualitative analysis of identified studies included in systematic review.

Quality Analysis Criterion	Alessi et al (2008)	Arora et al (2011)	Bakken et al (2013)	Bihari et al (2012)	Frighetto et al (2004)	Hultman et al (2012)	Lee et al (2007)	Martin et al (2012)	Martin et al (2013)	Monteiro et al (2014)
Research question	1	0	1	0	1	1	1	1	1	0
Study subjects	1	0	1	1	1	1	1	1	1	1
"Data" collection methods	1	1	1	1	1	1	1	1	1	0
Completeness of "data"	0	1	1	1	0[a]	1	1	0	0	1
Confounding variables acknowledged	1	0	1	1	0	1	0	1	1	0
Analysis of results	1	1	1	1	1	1	1	1	1	0
Conclusions	1	1	1	1	1	1	1	1	1	1
Reproducibility	1	0	1	1	1	1	1	1	1	0
Prospective	1	1	1	1	1	0	1	1	1	1
Ethical issues	1	1	1	1	1	1	0	1	1	0
Triangulation	1	1	1	1	1	0	1	1	1	1
Total score /11	10	7	11	10	9	9	9	10	10	5

Note. [a]=Not stated.

1.14.4 Data analysis

A meta-analysis of standardised effect sizes was conducted using continuous outcome data. Standardised effect sizes are a common approach to enable pooling of data captured using different measurements of the same construct (Higgins & Green, 2011). Standardised effect sizes were calculated using a between-subjects analysis approach where within-subject correlations were not reported. The researchers divided the overall sample size into half pre-hospitalisation and half post-hospitalisation so as to not double count the sample size of these within subject studies.

1.15. Results

1.15.1. Included and excluded studies

The Medline, PubMed, PsycINFO, CINAHL, Embase, AMED, ProQuest, Scopus, and Web of Science database searches identified 273, 10, 42, 10, 53, 4, 61, 571, and 492 unique studies, respectively. Twenty-one studies were identified from the reference and author searches (N=1139 in total). One hundred and two studies were selected as potentially relevant following the application of the inclusion criteria to the titles and abstracts. Approximately a third of the articles were excluded because sleep quality was not assessed in at least two locations (pre-hospital, hospital or home, n=33). Nineteen articles were excluded as the sample mean age was under 65 years; twelve compared sleep quality of two or more sample groups; seven had sleep quality reported by a third party (i.e., nurse, spouse or caregiver); six did not review sleep disturbance or change in sleep quality; five reviewed a sample that had not been hospitalised at all; two articles were not available in English; two articles focused on the validity of an assessment or intervention; two did not have sleep in the article title; and, one was a review article. Therefore, ten published manuscripts arising from eight studies were included in this systematic

review. The primary and second authors (AL, LO) assessed eligibility of each study. The last author (TH) resolved any discrepancies. The PRISMA flow diagram of the database searches and summary of the reasons for exclusion are presented in Figure 1.8.

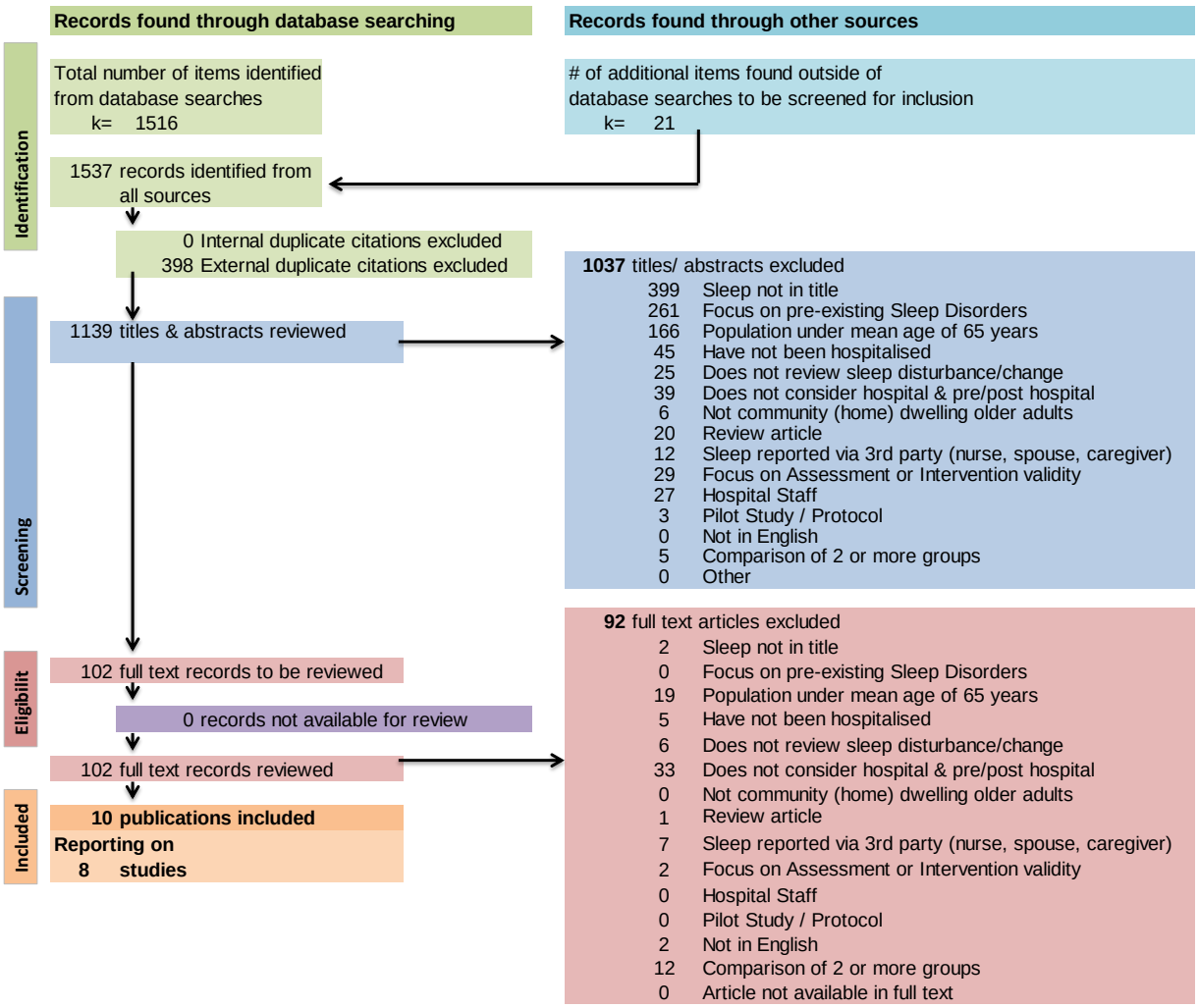

Figure 1.8. Summary of the PRISMA flow diagram and reasons for exclusion of articles for systematic review.

The eight studies included were conducted across various facilities including an intensive care unit, a rural hospital, four university/teaching hospitals, and two rehabilitation units. Of the 878 participants across the eight studies, 414 were male (55.6%; 37 participants in one study did not disclose their gender). Three of the ten studies reported the prevalence of depression in their population. Only one study provided data regarding BMI. Four studies reported on participant ethnicity (including African Americans, non-Hispanic whites, Hong Kong Chinese, and ethnically white

participants). Four studies reported on the comorbidities of the participants within their samples (first time stroke in one study, and prevalence of participants with chronic obstructive pulmonary disease in the remaining three studies, in addition to the mention of diabetes, congestive heart failure, stroke, atrial fibrillation, hypertension, end stage renal disease, depression and anaemia in only one or two studies).

Four of the eight studies reported medication use. Only one of these studies (Frighetto et al., 2004) reported pre-hospital sedative use (specifically, prescription hypnotics (benzodiazepines or zopiclone) and antidepressants (any class)) 'at or around' bedtime. This study also reported medication prescribed during hospitalisation that might affect sleep (specifically, hypnotic drugs or other medications that may have affected sleep). Details regarding the effectiveness of the medication or the time interval between dose and sleep were not reported other than 'at or around' bedtime. The remaining three studies reported that participants were on 16.0 medications on average (Alessi et al., 2008; Martin et al., 2013; Martin et al., 2012), whilst Monteiro and Ceolim (2014) reported that 88.8% of older adults were taking medication prior to hospital however 100% were taking medication during hospital. Bihari et al. (2012) reported on various medications in relation to the effect of them on sleep quality during or prior to the ICU stay. Data collected regarding medication in the ICU included: treatment of hypo- and hyperthyroidism, intravenous magnesium administration, inotropes, steroids, β-blockers, antipsychotics, diuretics, benzodiazepine (BZD), regular opioids, anti-anxiety, anti-depressant drugs, and sleeping tablets. Data collected regarding history of medication included: regular use of sleeping tablets, antidepressants, antipsychotics, or anti-mania drugs. Refer to Table 1.4 for the outline of the basic descriptors and general characteristics of each study included in the systematic review.

1.15.2. Research question 1: What is the impact of hospitalisation on sleep quality in older adults before versus during hospitalisation?

Seven studies compared sleep quality before versus during hospitalisation, but only three (discussed later) provided 'useable' quantitative data (i.e., comparable data from at least two time points; for instance, if a different measure of sleep was used at the two time points it was not able to be used in the meta-analysis. Similarly, data could not be further analysed if sleep data collected compared to a different cohort or normative group). In each of the seven studies, investigators recruited participants while in hospital and asked them to recall retrospectively what their sleep quality was like prior to hospitalisation. One study (Alessi et al., 2008) reported useable data from the Pittsburgh Sleep Quality Index (PSQI); one used a modified Sleep in the Intensive Care Unit Questionnaire (SICUQ) (Bihari et al., 2012); while another used an estimate of overall sleep duration (Arora et al., 2011). Figure 1.9 presents a meta-analysis of standardised effect sizes generated from data reported in these three studies. This meta-analysis indicates that hospitalisation has a detrimental effect on sleep quality in older adults. The magnitude of the standardised mean difference is in excess of what is conventionally thought to be a large effect size. However, some caution with interpreting this result in this way is required as there was significant statistical heterogeneity observed in our meta-analysis (I^2=78.3%, p=0.010). This heterogeneity may have been due to different patient populations examined, measurement approaches employed, and other variations in research designs employed.

Two studies made comparisons between sleep quality measures captured in hospital with other "normative" data. One (Frighetto et al., 2004) compared measures of sleep quality using the Verran Snyder-Halpern (VSH) Sleep Scale to normative data for healthy, non-hospitalised adults and insomniac, non-hospitalised adults and reported

that sleep quality was poorer for adults in hospital compared to healthy, non-hospitalised adults. Sleep quality for hospitalised adults was similar to that of insomniac, non-hospitalised adults when using sleep quality assessments taken on day 1 of hospitalisation, but was better than that of insomniac, non-hospitalised adults when taken on day 3. Another study (Arora et al., 2011) compared in-hospital sleep duration of n=20 inpatients to "matched community controls" and reported that mean duration was 2 hours shorter for those in hospital. It is important to realise however that quantity of sleep, whilst associated with sleep quality, is considered to be only one sub-domain of sleep quality.

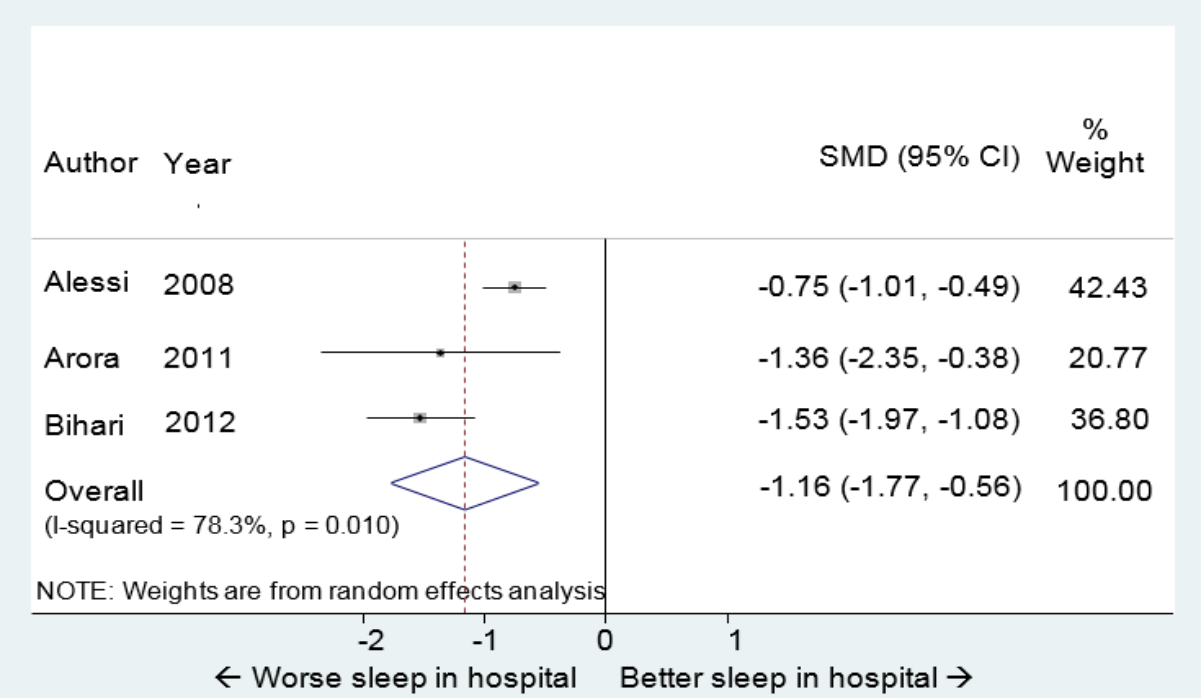

Figure 1.9. Forest-plot of meta-analysis of sleep quality before and during hospital for older adults. *Note. Only surnames of first authors of each study included listed in figure.*

The results of this meta-analysis were consistent with findings from the included qualitative studies that described how participants experienced dynamic changes in their sleeping patterns during hospitalisation resulting in sleep disruption and deprivation (Lee, Low, & Twinn, 2007). Monteiro and Ceolim (2014) coded data from open ended questions regarding subjective perception of sleep quality into

Table 1.4.

General characteristics of each study included in the systematic review.

Study	Sample size	Study design	Study location	Mean age	N time points (Time points assessed)[a]
Alessi et al. (2008)	245	Cohort, Prospective	Los Angeles	80.6 ± 7.2	2 (Pre, During)
Arora et al. (2011)	20	Cohort, Prospective	Chicago	72.4 ± 7.5	2 (Pre, During)
Bakken et al. (2013)	114	Cohort, Prospective	Norway	Male: 67.4 ± 12.7 Female: 71.1 ± 13.4	2 (During, Post)
Bihari et al. (2012)	100	Cohort, Prospective	Adelaide, South Australia	65.1 ± 15.2	2 (Pre, During)
Frighetto et al. (2004)	100	Cohort, Prospective	Canada	75 (range 35-97)	2 (Pre, During)
Hultman et al. (2012)	37	Qualitative	Northeast region of USA	67.375	2 (Pre, During)
Lee et al. (2007)	6	Qualitative	Hong Kong	71 (range 65-79)	2 (Pre, During)
Martin et al. (2012)	245	Cohort, Prospective	Los Angeles	80.6 ± 7.2	3 (Pre, During, & Post)
Martin et al. (2013)	245	Cohort, Prospective	Los Angeles	80.6 ± 7.2	3 (Pre, During, & Post)
Monteiro et al. (2014)	160	Cohort, Prospective	São Paolo	69.8 ± 7.2	2 (Pre, During)

Note. [a]=Time points assessed: pre, during, post-hospital.

categories of “well” or “poor”. However, the specific wording of the question used to elicit this response was not provided. Of the 160 people in their sample, 70 reported sleeping well at home but poorly in hospital, 45 reported sleeping well in hospital but poorly at home, 30 reported sleeping well in both locations and 14 reported sleeping poorly in both locations (1 respondent missing). Our statistical comparison of the proportion of participants sleeping well at home (63%) to the proportion sleeping well at hospital (47%) identified a significant reduction ($p<0.001$) in the proportion sleeping well when in hospital.

1.15.3. Research question 2: What is the impact of hospitalisation on sleep quality in older adults during versus after hospitalisation?

There was one study that provided quantitative data comparing sleep quality during hospitalisation with sleep quality post-hospitalisation (Bakken, Kim, Finset, & Lerdal, 2014). Investigators recruited participants from two hospitals and asked them to recall what their sleep quality was like during their hospitalisation. The study reported useable data from the PSQI and stated that subjective sleep quality was better (d=0.44) at the six-month follow-up (n=100) than in the acute phase (n=119). This study indicates that hospitalisation has an effect on the sleep quality of adults and that transitioning home to community dwelling can improve sleep quality post-hospitalisation.

1.15.4. Research question 3: What is the impact of hospitalisation on sleep quality in older adults before and after, +/- during hospitalisation?

One study (with data reported in three publications) described a prospective cohort investigation that collected data across all three time points (pre-, during and post-hospitalisation). One of these papers (Alessi et al., 2008) examined sleep outcomes only pre and during hospitalisation and has already been discussed in our results. Two of the papers arising however used latent class analysis to examine this

data across all three time points. Martin et al. (2012) reported mean and standard deviation scores of PSQI across these time points, however did not present statistical contrast using these data. The mean pre illness score reported was 5.2, the mean 7-day PSQI score in hospital was 8.4, and post-hospitalisation mean PSQI follow up scores ranged between 6.0 and 6.7. The researchers did not undertake statistical analyses of the data presented due to the large amount of missing data during the follow up of this study (n=245 at baseline, reducing to n=87 at 12-month follow up). These authors did report in a subsequent paper that 46% of their sample slept well before, during and after rehabilitation, 34% slept well prior to hospitalisation but poorly during and after, 14% slept poorly before, during and after rehabilitation, and 6% slept poorly before and during rehabilitation but better afterwards (Martin et al., 2013).

1.15.5. Research question 4: What is the time course of recovery in sleep quality in during the post-discharge period?

No papers examined the time course of recovery of sleep quality during the post-discharge period.

1.15.6. Research question 5: What are the potential causative factors for this sleep disturbance?

Martin et al. (2013) investigated factors that discriminate between people who sleep well before, during, and after, hospitalisation from those who sleep well before, but not during and after, hospitalisation. They reported that higher pain in hospital was associated with developing poorer sleep quality in hospital, while better cognitive functioning was associated with a lower likelihood of maintaining good sleep. Qualitative studies, however, identified several factors thought to be causally related to a loss of sleep quality in hospital. The researchers grouped these factors into the themes of a change in sleep routines between the hospital and home environment

(e.g., not being able to have a particular drink prior to going to bed [Lee et al., 2007]), hospital environment (e.g. noise, light, unfamiliar bed [Hultman, Coakley, Annesse, & Bouvier, 2012], lack of privacy and space [Lee et al., 2007]), effectiveness of symptom management (particularly pain management [Hultman et al., 2012]), hospital processes (e.g. being woken up to have vital signs measured by nursing staff [Hultman et al., 2012]), and emotional response to hospitalisation (e.g. sense of helplessness, frustration at unfulfilled requests [Lee et al., 2007]). One paper also reported that patient's cultural beliefs and practices influenced how they conceptualised this problem (e.g., one participant reported they did not have "sufficient vitality in their blood" [Lee et al., 2007, p. 342]).

No studies examined the relationship between independent variables and the change in sleep quality between during and post-hospitalisation. Based on the results Figure 1.10 represents visually our construction and conceptualisation of the interactions between the reported factors affecting sleep quality of older adults.

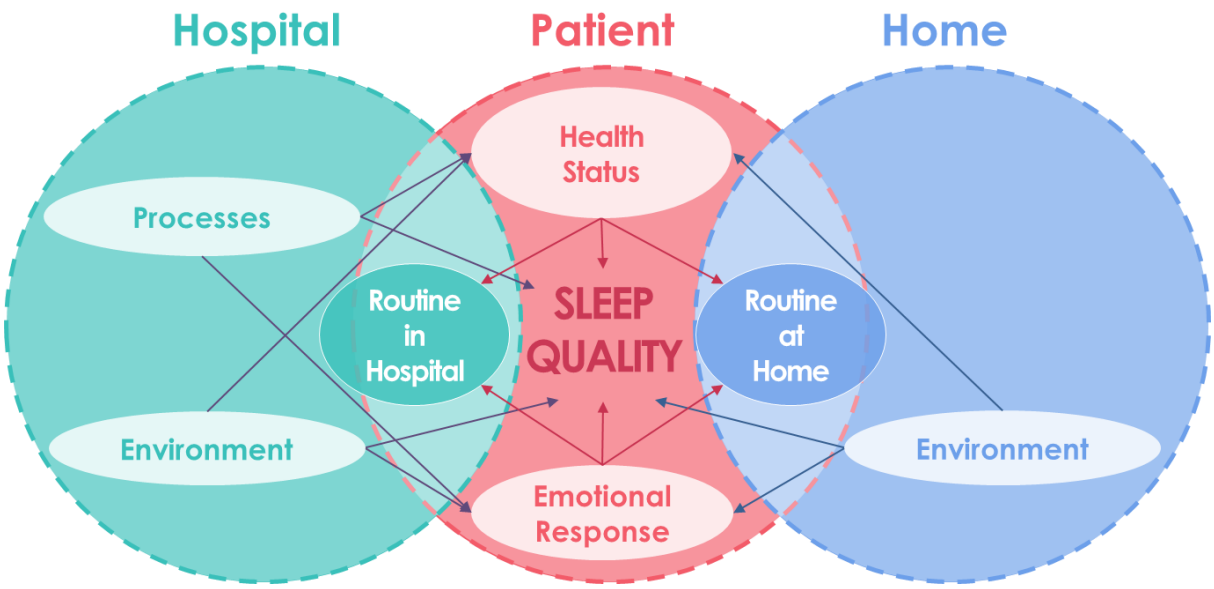

Figure 1.10. Interaction between the reported factors affecting sleep quality of older adults.

1.15.7. Research question 6: In the identified studies, what sleep measures were used and how sensitive are they to assess sleep quality?

The eight studies identified for inclusion in this review used four measures of sleep (as per Table 1.5): Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989), Epworth Sleepiness Scale (ESS; Johns, 1991), Verran Snyder-Halpern Sleep Scale (VSH; Snyder-Halpern & Verran, 1987) (and Portuguese version: Visual Analogue Sleep Scale [VASS]; Bergamasco & Cruz, 2007), and a modified Sleep in the Intensive Care Unit Questionnaire (SICUQ; Freedman, Kotzer, & Schwab, 1999). Two qualitative studies (Hultman et al., 2012; Lee et al., 2007) used semi-structured interviews to establish the patient's perspective of sleep quality. Four studies (across six papers) used the PSQI. One study used the PSQI in conjunction with the ESS, while another used the PSQI to measure sleep at home and the VASS to quantify sleep in hospital. One additional study used a modified version of the SICUQ. Table 1.5 outlines the sleep measures and characteristics used by each study to identify sleep disturbances. The PSQI was the predominant tool to assess subjective sleep quality in the studies identified.

1.16. Discussion

This review has demonstrated that sleep quality is disturbed during hospitalisation and improves to some extent post-discharge to home. The research team do not know how long it takes to return to premorbid sleep quality or the proportion of patients unable to do this. However, our meta-analysis indicates that the recovery may be incomplete given the difference in effect sizes noted across the two transition points (admission to and discharge home from hospital). Furthermore, the PSQI was the most commonly used assessment for measuring sleep in this population, of the studies identified for inclusion within this review.

Factors associated with sleep disturbance from the qualitative papers included in our review were grouped into those internal to the person and those related to the

Table 1.5.

Characteristics of sleep measures of identified studies included in systematic review.

Sleep Quality Measures	Developers	Purpose	Domains of Sleep Quality assessed	No. of items	Scale and scoring	Psychometrics	Identified studies that utilised measure
Pittsburgh Sleep Quality Index (PSQI)	Buysse, Reynolds, Monk, Berman, & Kupfer (1989)	Measure retrospective sleep quality over past month	Subjective sleep quality; Sleep latency; Sleep duration; Habitual sleep efficiency; Sleep disturbances; Use of sleep-promoting medication; Daytime dysfunction	19	4-point Likert scale Global score (range 0-21); Cut-off score>5 distinguishes 'poor' sleepers from 'good' sleepers.	Adequate internal consistency, strong diagnostic sensitivity and specificity from global score (Spira et al., 2012); Adequate test-retest reliability (Smith & Wegener, 2003)	Alessi et al. (2008) Arora et al. (2011) Bakken et al. (2013) Martin et al. (2012) Martin et al. (2013) Monteiro et al. (2014)[b]
Epworth Sleepiness Scale (ESS)	Johns (1991)	Measure subjective daytime sleepiness	likelihood of falling asleep or dozing during eight common situations in life	8	4-point Likert scale Global score (range 0-24); Clinical significant daytime sleepiness indicated by a score greater than 10.	High internal consistency and test-retest reliability (Hardinge, Pitson, & Stradling, 1995; Johns, 1993)	Arora et al. (2011)
Sleep in the Intensive Care Unit Questionnaire (SICUQ)[a]	Freedman, Kotzer, & Schwab (1999)	Evaluates sleep within the Intensive Care Unit (ICU)	Sleep quality (home and hospital); Daytime sleepiness; Disruptive factors produced by ICU staff; Disruptive factors of ICU environment	27	10-point rating scale	Limited psychometric testing however tool has been used to assist evaluation of sleep promotion interventions (Patel, Baldwin, Bunting, & Laha, 2014)	Bihari et al. (2012)
Verran Snyder-Halpern Sleep Scale (VSH)	Snyder-Halpern & Verran (1987)	Evaluation of general sleep	Sleep disturbance (SD) (fragmentation and latency); Sleep effectiveness (SE) (quantity and length of sleep); Sleep supplementation (SS) (additional sleep)	15	100mm VAS[c]; SD (max. 700); lower scores=less SD; SE (max. 500); higher scores=greater SE; SS (max. 400); higher scores=worse outcome (SS required).	Psychometric testing was conducted with hospitalised and ambulatory patients (Verran & Snyder-Halpern, 1990, as cited in Frighetto et al., 2004)	Frighetto et al. (2004) Monteiro et al. (2014)[d,e]

Note. [a]=SICUQ modified by Bihari et al. (2012) to include pain; [b]=PSQI used to assess sleep quality at home; [c]=Visual Analogue Scale; [d]=VSH used to assess sleep quality in hospital; [e]=Portuguese version of VSH Sleep Scale: Visual Analogue Sleep Scale utilised has been validated for use in Brazil (Bergamasco & Cruz, 2007).

hospital environment. These factors were largely consistent with related studies that have only examined potential reasons for disturbed sleep within the hospital environment. For example, Redeker (2000) reported in her integrative review several personal factors that contributed to a person's sleep experience: a patient's state of health and illness and associated symptoms (including pain and discomfort), their functional status, and gender and age. Redeker (2000) additionally reported several environmental factors that contributed to a person's sleep experience: noise, light, and disruptions. Another example included Park et al.'s (2014) study that highlighted the number of people in a room and ward can affect the environmental noise and overall sleep disturbance of patients whilst in hospital. Similarly, Adib-Hajbaghery, Izadi-Avanji, and Akbari (2012) found that internal factors like worries and anxiety, pain, and existing disorders, in conjunction with external factors like noise, lights and changes to sleep habits and routines could disturb sleep. Park and Kim (2016) also reported that depression was the most powerful predictor of sleep quality, followed by perceived health status, diagnosis, number of cohabitants and the duration of hospitalisation.

The framework presented goes beyond the earlier work identified in this review by integrating factors thought to initially cause sleep disturbance with those that might explain ongoing sleep disturbance following discharge from hospital. Central to this framework is our hypothesis that disturbances to sleep routines brought about by factors related to the hospitalisation (e.g. noise, lighting) could have a persistent impact on sleep quality following discharge home from hospital. These factors could therefore be targets for interventions to minimise disruption to sleep quality in this population. For example, Missildine (2008) identified that nurses can initiate sleep improvement protocols based on better understanding and identification of sources of noise and light in acute care settings and Gathecha et al. (2016)

demonstrated that nurse-delivered sleep-promoting interventions including control of environmental factors could improve sleep quality during hospitalisation.

Our framework also highlights that some factors that emerge during hospitalisation (e.g. pain) can be relatively well managed while in hospital, but become more of a problem and threat to sleep quality once the older adult has returned home. Other interventions that might be considered may be more generic, and not targeted at one specific factor. For example, relaxation interventions have demonstrated improvement of sleep quality by almost 38% (Tamrat, Huynh-Le, & Goyal, 2014).

Limitations within the studies included in this systematic review were evident. In each study that was inclusive of pre-hospital data, investigators recruited participants while in hospital and asked them to retrospectively recall what their sleep quality was like prior to hospitalisation. Relying entirely on the memory of a person can be unreliable and contribute to recall bias (Hassan, 2005), which may be amplified with greater time intervals between the event and the time of assessment (Margetts, Vorster, & Venter, 2003). Therefore, studies that collected data more contemporaneously may be less subject to recall bias. This means that our observed effect size when transitioning from community living into the hospital environment may possibly be more subject to recall bias than the more conservative effect size observed when transitioning from hospital back to community living.

Another limitation was that some authors did not report when participants had their sleep quality assessed during their hospitalisation (Bakken et al., 2014), which may have had a direct impact on the results reported. Related to this was that no study provided data regarding the time course of loss of sleep quality during hospitalisation or of recovery following return to community living. An additional limitation was that a formal analysis of sources of heterogeneity using meta-

regression was not possible due to the low number of studies that could be pooled. A detailed review of the differences in study methodologies indicated that differences in the populations that were recruited in these studies might have been responsible for the differences found between studies. Moreover, the studies included in this systematic review included different study designs and different methods to measure sleep quality. Additionally, some data reported compared different cohorts or used different tools to measure sleep at different time points, which reduced the ability to make use of the data reported. Standardised effect sizes were used in our analyses however to enable the pooling of data captured using different measurements of the same construct.

1.17. Conclusion

These findings provide a point of reference for future research directions. First, it would be beneficial for all three time points (before, during, and after hospitalisation) to be examined within one cohort of older adults to understand if sleep quality returns to pre-hospital levels or not. This would assist in determining if loss of sleep quality during hospitalisation was only a temporary problem that naturally resolved without specific intervention. That being said, if pre-hospital sleep quality is poor to begin with, then it still may be an opportune time to commence investigations of factors contributing to this while the patient is in hospital even if this is not the principal reason for the admission. Ideally, a coordinated intervention approach from hospital through to community settings may be optimal for identifying and managing problems with sleep quality.

Second, investigation of the temporal course of sleep disturbance and recovery is warranted, as is the identification of factors that contribute to a decline in sleep quality and less than optimal recovery following hospitalisation. Third, the PSQI is a common choice of assessment for assessing sleep quality of older adults. Last if

older adults who have poor sleep quality that persists post-discharge, it would be important to know whether they experience poorer health outcomes in the longer term as this would help to identify how important this potential problem may be. If healthcare providers were more conversant with significant negative impacts that sleep routine disturbance can have on the health outcomes of older adults they likely would be more proactive in implementing interventions that target personal and environmental factors that impedes sleep.

1.18. Research aim and questions

1.18.1. Primary research aim

The comprehensive introduction and background provided within this chapter, in conjunction with the systematic literature review and meta-analysis, provide evidence to warrant this doctoral research. The primary aim of this research is to investigate the causes and consequences of impaired sleep quality amongst older adults both during and after an extended period of hospitalisation.

1.18.2. Research questions

The specific research questions of this doctoral research to explore the primary research aim are:

1. Investigate whether there is a change in sleep quality of community-dwelling older adults prior to hospitalisation, during hospitalisation, and the period following hospitalisation.
2. Determine what factors for community-dwelling older adults, if any, are associated with changes in sleep quality prior to hospitalisation, during hospitalisation, and the period following hospitalisation.
3. Determine why the issue of sleep quality is there, if present, for community-dwelling older adults during hospitalisation and the period following

hospitalisation.

4. To identify what is being done by health professionals to identify and manage impaired sleep quality prior to hospitalisation, during hospitalisation, and the period following hospitalisation.
5. Assess the impact of change in sleep quality for community-dwelling older adults, if any, on health-related quality of life, mood disturbance, social isolation, falls, hospital readmissions, and participation in physical activity during hospitalisation and the period following hospitalisation.

1.19. Chapter conclusion

The present chapter provided a comprehensive understanding of the existing empirical evidence and presented the results of a systematic review and meta-analysis regarding the impact of hospitalisation on sleep of older adults during and after hospitalisation. The conclusions of the review highlight the need for:

1. assessment of sleep quality of one cohort of older adults before, during, and after extended hospitalisation,
2. identification of factors that contribute to poor sleep quality for older adults during and following hospitalisation, and,
3. identification of health outcomes post-hospitalisation for older adults who experience poor sleep quality.

These conclusions provide clear evidence to guide the methodology of this doctoral research, outlined in the following chapter, and support the subsequent chapters of this thesis.

The following chapter (Chapter 2) presents the methodology and methods underpinning the research. A protocol paper (published) of an overarching project outlines the pre-existing literature regarding older adult's health and wellbeing, particularly in relation to anxiety and depression, following extended hospitalisations

and their transition home. This paper provides consideration for a broad and holistic view of potential factors that may influence an older adult's transition home and their health outcomes. This paper justifies the need for the overarching project regarding older adults transitioning home from hospital, and highlights the lack of existing literature within this area. The project design and rationale specific to this doctoral research are presented. Chapter 2 details the predominant data analysis methods undertaken throughout the research project to assist the reader with the results presented in the later chapters. Ethical considerations of the research are identified.

CHAPTER 2
METHODS

And if tonight my soul may find her peace
in sleep, and sink in good oblivion,
and in the morning wake like a new-opened flower
then I have been dipped again in God, and new-created.
(D. H. LAWRENCE, "LADY CHATTERLEY'S LOVER")

CHAPTER 2 METHODS

2.1. Context

The previous chapter presented a review of the empirical literature regarding the impact of hospitalisation on the sleep of older adults during and post-hospitalisation. This work identified that there is a need for assessing sleep quality of one cohort of older adults before, during, and after extended hospitalisation; factors that contribute to poor sleep quality for older adults during and following hospitalisation need identifying; and, health outcomes post-hospitalisation for older adults who experience poor sleep quality during hospitalisation need identifying. This doctoral research reports the outcomes of a number of studies designed to consider these needs. This chapter presents the methodology of a broader investigation project and summarises the methodology for the research in this thesis. This doctoral research project was designed according to the five research questions outlined in Chapter 1. Further detail, relating to each section of the research project, is contained within the methods section of each chapter. The research incorporated a mixed method approach, involving the collection and analysis of both quantitative and qualitative data. The study was conducted in hospital and community settings and participants included older adults who were experiencing extended hospitalisation and were returning to community dwelling post-discharge.

2.2. Research orientation and methodology

Effective research depends on selection of research methods that are most appropriate for answering the research issues presented. A suitable research paradigm, or theoretical framework, should underpin the implementation of effective research, to guide the researcher and the selected methodological approach. In order to achieve the aim and research questions of this doctoral study, the doctoral candidate relied on a number of inter-related models and frameworks outlined in

Chapter 1 to guide their research process. This doctoral research uses predominantly quantitative methods to respond to the identified gaps in current empirical knowledge regarding the longitudinal experience of sleep quality for older adults.

2.3. Summary of methodology

This doctoral research undertook a primarily quantitative methodology approach. Research questions 1-3 and 5 posed by this doctoral research benefit from a quantitative approach, including both retrospective and prospective methods of self-report over a six-month period. One component of the doctoral research focuses on a qualitative description approach to the analysis of consultations and discussions older adults had with health professionals regarding sleep. This component relates to research question 4 and provides the ability to explore the experiences and recollection of older adults in relation to the management of their sleep. The combination of methodology used in this research increases the range and scope of the data collected primarily by quantitative methods.

2.4. Introduction

With a higher proportion and number of older adults and increased prevalence of multi-morbidities and hospitalisations, older adults are particularly vulnerable when transitioning from hospital to their home. The work related to this thesis is in the context of a broader investigation study funded by BeyondBlue (a national not-for-profit organisation within Australia focused on addressing issues associated with mental health). The broader investigation study protocol was published as a concept paper outlining the examination of mood disturbance amongst older adults who have an extended period of hospitalisation. This chapter initially presents a modified version of the text of the published study protocol, within the formatting of this doctorial research, to provide context to the initial conceptualisation of the thesis. A

copy of the published article is included in Appendix C. The article citation is:

> Lalor, A. F., Brown, T., Robins, L., Lee, D-C. A., O'Connor, D., Russell, G., Stolwyk, R., McDermott, F., Johnson, C., & Haines, T. P. (2015). Anxiety and depression during transition from hospital to community in older adults: Concepts of a study to explain late age onset depression. *Healthcare, 3*(3), 478-502. doi:10.3390/healthcare3030478.

2.5. Manuscript II: Introduction

The transition between extended hospitalisation and discharge to home for older adults is a critical period characterised by poor health outcomes, hospital re-admissions and gaps in healthcare service provision (Forster, Murff, Peterson, & Gandhi, 2005; Haines et al., 2009; Heim et al., 2014; Hill et al., 2011). It is a period of change and adjustment for the patient, their carers and family, their social support network, and the health care system that provides services to them. This transition from hospital to community living is important as individuals move from having their cares met for them to having to self-manage their health once home. The increased risk of functional decline and loss of independence are high and often permanent and are reflected in outcomes including increased falls, poor nutrition, functional decline, reduced activities of daily living (ADL) and depressed mood (Boyd et al., 2009; Covinsky et al., 2003; Heim et al., 2014; Sager et al., 1996; Wu, Sahadevan, & Ding, 2006). Additional research indicates that hospitalisation can impact the sleep quality of older adults (Bakken et al., 2014), and impaired sleep has been linked to cardiac disease, immune system disorders, higher mortality rates, decreased response times, falls, depression, and impaired memory, concentration and decision making (Ancoli-Israel & Cooke, 2005; Linton & Lach, 2007).

Management of these problems can be difficult. Screening for sleep

impairments is not routinely employed at discharge from hospital despite signs of sleep impairments being evident at this point. It is unknown what the causes and consequences are and whether sleep impairments resolve, persist or worsen over the months that follow. Indications from previous literature has also indicated that behaviour resulting from sleep disturbances in older adults can be mistaken for cognitive impairment or dementia (Ancoli-Israel & Cooke, 2005), and can often influence the decision by family to place an older adult into a nursing home or aged care facility (Pollak & Perlick, 1991; Pollak, Perlick, Linsner, Wenston, & Hsieh, 1990). Thus, sleep impairments could be common health concerns that are not systematically being identified nor adequately managed despite a prolonged period of care for older adults within the health care system.

The aim of this current paper is to describe the concepts and design of a study aiming to:

1. Assess the time-course of impaired sleep quality amongst older adults who have been discharged to the community following at least two weeks of hospitalisation.
2. Identify and understand inter-relationships between factors that may cause older adults to experience impaired sleep and associated health outcomes during the six months following an extended period of hospitalisation.

2.6. Experimental section

2.6.1. Study design

This study was a mixed methods investigation. It comprises an observational, prospective cohort study, and a qualitative investigation with qualitative description. Quantitative and qualitative data were gathered from participants over a six-month period. Data were collected from older adults using questionnaires based on a combination of standardised surveys, demographic information questions, and open-

ended questions. Participants completed a baseline questionnaire whilst in hospital providing information regarding their sleep during and prior to hospitalisation. Participants were followed up in their home at three and six months post-discharge to collect data regarding their sleep, health, and participation levels post-discharge.

2.6.2. Participants and setting

Participants in the prospective cohort study were older adults aged 65 years and over who were transitioning home to community living following a period of extended hospitalisation (two or more weeks). Study exclusion criteria was cognitive impairment, discharge location to a residential aged care facility, length of stay in hospital of less than two weeks. Patients with cognitive impairment were excluded due to the cognitive demands for completing the largely survey-based data collection approaches in this study. Cognitive ability was determined by the investigator with the participant in person via completion of the 6-item Cognitive Impairment Test (6-CIT; Katzman et al., 1983). Patients discharged directly to a residential aged care facility were excluded as they were returning to a care arrangement where many decisions regarding their health are determined by others on their behalf.

Participants were recruited through Monash Health at the Kingston Rehabilitation Centre, Dandenong Hospital, and Casey Hospital, Melbourne, and Peninsula Health at the Golf Links Road Rehabilitation Centre, the Mornington Centre, and the Rosebud Rehabilitation Centre, Mornington Peninsula. These health services are suburban health networks in Victoria, Australia that provide tertiary level care to residents of that area.

Consecutive sampling of eligible patients from identified wards was employed until 300 participants had been recruited. The total sample was 311 older adults at baseline. In this study, the investigators sought to have 50% of the total sample being male and 25% identifying as being from culturally and linguistically diverse

backgrounds. Use of quotas in this manner aimed to ensure that sufficient data were available in the overall study sample so that if there are significant differences in outcomes between these sub-groupings they could be identified. There is evidence indicating that the incidence and response to sleep impairments is different between men and women, while people from culturally and linguistically diverse backgrounds have been found to encounter additional barriers in accessing health services which may affect their health outcomes following hospitalisation and/or their reporting of sleep impairments. All participants were included in the qualitative investigation while participating in the prospective cohort study.

Tables 2.1, 2.2, and 2.3 outline the power for each research question based on the initial proposed sample size of N=300 at baseline, as determined with use of G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009). Please refer to Appendix D for visual screenshots of the power analysis.

Table 2.1.

Correlational power analysis of research questions 2 and 5 (pre and within hospital).

Research Question	Independent Variables	Dependent Variable	Effect Size	Analysis Approach	Power
What factors for community-dwelling older adults, if any, are associated with changes in sleep quality between pre-admission and within hospital?	Health related Quality of Life (EQ-5D-5L), Mood Disturbance (GDS-SF, GAI), Falls, Physical Activity Participation (Phone-FITT), length of stay, medication	Change in sleep quality between each time point	0.163	Correlational (Regression Analysis)	0.80
What is the impact of change in sleep quality for community-dwelling older adults, if any, on health-related quality of life, mood disturbance, social isolation, falls, hospital readmissions, and participation in physical activity between pre-admission and within hospital?	Health related Quality of Life (EQ-5D-5L), Mood Disturbance (GDS-SF, GAI), Social Isolation (FSS), Falls, Physical Activity Participation (Phone-FITT), length of stay, medication				

*Note. * based on sample size N=300.*

Table 2.2.

Paired t-test power analysis of research question 1.

Research Question	Effect Size	Analysis Approach	Power
Q1: Is there a change in sleep quality of community-dwelling older adults between *pre-admission* and *within hospital*?	0.163	Paired t-test	0.80
Q1: Is there a change in sleep quality of community-dwelling older adults between *within hospital* and *post-discharge* living amongst community-dwelling older adults?	0.1905	Paired t-test	0.80

Note. based on sample size N=300 at baseline and N=218 at 6 month. In the actual study, 311 participants were recruited and 93 withdrew (70% retained), therefore, N=218 was the sample size remaining at six months.

Table 2.3.

Correlational power analysis of research questions 2 and 5 (within hospital to post-discharge).

Research Question	Independent Variables	Dependent Variable	Effect Size	Analysis Approach	Power
What factors for community-dwelling older adults, if any, are associated with changes in sleep quality between within hospital and: a. 3 months post-hospitalisation? b. 6 months post-hospitalisation?	Mood Disturbance (GDS-SF, GAI), Health related Quality of Life (EQ-5D-5L), Falls, Physical Activity Participation (Phone-FITT), medication	b. change in sleep quality between within hospital and 3 months post-hospitalisation c. change in sleep quality between within hospital and 6 months post-hospitalisation	0.1905	Correlational (Regression Analysis)	0.80
What is the impact of change in sleep quality for community-dwelling older adults, if any, on health-related quality of life, mood disturbance, social isolation, falls, hospital readmissions, and participation in physical activity between within hospital and: a. 3 months post-hospitalisation? b. 6 months post-hospitalisation?	Health related Quality of Life (EQ-5D-5L), Mood Disturbance (GDS-SF, GAI), Social Isolation (FSS), Falls, Physical Activity Participation (Phone-FITT), length of stay, medication	b. change in sleep quality between within hospital and 3 months post-hospitalisation c. change in sleep quality between within hospital and 6 months post-hospitalisation			

Note. based on sample size N=218.

Figure 2.1 presents a flow of participant involvement throughout the study.

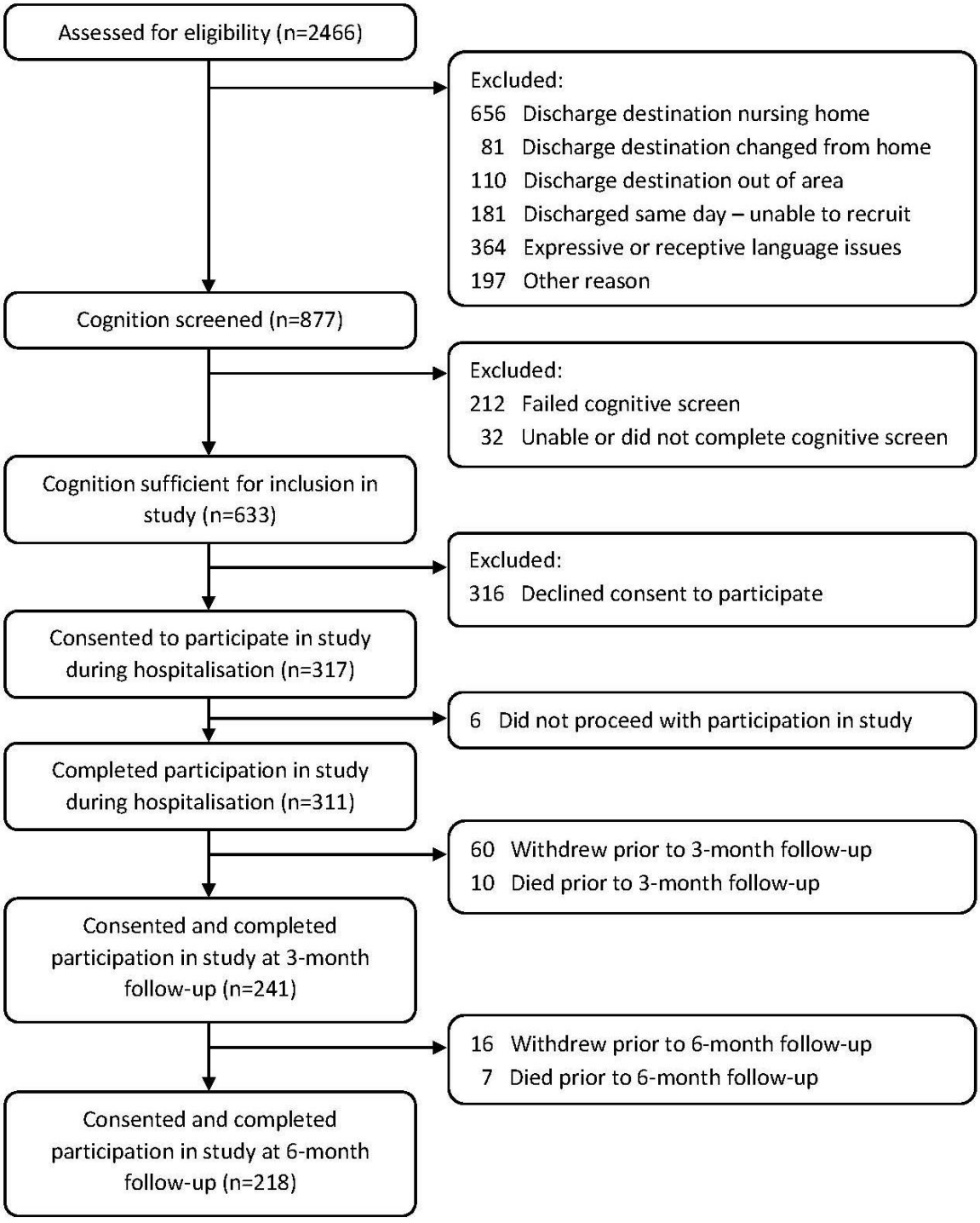

Figure 2.1. Flow of participant involvement throughout study. In the actual study, 311 participants were recruited and 93 withdrew (17 died; 70% retained), therefore, N=218 is the sample size remaining at six months.

Every older adult within the recruitment locations, who met the inclusion criteria and had sufficient cognition to participate for six months, was invited to participate in this study. In

total, 311 participants were initially recruited and 93 withdrew (17 of these died; 70% retained). Therefore, the sample size remaining at the six month point in time was 218 participants.

2.6.3. Measurements

2.6.3.1. Prospective cohort study measurements

The investigators decided to capture a broad range of potential predictor/criterion variables in this study (given the relatively small amount of quantitative information currently available) on factors found to be associated with impaired sleep and mood disturbance, particularly late age onset depression[1]. As a starting point, the "Behavio[u]ral model depicting onset and maintenance of depression in late life" (Fiske, Wetherell, & Gatz, 2009) was used to guide the selection of data-gathering tools (refer to Figure 2.2). This model proposes an explanation for the development of late age onset depression and anxiety and depicts various domains related to aging including: the interaction between longstanding vulnerabilities (e.g., genetic factors) and stressful events that are more likely in later life (e.g., spousal bereavement, loss of roles); in addition to biological factors (physical or cognitive) (Fiske et al., 2009). This interplay can limit both the capacity and the participation levels of an older adult and lead to reduced activities. Potential further compounding factors include self-critical cognitions, low rate of positive outcomes and mood disturbance (e.g., a depressed person may be overly critical of their engagement in an activity, feel they performed poorly, and this then leads them to further reduce their participation in activities they previously engaged in). Negative reinforcement can occur of this behaviour as future attempts to engage

[1] Mood disturbance, particularly anxiety and depression, were the predominant components of the broader research project. Some components relating to this are included here due to the bi-directional (cause and consequence) of depression with sleep impairments even though this doctoral research primarily focused on sleep impairments with secondary analyses of symptoms of anxiety and depression.

in activities may be considered to result in failure and therefore a feedback loop of negative cognitions is established. This study will operationalise the three input domains and the negative feedback loop as the output feedback loop domain.

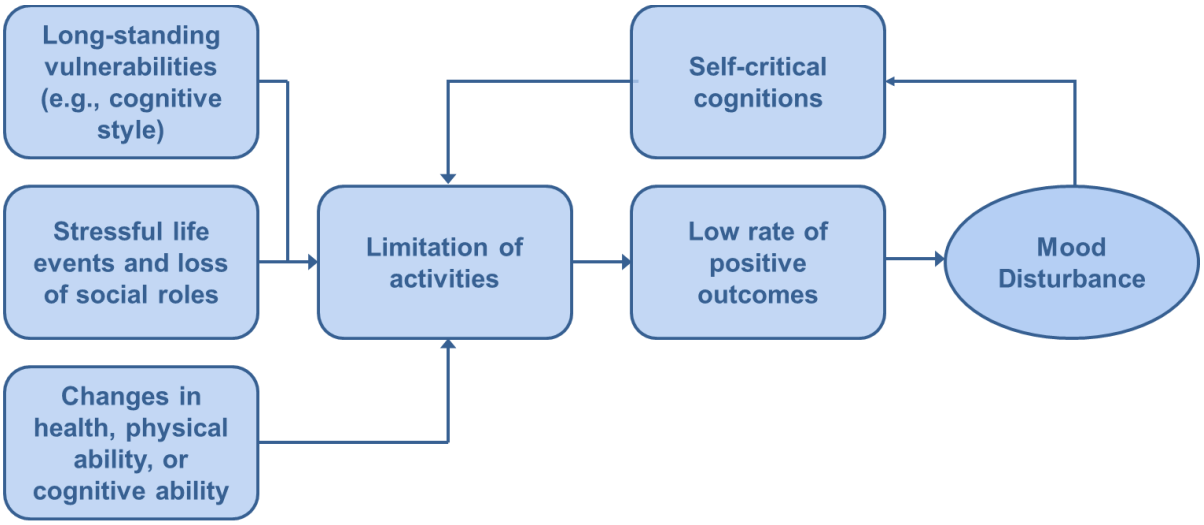

Figure 2.2. "Behavio[u]ral model depicting onset and maintenance of depression in late life" (Republished with permission of Annual Reviews, Inc., from "Depression in older adults", Fiske, Wetherell, & Gatz, volume 5, p. 369, 2009; permission conveyed through Copyright Clearance Center, Inc. (see Appendix E)).

To measure these three input and one output domains, a suite of measures across a range of fields were pilot tested and subjected to review by a Project Reference Committee. Pilot testing of the initial baseline questionnaire was conducted with five non-hospitalised, community-dwelling older adults that are representative of our target population. Feedback the research team received from our consumers was that the survey was overly burdensome and that there were several items that appeared repetitious that could be removed and this led to modification of some measures.

The Short Geriatric Depression Scale (GDS-SF; Yesavage & Sheikh, 1986), Geriatric Anxiety Inventory (GAI; Pachana et al., 2007), EuroQol-5 Dimensions-5 Levels (EQ-5D-5L; Herdman et al., 2011), PhoneFITT (Gill, Jones, Zou, & Speechley, 2008), Epworth Sleepiness Scale (ESS; Johns, 1991), Pittsburgh Sleep Quality Index

(PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), and the Death Anxiety Questionnaire (DAQ; Conte, Weiner, & Plutchik, 1982), along with items relating to current falls and exercise program adherence were used to capture the output feedback loop domain.

The Intrinsic Spirituality Scale (ISS; Hodge, 2003), DAQ, Pain Attitudes Questionnaire (Revised; PAQ-R; Yong, Gibson, Horne, & Helme, 2001), Brief Resilient Coping Scale (BRCS; Sinclair & Wallston, 2004), and Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) along with single item questions relating to demographic data, housing and financial situation, and medical history were used to capture the long-standing vulnerabilities domain.

The Friendship Scale (FSS; Hawthorne, 2006), Lubben Social Network Scale Abbreviated (LSNS-6; Lubben, 1988) along with single item questions relating to services received, caring or volunteering roles, computer use, transport options and stressful life events were used to capture the stressful life events and loss of social roles domain.

The Controlled Oral Word Association Test—Semantic (category) version (COWAT-S; Gladsjo et al., 1999), Color Trails Test (CTT; D'Elia, Satz, Uchiyama, & White, 1996), and Urogenital Distress Inventory (UDI-6; Uebersax, Wyman, Shumaker, & McClish, 1995), along with single item questions relating to demographic data and health and wellbeing history were used to capture the changes in health, physical activity and cognitive ability domain. The variables and domains that are measured by the aforementioned tools are summarised in Table 2.4. This table also highlights at which time points during the study these measures are proposed to be utilised. The measures selected within each domain are now presented and highlight any modifications that were made as a result of the pilot and review process. Table 2.5 encapsulates the psychometric properties of the summarised measures.

Table 2.4.
Summary of the key domains assessed via questionnaire in the study of older adults.

Domain	Questionnaire Data (Measurement Tool)	Measurement Points							
		R	**B**	**1**	**2**	**3**	**4**	**5**	**6**
Output feedback loop	Depression symptoms (GDS-SF, EQ-5D-5L)	X	X	X	X	X	X	X	X
	Anxiety symptoms (GAI, EQ-5D-5L)	X	X	X	X	X	X	X	X
	Physical capacity and participation (PhoneFITT)	X	X	X	X	X	X	X	X
	Quality of life (EQ-5D-5L)					X			X
	Falls		X	X	X	X	X	X	X
	Sleepiness and sleep quality (ESS, PSQI)	X	X			X			X
	Perception of death * (DAQ)		X						
	Exercise program		X			X			X
Long-standing vulnerabilities	Gender		X						
	Culturally and Linguistically Diverse (CALD)		X						
	Marital status		X						
	Housing situation		X						
	Financial situation		X						
	Primary occupation		X						
	Education level		X						
	Existing chronic conditions *		X						
	Religiosity/spirituality (ISS)		X						
	Perception of death * (DAQ)		X						
	Pain and stoicism (PAQ-R)		X						
	Resilience and coping style (BRCS)		X						
	Personality (TIPI)		X						
Stressful life events and loss of social roles	Services received		X						
	Social isolation (LSNS-6, Friendship Scale)		X			X			X
	Computer use		X			X			X
	Driving/transport		X			X			X
	Carer/volunteering		X						
	Stressful life events		X			X			X
Changes in health, physical ability, or cognitive ability	Cognition (COWAT-S, CTT)		X			X			X
	Vision and visual aids		X						
	BMI		X						
	Falls history	X							
	Physical capacity and participation * (PhoneFITT)	X	X	X	X	X	X	X	X
	Continence (UDI-6)		X			X			X
	Reason for hospital admission		X						
	Existing chronic conditions *		X						
	Nutrition		X						
	Caffeine intake		X			X			X
	Alcohol intake		X			X			X
	Smoking intake		X			X			X
	Health professional consultations		X			X			X
	Medication		X			X			X

Note: * denotes questionnaire data relevant to two or more domains; B: Baseline questionnaire; R: Retrospective questionnaire; 1: 1 month questionnaire; 2: 2 month questionnaire; 3: 3 month questionnaire; 4: 4 month questionnaire; 5: 5 month questionnaire; 6: 6 month questionnaire; GDS-SF: Short Geriatric Depression Scale; EQ-5D-5L: EuroQol-5 Dimensions-5 Levels; GAI: Geriatric Anxiety Inventory; ISS: Intrinsic Spirituality Scale; DAQ: Death Anxiety Questionnaire; PAQ-R: Pain Attitudes Questionnaire (Revised); BRCS: Brief Resilient Coping Scale; TIPI: Ten-Item Personality Inventory; LSNS-6: Lubben Social Network Scale Abbreviated; COWAT-S: Controlled Oral Word Association Test—Semantic (category) version; CTT: Color Trails Test; UDI-6: Urogenital Distress Inventory; ESS: Epworth Sleepiness Scale; PSQI: Pittsburgh Sleep Quality Index

Table 2.5.
Psychometric properties of proposed tools to be included

Measure	Reliability/Validity	Sample Item
Short Geriatric Depression Scale (GDS-SF)	The GDS-SF has a high level of internal consistency (Cronbach's α = 0.80) (D'Ath, Katona, Mullan, Evans, & Katona, 1994) and strong sensitivity (81.3%) and specificity (78.4%) (Mitchell, Bird, Rizzo, & Meader, 2010). Additionally, the efficiency (fraction correctly identified) of the GDS-SF is significantly higher than the GDS (77.6% *vs.* 71.2%, $Chi^2 = 24.8$, $p < 0.0001$) and the clinical utility of the GDS-SF was rated as "good" for screening (UI—0.75) (Mitchell et al., 2010).	Individuals are asked to choose the best answer for how they have felt over the past week, e.g., "Are you basically satisfied with your life?"
Geriatric Anxiety Inventory (GAI)	The GAI has well established psychometric properties in various population groups within the older aged (Byrne et al., 2010), with high test-retest reliability ($R = 0.91$) and inter-rater reliability ($R = 0.99$) (Pachana et al., 2007) and demonstrated sensitivity (85.7%) and specificity (78.0%) (Cheung, Patrick, Sullivan, Cooray, & Chang, 2012).	Individuals are asked to choose the best answer for how they have felt over the past week, e.g., "I worry a lot of the time".
6-item Cognitive Inventory Test (6-CIT)	It takes less than 5 min to complete (mean 2.5 min) and has demonstrated high correlation ($R^2 = 0.911$) with the Mini-Mental State Examination (Brooke & Bullock, 1999; Sheehan, 2012; Tuijl, Scholte, de Craen, & van der Mast, 2012). Recent evidence has highlighted the advantages of using the 6-CIT over the MMSE in hospital settings (Tuijl et al., 2012). It has also demonstrated good sensitivity and specificity of 78.57% and 100% (cut-off 7/8) for detecting mild dementia and when compared to the Mini-Mental State Examination (90% and 96%, respectively) (Brooke & Bullock, 1999; Tuijl et al., 2012). It is recognised for being culturally unbiased and has further demonstrated not to be sensitive to educational level, nor require advanced language skills (Tuijl et al., 2012). The 6-CIT has limited validation data available although stable reliability (*test-retest* immediate: *Pearson's r* = 0.68; *test-retest* delayed: *Pearson's r* = 0.74) has been reported (Wade & Vergis, 1999).	Individuals are asked to "Count backwards from 20 to 1".
Phone-FITT	Preliminary evidence demonstrates substantial test-retest reliability (95% CI, intra-class correlation coefficients 0.74–0.88; Spearman's rho = 0.29–0.57), in addition to concurrent, convergent and discriminant validity (Gill et al., 2008).	Individuals are asked initially to answer Yes/No as to whether they completed an activity (e.g., Light housework such as tidying, dusting, laundry, or ironing). If the individual answers yes, they are then asked "How many times in the past week did you complete this activity?" Individuals are also asked "About how much time did you spend on each occasion completing this activity?"
EuroQol-5 Dimensions-5 Levels (EQ-5D-5L)	The EQ-5D-5L was recently developed following revision of the EQ-5D-3L to improve sensitivity and reduce possible ceiling effects previously found in the EQ-5D-3L (Herdman et al., 2011). Recent research has supported the revised version for sensitivity (Kim, Kim, Lee, & Jo, 2012).	Measures 5 dimensions of health including: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression across a five point scale (0 = "No problems" to 5 = "Extreme

Measure	Reliability/Validity	Sample Item
		problems") (Herdman et al., 2011).
Intrinsic Spirituality Scale (ISS)	The overall measure reports strong internal consistency (Cronbach's α = 0.96), strong reliability (0.80), and strong construct validity (r = 0.91, p < 0.001) (Hodge, 2003).	The ISS uses a ranking scale from 0–10 where 0 = "Plays absolutely no role" to 10 = "Is always the over-riding consideration". Individuals are asked to rank themselves in response to each item (e.g., "When I am faced with an important decision my spirituality…").
Death Anxiety Questionnaire (DAQ)	Initial research suggests discriminative validity of the items, construct and concurrent validity of the scale as a whole, and applicability over a broad age range ranging from 30 to 82 years [22]. Subsequent research has indicated excellent internal consistency (Cronbach's α = 0.90) and strong factor structure (Gershuny, Najavits, Wood, & Heppner, 2004).	Individuals are asked to respond either "not at all", "somewhat", or "very much" in relation to each item (e.g., "Do you worry about dying?")
Pain Attitudes Questionnaire (Revised) (PAQ-R)	Previous evidence suggests chronic pain sufferers attempt to preserve their self-esteem and maintain acceptance socially by exhibiting stoicism and reduce negative (expected or real) social consequences of disclosure (Large & Strong, 1997; Morley, Doyle, & Beese, 2000).	Individuals are asked to select the best answer for them (e.g., "I do not see any good in complaining when I am in pain") (Yong et al., 2003).
Brief Resilient Coping Scale (BRCS)	Initial evidence exists relating to adequate reliability of the tool (Cronbach's α = 0.69; test-retest correlation = 0.68–0.71, p < 0.001) and validity (r = 0.37, p < 0.01), given the brevity of the measure (Ahern, Kiehl, Lou Sole, & Byers, 2006; Morley et al., 2000; Sinclair & Wallston, 2004). Preliminary evidence demonstrates that the BRCS is a reliable and valid measure of resilient coping in non-English speaking elderly populations (Tomas, Sancho, Melendez, & Mayordomo, 2012).	Individuals are asked to select the extent to which they agree to each of the statements (e.g., "I tend to bounce back quickly after hard times").
Ten-Item Personality Inventory (TIPI)	Initial evidence reports adequate psychometric levels for the tool (Gosling et al., 2003).	Individuals are asked to rate how they perceive themselves across various personality traits (e.g., "I see myself as: extraverted/enthusiastic").
Lubben Social Network Scale Abbreviated (six items; LSNS-6)	The two factor (family and friends) structure was confirmed across three European community samples and loaded highly on each factor indicating strong construct validity (Lubben et al., 2006). The LSNS-6 has high levels of internal consistency (Cronbach's α = 0.83) and correlations with criterion variables (Lubben et al., 2006).	Individuals are asked to rate, where 0 = None and 5 = Nine or more, "considering the people to whom you are related either by birth or marriage, how many relatives (including spouses, partners, children, *etc*.) do you see or hear from at least once a month?"
Friendship Scale	Developed in Australia, the Friendship Scale comprises six of the seven identified dimensions that are believed to contribute to social isolation or social connectedness (Hawthorne, 2006). While the Friendship Scale has limited related publications at present, initial evidence suggest it has excellent internal structures (CFI = 0.99, RMSEA = 0.02), strong reliability (Cronbach's α = 0.83), and concurrent discriminant validity suggesting	Individuals are asked to rate, on a 5-point scale from "Almost always" to "Not at all", over the past 4 weeks "It has been easy to relate to others"

Measure	Reliability/Validity	Sample Item
	sensitivity to known social isolation correlates (Hawthorne, 2006).	
Color Trails Test (CTT)	Research has been conducted comparing the utility of the CTT to three other tests for assessing executive functioning in older adults and was found to be the highest loading for the executive function domain (factor loading = 0.57) (De Frias, Dixon, & Strauss, 2006). Further evidence also suggests that the CTT is appropriate for cross-cultural and clinical assessment of mental processing speed, sequencing, and visual scanning in non-English-speaking adults and adults with limited education (Mitrushina, Boone, Razani, & D'Elia, 2005).	N/A
Urogenital Distress Inventory (UDI-6)	Research has demonstrated that the UDI-6 has strong psychometric properties (Cronbach's α = 0.93) and is considered more useful in clinical and research settings (Uebersax et al., 1995). High internal consistency (Cronbach's α = 0.74) and test-retest reliability (Spearman's rho = 0.99, p<0.001) was demonstrated with a sample of 302 Turkish speaking women with urinary issues (Cam, Sakalli, Ay, Cam, & Karateke, 2007). Furthermore, while predominantly utilised with women, the UDI-6 has been used in studies with both males and females and identified high levels of distress relating to urinary issues in males that had not previously been detected (Chadwick et al., 2012).	Individuals are asked whether they currently experience: "Urine leakage related to the feeling of urgency" (Yes or No).
Epworth Sleepiness Scale (ESS)	The ESS has high internal consistency (Cronbach's α = 0.88) and test-retest reliability (r = 0.82) (Johns, 1991; Johns, 1992; Chadwick et al., 2012; Hardinge, Pitson, & Stradling, 1995; Johns, 1993).	Individuals are asked to choose the most appropriate response, on a 4 point scale where 1 = would NEVER doze or sleep to 4 = HIGH chance of dozing or sleeping, for various situations (e.g., "Sitting and reading").
Pittsburgh Sleep Quality Index (PSQI)	Initial development of the PSQI was conducted with patients with major depression and patients with a sleep disorder (Buysse et al., 1989). It has subsequently become a widely used, recognised and validated tool for assessing sleep quality with participants presenting with a variety of medical diagnoses (Carpenter & Andrykowski, 1998; Fichtenberg, Putnam, Mann, Zafonte, & Millard, 2001). More recently, the PSQI has been further validated for use with community-dwelling older men and older women (Beaudreau et al., 2012; Spira et al., 2012). Adequate internal consistency was reported for total PSQI scores (Cronbach's α = 0.69). Previous research also demonstrated good internal consistency (Cronbach's α = 0.78) for the PSQI in both black (n = 306) and white (n = 2662) community-dwelling women aged 70 years and over. [79] Adequate test-retest reliability (0.85), strong criterion validity, and responsiveness to have also been established for the PSQI (Buysse et al., 1989; Smith & Wegener, 2003). The global score has a strong diagnostic sensitivity (89.6%) and specificity (86.5%) (Lau, Eskes, Morrison, Rajda, & Spurr, 2013).	Individuals are asked to answer various items relating to their usual sleep habits during the past month. (e.g., "During the PAST month, what time have you usually gone to bed at night?")

2.6.3.2. Initial cognitive screen

An initial cognitive screen was used prior to participants being recruited for the study in order to ensure sufficient cognitive ability to partake in the study over the six months. The 6-CIT (Katzman et al., 1983), also known as the Short Orientation-Memory-Concentration Test, is a brief cognitive test used in primary care and involves three orientation items. (See Appendix F).

2.6.3.3. Output feedback loop domain

This domain contains several different measures that address aspects of a person's health and activities that form part of a negative feedback loop thought to culminate in mood disturbance. Previous authors proposed that both the "lack of opportunity for positive outcomes and the aversive experience of self-critical cognitions may intensify and maintain a depressive state" (Fiske et al., 2009, p. 6). In addition, the investigators hypothesise that falls, sleep disturbance, and loss of physical capacity are additional compounding factors that will be important factors within this feedback loop for older adults.

As highlighted in Chapter 1, there are different approaches of measuring sleep quality and each approach has its associated strengths and limitations. Because of its feasibility and client centred approach (allowing self-report of sleep by the older adult), the PSQI (Buysse et al., 1989) was chosen to measure sleep quality and the ESS (Johns, 1991) to measure daytime sleepiness. The PSQI is a 19-item measure of retrospective sleep quality and disturbances relating to the individual's recollection of night-time sleep quality over the past month (Buysse et al, 1989; Hauer, Lamb, Jorstad, Todd, & Becker, 2006). The PSQI yields scores across seven equally weighted component domains including: (1) Subjective Sleep Quality; (2) Sleep Latency (time it takes to fall asleep); (3) Sleep Duration; (4) Habitual Sleep Efficiency (ratio of total sleep time to time in bed); (5) Sleep Disturbances; (6) Use of Sleep-

Promoting Medication (prescribed or over-the-counter); and, (7) Daytime Dysfunction. The PSQI uses a combination of open-ended questions and a 4-point Likert scale (0 = “Not during the last month” to 3 = “Three or more times a week” in relation to problem frequency; or 0 = “Very good” to 3 = “Very bad” in relation to overall sleep quality). Overall points are summed (range 0 to 21) where a higher overall score (Global Score) indicates poorer sleep quality. Component scores range from 0 to 3 and are summed to obtain the Global Score. A cut-off score of >5 was empirically derived and distinguishes poor sleepers from good sleepers (Buysse et al., 1989). The ESS is an 8-item subjective measure of daytime sleepiness (Johns, 1991; Johns, 1992). Using a 4-point Likert scale (0 = “No chance” to 3 = “High chance of dozing”) respondents rate their likelihood of falling asleep or dozing during eight common situations in life (e.g., sitting and reading). A score greater than 10 (out of a possible 0–24) is considered clinically significant in relation to daytime sleepiness (Johns, 1991).

Symptoms of depression were measured using the GDS-SF. The GDS-SF (Yesavage & Sheikh, 1986) is a shortened version of the original 30 item Geriatric Depression Scale (GDS). The GDS was created for use in geriatrics as its items were based on characteristics of depression in the elderly (Montorio & Izal, 1996). The GDS-SF is a 15 item yes/no questionnaire devised to detect depression, specifically within the older population (65 years and over). To determine clinically significant symptoms of depression, a cut-off of six or more was used, in accordance with recommendations by the original authors (Stiles & McGarrahan, 1998; Yesavage & Sheikh, 1986). Symptoms of anxiety were measured using the GAI. The GAI is a 20-item agree/disagree questionnaire that was developed as a simple instrument to allow measurement of anxiety symptom severity in older adults in varied settings (Pachana et al., 2007). While a score of eight correctly identified 78% of patients with

any anxiety disorder in a group of older adults with psychiatric disorders, a cut-off score of nine or greater was used to determine clinically significant symptoms of anxiety, as per original author suggestion (Pachana et al., 2007). The EQ-5D-5L is a 5-item measure (Herdman et al., 2011), that will assess depression and anxiety symptoms and quality of life in the Output Feedback Loop.

Physical capacity and participation was assessed with the Phone-FITT. This measure is a brief physical activity interview for use with older adults (Gill et al., 2008). It was designed to measure dimensions of physical activity including: Frequency, Intensity, Time and Type (FITT) as identified as the most familiar dimensions required in the context of aerobic endurance training by the American College of Sports Medicine (American College of Sports Medicine, 2013). Activities included are those prevalent among older Canadians (where the scale was developed) and those that have demonstrated importance in falls prevention (e.g., balance and strengthening exercises) (Gill et al., 2008).

A participant's perception of death was assessed via the DAQ within this study. The DAQ is a 15-item, three point scale ("not at all", "somewhat", "very much") reported to assess the specific fears that individuals may have when thinking about death or dying (Conte et al., 1982). The 15-items are classified across five factors: fear of the unknown; fear of suffering; fear of loneliness; fear of personal extinction; and, unclassified. Items were removed from the DAQ on the judgment of investigators as they were deemed as being least relevant to the overall study aims and in an attempt to reduce overall respondent burden.

Falls in the study were assessed through subjective recall over the past month. Participants were provided with the World Health Organization definition of a fall. Evidence from a systematic review of falls methodology has shown that there is no "gold standard" for documenting falls, however, if retrospectively collected it is

recommended that details are ascertained at least once a month (as is proposed in the present study) to reduce limitation of recall bias (Hauer et al., 2006).

2.6.3.4. Long-standing vulnerabilities domain

This domain reflects background traits and experiences that are thought to predispose, or protect against, late age onset depression in older adults. Potential indicators of long-standing vulnerabilities included in the initial baseline questionnaire for this study consist of information regarding the person's home environment (e.g., natural lighting); socioeconomic status (e.g., financial, education and housing situation); existing chronic conditions; religiosity or spirituality; perception of death (using the DAQ previously outlined); pain and stoicism; resilience and coping style; personality; additional demographic items (e.g., gender, marital status); and a participant's Culturally and Linguistically Diverse (CALD) status. Previous research has demonstrated that people from CALD backgrounds are likely to have experienced, and attempting to recover from, loss, grief, torture, trauma, and the obstacles of resettlement (AIHW, 2008; United States Department of Health and Human Services, 2001). Additionally, they may lack access to mental health services due to stigma, language difficulties, or unfamiliarity with the health system of Australia, thereby placing greater demands on them to cope with limited appropriate support regarding their mental health. Participants in this study will be classified as being from a CALD background if they answer "Yes" to two of the three following questions: (1) Were you born in a country other than Australia? (2) Do you speak a main language other than English at home? (3) Do you identify with a specific cultural group (other than Australian) or as an Indigenous Australian or Maori?

A participant's religiosity or spirituality will be assessed via the ISS, which is a 6 item measure designed to assess the degree to which an individual's spirituality functions as a "master motive" beyond a religious framework (Hodge, 2003). During

piloting of items, only two of the six items in the ISS were considered to have face validity while the other four items were ambiguous. Therefore, only these two items have been included in the study questionnaire. (Refer to Appendix G for a list of all items included in the surveys at the baseline (questions during hospital relating to pre-hospital and during hospital), three-months post-hospitalisation, and six-months post-hospitalisation). Additionally, the PAQ-R was included to measure pain and stoicism. The PAQ-R is a 24 item, 5-point rating scale (1 = “Strongly disagree” to 5 = “Strongly agree”) of the attitudes of stoicism and cautiousness individuals may have towards perception and reporting of pain symptoms (Yong et al., 2001; Yong, Bell, Workman, & Gibson, 2003). Within the PAQ-R, five of the possible 24 items, relating to the Stoic-Fortitude sub-scale, were identified as being appropriate for inclusion in order to reduce respondent burden.

Resilience refers to the “dynamic process that results in adaptation in the context of significant adversity” (Margalit & Idan, 2004, p. 60). The BRCS is a 4-item measure that uses a 5-point rating (1 = “Does not describe me at all” to 5 = “Describes me very well”) designed to measure an individual’s tendencies to cope with stress in a highly adaptive manner (an individual’s competence of daily skills to meet everyday living demands) (Sinclair & Wallston, 2004). Lastly, personality was briefly assessed via the TIPI. This measure is a 10 item personality scale utilising a 7-point Likert scale (1 = “Disagree strongly” and 7 = “Agree strongly”) (Gosling et al., 2003). The TIPI includes the identified “*Big Five*” dimensions of personality: “extraverted”, “agreeable, warm”, “conscientious”, “emotionally stable”, and “open to new experiences”. The TIPI was developed for use in research screening where personality is not the primary topic of interest (as is the case for this project) and where brevity is required to reduce respondent burden (Gosling et al., 2003).

2.6.3.5. Stressful life events and loss of social roles domain

This domain reflects events, largely external, that may impact on an older adult's propensity to develop late age onset depression; some events may be sudden (e.g., loss of partner), while others may take place over an extended period (e.g., loss of social role). This domain was assessed via the LSNS-6 and FSS in addition to various social role factors. The LSNS-6 is an abbreviated version of the Lubben Social Network Scale (LSNS) to lessen respondent burden, and was produced to screen for social isolation (Lubben, 1998). The LSNS was specifically developed for use among older adult populations (Lubben, 1998). It uses a two-factor structure (family and friends) to measure perceived social support from family (three items) and friends (three items) (Lubben & Gironda, 2004). The LSNS-6 uses a six-point scale of the number of family or friends within the past month that the person reports seeing or hearing from in relation to the item asked (0 = "none" through to 5 = "nine or more"). The FSS is a short 6-item scale with a 5-point scale ("Almost always" to "Not at all") devised to assess social isolation in older adults (Hawthorne, 2006). Each item is scored 0–4 with a possible range of 0–24 overall. Scores between 0 and 15 indicate low friendship acuity, 16 and 18 moderate friendship acuity, and 19 and 24 high friendship acuity (Hawthorne, 2006). Four items were removed from the LSNS-6 for inclusion within this study as they overlapped with the FSS.

2.6.3.6. Changes in health, physical ability, or cognitive ability domain

This domain reflects changes to the internal health and capacity of the older adult to function. Cognition was assessed via the COWAT-S and the CTT, and continence via the UDI-6. Additional items assessed a participant's Body Mass Index (BMI); reason for hospital admission and existing chronic conditions; intake of caffeine, alcohol, and/or tobacco; connection with a regular general practitioner (GP); and consultations within the past month with GP or other health professional. The COWAT-S is a category fluency task to assess executive functioning, semantic

knowledge and memory retrieval ability (Gladsjo et al., 1999). Category fluency tasks require an individual to name as many animals (or supermarket items or similar) as possible within one minute from memory. The number of category items reported, repeated words and words not pertaining to the category are all recorded. Category fluency is believed to be appropriate for use with individuals across various backgrounds to allow for demographic correction relating to age, education and ethnicity. Norms for the COWAT-S have been developed to adequately address ethnicity, education and age (Gladsjo et al., 1999). The CTT consists of two timed trail tests where individuals are required to connect circles numbered 1 through to 25 in sequence with a pencil as fast as possible (D'Elia et al., 1996). For the CTT 1 trail, the respondent has one set of numbers to connect (1–25). For the CTT 2 trail, the respondent is presented with duplicate coloured numbers within the range (1–25). Participants are required to rapidly connect these in sequence, while alternating between pink and yellow coloured circles. Both trail tests assess visual scanning, graphomotor skills, sustained visual attention and allow the assessor to also obtain information regarding eye-hand coordination speed and information processing speed as the respondent completes the trails (D'Elia et al., 1996). To reduce cultural and linguistic bias, the CTT uses no letters and can be administered verbally or non-verbally through demonstration (D'Elia et al., 1996; Vlahou & Kosmidis, 2002). However, participants do need to be able to recognise Arabic numerals (1 to 25) and distinguish colours pink and yellow (D'Elia et al., 1996; Strauss, Sherman, & Spreen, 2006). The time to complete both trails is recorded in seconds with errors, near misses, and prompts also recorded.

The UDI-6 is a 6-item, 4-point measure designed to assess the symptom distress and life impact of urinary incontinence (Uebersax et al., 1995). It was developed from the Urogenital Distress Inventory—Long Form which consists of 19

items (Shumaker, Wyman, Uebersax, McClish, & Fantl, 1994). Respondents are asked whether they currently experience, and how much they are bothered by (0 = not at all, 1 = slightly, 2 = moderately, 3 = greatly), various urinary incontinence issues (e.g., urinary leakage related to the feeling of urgency). For the present study, only three items of the UDI-6 (2, 3, and 4) have been included along with an additional item ("problems with your bowels, like constipation or diarrhoea") which was determined following piloting of the items. During piloting respondents indicated that bowel issues, not just bladder concerns, impacted on their likelihood of leaving their home or socialising with family or friends.

Additional questions were asked at the baseline assessment about the patient's current condition and the patient's recollection of their premorbid condition. Table 2.4 outlines the time periods for each measure and additional questions across the eight time periods[2] (e.g., R: Retrospective, B: Baseline, 1–6: 1 month to 6 months). For example, a current condition question: "If you were to try today, could you walk up and down stairs without a handrail or assistance from someone else?" for premorbid condition would be rephrased: "Prior to coming into hospital, if you were to try, could you walk up and down stairs without a handrail or assistance from someone else?"

2.6.3.7. Qualitative exploration

During hospital, and at three- and six-month follow-up, the investigators asked participants open-ended questions regarding the consultations that they have had in the three months prior with their GP or other health professionals. The interviews aimed to elicit the narrative account of what older adults recall discussing in relation

[2] Participants were followed up monthly in the overall project via telephone in between the three- and six-month follow-ups. These interviews did not include questions regarding sleep quality and therefore results from the 1, 2, 4, and 5 month time points have not been included in analyses within this doctoral research. Acknowledgement of these time points is included however as it is likely that monthly follow-up assisted with retention of participants to the six-month follow-up.

to their sleep, falls, mental health, and social isolation and how this changes over the course of the project. Participants were asked if they had had any consultations in the previous three months, who they consulted with, who initiated the consultation topic, what was discussed, and what was decided upon to address the health issue (if anything). If participants had had a consultation but the topics of sleep, falls, mental health, or social isolation were not discussed, participants were asked why they believe these topics were not discussed. The question set for the interviews relating to sleep are provided in Table 2.6.

Table 2.6.

Question set for qualitative structured interviews regarding consultations.

Question
Initial question participant answers Yes or No to each option provided
1. Have you consulted any of the following health professionals in the last three months? a. General Practitioner (GP) or Doctor b. Psychiatrist c. Other medical practitioner d. Occupational therapist e. Physiotherapist f. Psychologist g. Podiatrist or chiropodist h. Social worker i. Nutritionist or dietician j. Sleep clinician k. An alternative health practitioner (i.e., herbalist, chiropractor, naturopath, meditation teacher, acupuncturist) (please state which if known) l. Other (please state if other than those listed)
2. Did you discuss your sleep with any of the health professionals you consulted in the last three months?
If participant answered No they were asked:
2a. Was there any reason why your sleep was not discussed?
If participant answered Yes they were asked:
3. Who did you discuss your sleep with?
4. Who initiated the discussion about your sleep? a. I did b. They did c. Family member/carer d. Can't remember e. Other (please state)
5. Can you tell me what was discussed in relation to your sleep? *(participant answer transcribed verbatim)*
6. What was done or decided to address this issue (i.e., your sleep) either by yourself or the health professional? *(participant answer transcribed verbatim)*

2.6.4. Procedure

Potential participants were identified by screening of ward discharge planning lists on the targeted hospital wards. Discharge dates are tentatively set within 48 h of admission, however, needed to be confirmed at least 24–72 h before the actual discharge date. Those appearing to meet the study inclusion criteria were screened by project research personnel to confirm eligibility and then approached for consent to participate. Those consenting had the baseline assessment completed within 48 hours to the time of discharge (of the planned discharge date). The baseline assessment included measurements as previously outlined (see Appendix G).

Once the participant was discharged from hospital, they undertook telephone interviews for follow-up asking about a subset of domains for the 1, 2, 4, and 5 month assessments. These domains were selected as they were central to the limitation of activities model for explaining development of mood disturbance in this population. The follow-up assessments undertaken at three- and six-months post-discharge were undertaken using a face-to-face interview approach at the participants home or agreed location. Accredited language interpreters were used when required.

2.6.5. Analysis

Data collected from participants were analysed using the data analysis and statistical software STATA® Version 13.1 (StataCorp., 2013). Descriptive statistics were generated to investigate the factors regarding sleep quality and sleep of participants, whilst correlation analysis was undertaken to determine the strength of the relationship between sleep quality of older adults and the various independent variables included in this research project. Multiple linear regression analysis were undertaken to determine any association between the dependent variable and independent variables. Further detail is contained within the methods section of each chapter relating to the individual studies within this doctoral research.

2.6.6. Ethical considerations

Ethical approval was obtained for the initial recruitment of participants for this study through the Human Research Ethics Committees (HREC) of Monash Health (previously Southern Health) (reference: 12182B), Peninsula Health (HREC/13/PH/51), and Monash University (HREC:0834). Documentation advising of ethics approval are presented in Appendices H-J. In accordance with ethical procedures, each participant enrolled in the study was provided with a Participant Information and Consent Form (PICF) (refer to Appendix K). The PICF invites possible participants to be involved in the initial part of the study and informs their consent. Documentation in non-technical language was provided to staff on all wards at Monash Health and Peninsula Health prior to recruitment commencing (refer to Appendix L).

2.7. Discussion

The components of this study will prospectively investigate the inter-relationships between factors that may cause older adults to experience impaired sleep quality during the six months following an extended hospitalisation. Individual outcome data will be collected over the six month time period to assist with assessment of sleep that older adults may experience post-discharge following at least two weeks of hospitalisation.

This study will provide important information regarding both causative mechanisms (such as social isolation, lack of resilience, and changes in sleep quality) and impacts of anxiety and depression amongst older adults (Bruce, 2002; Cho et al., 2008; Cole & Dendukuri, 2003; Hardy, Concato, & Gill, 2004; Vanderhorst & McLaren, 2005; Yao, Yu, Cheng, & Chen, 2008). It will enable health services to better address these issues and potentially break the vicious cycle represented in the Behavio[u]ral Model by the output feedback loop. Specifically, this study will review

potential factors that contribute to impaired sleep quality for older adults, which could be targets for intervention. It will assist early identification of those at risk of experiencing impaired sleep during the transition period, and will identify those unlikely to otherwise access health services to assist with management of their sleep and associated health outcomes. It will also permit exploration of how sleep interacts with other geriatric conditions such as mental health problems, quality of life, and social isolation, while identifying opportunities for health care service delivery reform to enable more comprehensive management of the older adult who has recently had an extended period of hospitalisation.

This study has several limitations that require acknowledgement. Firstly, due to the age of participants to be recruited and/or the length of time participants are to be engaged with the study, there is the potential for dropout or death of participants. Participants are required to complete a baseline questionnaire prior to their discharge to community-living which takes approximately one hour to complete. Additional follow-up questionnaires will take between 10 and 30 min to complete depending on the month of follow-up. This time burden may affect initial recruitment and retention as well as potentially impact on recruitment for participants to take part in the qualitative structured interview (whereby some potential participants may decline to participate in the second part of the study having completed the first six months of follow-up). Some tools included do not have research to establish whether they are able to detect change over each month or over a three month time frame.

Another limitation of this study is that the investigators made modifications to the content of previously developed and validated measures. This was necessary to minimise duplication and overall participant burden in completing the questionnaires as the investigators were concerned that a more burdensome survey would lead to greater participant attrition (AIHW, 2004; Little et al., 2012). This means that analyses

will be unable to use pre-existing summative scale scores in the analyses where scales have been modified. Instead, scores from individual items and/or factor analysis procedures will need to be used when building latent growth curve models.

One strength of this study lies in its prospective design with repeated measurement of constructs of interest. Information will be gained directly from participants rather than observations from a health professional allowing for participants to provide information from their own perspective. This is particularly important as participant-centred information can sometimes be lost in quantitative research. Furthermore, the qualitative items will drive the analysis of quantitative data. Future work that may emanate from this research should focus on development of interventions targeting factors found to precipitate impaired sleep quality in this population.

2.8. Conclusion

This study will provide important insights into the health and wellbeing of older adults while they transition to community-living following an extended period of hospitalisation. This study will fill an important gap in our understanding of sleep quality and the associated comorbidities in this population. It will further provide a unique contribution to the existing research body of knowledge due to the unique prospective study design that incorporates both quantitative and qualitative data collection methods. This mixed methods design allows the patient reported experience of these issues to drive the quantitative data analysis, and be central to the overall study findings.

2.9. Overview of the retrospective and prospective longitudinal approach

A longitudinal study design was used to capture changes in the experience of sleep of older adults over four time points: before, during, and three- and six-months following extended hospitalisation. This design contrasts with existing literature of

cross-sectional study designs that capture a ‘snapshot’ at one point in time of the sleep experience or for a specific population (i.e., those in a specific environment like an Intensive Care Unit (ICU), or with a specific diagnosis like cardiovascular disease).

Longitudinal cohort can be advantageous in establishing a sequence of events; identifying particular events over time; following change over time; and ability to correct for the “cohort effect” (Caruana, Roman, Hernández-Sánchez, & Solli, 2015). Longitudinal studies are also useful for evaluating the relationship between the outcomes over time following an event (or intervention) (Caruana et al., 2015), such as this doctoral research aims to provide. Some longitudinal quantitative research studies (see Martin et al., 2012) have explored the sleep of older adults, and their health outcomes following hospitalisation. The results of these studies were outlined in detail in this study’s systematic literature review and meta-analysis. There is no evidence of a longitudinal study regarding the sleep of older adults who have experienced an extended hospitalisation, within an Australian context.

Furthermore, cohort studies can be progressive or retrospective. Prospective studies collect data from the present time into the future, while retrospective studies examine data from the present time and into the past (Song & Chung, 2010). Retrospective and prospective cohort studies have higher efficiency and higher accuracy as their respective main advantage (Euser, Zoccali, Jager, & Dekker, 2009). This doctoral research undertook aspects of both retrospective and prospective design and analysis over four time points with the same cohort of older adults in relation to their sleep quality and their health, wellbeing, and functioning.

In summary, the strength of this doctoral research design include: observational, longitudinal, retrospective and prospective aspects, and comparison of the same cohort over the course of the study, as a means to determine what the

causes and consequences are for older adult's sleep during and following extended hospitalisation.

2.10. Chapter conclusion

This chapter presents an overview of the methodology of the broader project in addition to the methodology specific to the research of this thesis. This chapter includes a summary of the instrumentation included within the study at each time point, and provision of the justification of the study sample size. Finally, this chapter includes details of the analysis approach and ethical considerations of the study. Subsequent chapters will provide more detail regarding analysis approach specific to each body of work outlined in that chapter as the thesis progresses.

The following chapter (Chapter 3) presents a detailed outline of the first component of study within this research project. This study was a cross-sectional study of older adults during hospitalisation regarding their sleep and health and wellbeing during and prior to their hospitalisation. The aim of the study was to identify possible factors that contribute to impaired sleep quality for this population and to expand the importance of understanding these factors in order to minimise subsequent health problems that may arise from impaired sleep. The chapter will conclude with a summary of findings and implications and link to Chapter 4, which focuses on factors that contribute to impaired sleep quality for older adults post-hospitalisation.

CHAPTER 3
CAUSES OF IMPAIRED SLEEP QUALITY DURING HOSPITALISATION

O sleep, O gentle sleep,
Nature's soft nurse, how have I fright[en]ed thee,
That thou no more wilt weigh my eyelids down
And steep my senses in forgetfulness?
(WILLIAM SHAKESPEARE, "HENRY IV, PART 2")

CHAPTER 3 CAUSES OF IMPAIRED SLEEP QUALITY DURING HOSPITALISATION

3.1. Context

The previous chapter outlined the methods and scope of the research project of this doctoral research within the context of a broader study. Methods specific to this thesis were outlined. This chapter reports on results related to research questions 1, 2, and 3. This study was cross-sectional and investigated whether there was a change, and if so, what factors were associated with this change, in the sleep quality of older adults between pre-admission and during hospitalisation. This study reports on results collected during participant admission to hospital regarding participants' sleep quality during and prior to their inpatient stay.

The following text is adapted from a manuscript that is currently under review with the journal titled *Research on Aging.* The citation for this manuscript is:

> Lalor, A. F., Brown, T., Stolwyk, R., McDermott, F., Russell, G., & Haines, T. P. (2017, under review). Factors of impaired sleep quality of hospitalised older adults. *Research on Aging.*

3.2. Manuscript III: Introduction

Sleep is an essential component of life, facilitating optimal health and wellbeing for people of all ages, by promoting restorative function for one's body and brain (Hirshkowitz et al., 2015). Good sleep quality, while difficult to define, is generally associated with a number of factors that contribute to positive health outcomes that enable a person to wake up feeling refreshed with the energy and cognitive function needed to engage in their everyday activities (Harvey, Stinson, Whitaker, Moskovita, & Virk, 2008). Poor or impaired sleep quality, also known as nonrestorative sleep, may contribute to impairment in one's social and occupational

functioning. A person who experiences impaired sleep may experience increased errors due to impairment of memory and inability to concentrate (Alhola & Polo-Kantola, 2007). Additionally, the body is placed under increasing physical stress to meet the demands of daily functioning, and therefore is less able to fight off disease or infection, in turn leading to increased susceptibility for stress and strain on the heart and body.

Dissatisfaction with sleep quantity or quality forms one of the major criteria for a diagnosis of insomnia in the DSM-V (APA, 2013). Further, impaired sleep quality is a significant clinical concern as the experience of sleep disorders (not just insomnia), whether medically or behaviourally driven, have been associated with mortality and morbidity (Cappuccio, D'Elia, Strazzullo, & Miller, 2010). The experience of altered sleep quality has been associated with a number of factors including stress (Åkerstedt et al., 2012), anxiety and/or depression (Leblanc, Desjardins, & Desgagné, 2015), illness (Institute of Medicine (US) Committee on Sleep Medicine and Research, Colten, & Altevogt, 2006), change in sleep environment (i.e., home to hospital) (Ancoli-Israel & Ayalon, 2006), and change in routines (Zisberg, Gur-Yaish, & Shochat, 2010). A number of these factors are bi-directional with sleep impairments or difficulties in that they may contribute to, but may also be contributed by, sleep impairments or difficulties. Evidence suggests that older adults (65 years and older) are at particular risk of impaired sleep quality due to increased possibility of multiple comorbidities (Foley, Ancoli-Israel, Britz, & Walsh, 2004). The prevalence of diagnosed sleep disorders (like insomnia, obstructive sleep apnoea, and restless leg syndrome) and undiagnosed impaired sleep ranges from 23 to 56% in an international study of 10,132 individuals aged 15 years or more (Léger, Poursain, Neubauer, & Uchiyama, 2008). Similar results were reported in a cross-sectional study of 16 countries in Europe where 17 to 31% of the population (aged 50 years

and older) reported being bothered by sleep problems (van de Straat & Bracke, 2015). Prevalence of self-reported inadequate sleep in Australian adults (aged 18 years and older) ranges between 33 to 45% of the general population (Adams, Appleton, Taylor, Gill, et al., 2017).

Thus, the current study (1) examines the factors that contribute to impaired sleep quality for older adults during extended hospitalisation and (2) expands on the importance of understanding these factors in order to minimise the subsequent health problems arising from impaired sleep.

3.3. Literature review

As noted previously, poor or impaired sleep quality can contribute to poor health outcomes (Cappuccio et al., 2010). Furthermore, evidence suggests that there is increased risk of sleep impairment during hospitalisation (Shear et al., 2014). In an Australian context, data show that older adults make up the highest proportion of hospital admissions (41% in 2014-2015) than any other age group (AIHW, 2016). Impairment of sleep in adults admitted to hospital has been associated with a change of environment (Pilkington, 2013), presence of hospital processes (Pilkington, 2013), disturbance from noise generated in the surrounding hospital environment (Bano et al., 2014; Park et al., 2014), presenting health issue(s) (Reid, 2001), and changes to usual sleep habits and routines (Costa & Ceolim, 2013; Pilkington, 2013). The impact of impaired sleep in older hospitalised adults has the potential to impact recovery and affect return to previous levels of function (Martin, Jouldjian, Mitchell, Josephson, & Alessi, 2012). Limited evidence exists within an Australian setting, particularly of older hospitalised adults, regarding the factors that impact sleep quality.

Greater understanding of factors affecting sleep and how these work in concert is needed to develop optimal models of care in hospitalised older adults. Currently there is insufficient evidence within the literature to recommend

interventions targeting older adults at increased risk of subsequent health problems secondary to poor sleep. As part of a broader research program (Lalor et al., 2015) the researchers have undertaken a cross-sectional study, which examines the extent of sleep quality impairment in hospitalised older Australian adults and identifies the factors associated with this impairment. The aim of the current paper is to present results regarding the experience of sleep impairment in older adults.

3.4. Method

3.4.1. Study design and setting

This cross-sectional study was nested within a broader prospective longitudinal cohort study examining mood and experiences of community-dwelling older adults' pre- and post- hospitalisation (Lalor et al., 2015).

The study included 311 older hospitalised Australian adults, aged 65 and over (mean age=78 years, SD=7.7, 58% female). Participants were recruited from one of five acute or sub-acute wards of Peninsula Health or Monash Health within the southeast region of Victoria, Australia. Inclusion criteria was extended hospitalisation of 14 days or more and community-dwelling prior to hospitalisation. Participants were excluded if they had severe language or cognitive impairment (six-item Cognitive Impairment Test [6-CIT] score of 14 or more; Katzman et al., 1983). Non-English speaking participants had access to a hospital interpreter.

3.4.2. Procedure

Ethics approval for this study was obtained from the Human Research Ethics Committees of Monash University (HREC:0834), Monash Health (HREC:12182B) and Peninsula Health (HREC/13/PH/51) and all patients enrolled in the study provided written, informed consent. Participants were recruited between January 2013 to March 2015. Participants aged 65 years or more were approached 48 hours

prior to their planned discharge home from hospital by one of four research assistants in conjunction with the primary author (AL). Following consent face-to-face interviews were conducted. Participant interviews included a range of validated measures and open-ended questions regarding sleep quality, mood, medical history, and functional wellbeing. Potential factors that could contribute to impaired sleep quality during or prior to hospital were considered and determined during the participant's in-patient admission. Data were collected prior to discharge and used in comparison to data elicited through retrospectively phrased questions (participants were asked about their present sleep quality in hospital as well as that prior to hospital admission). Interviewers used the online survey program SurveyMonkey® (http://www.surveymonkey.com) to collect participant responses via an iPad. Participants were able to confirm immediately their verbal response by reviewing the verbatim record transcription on the iPad. Prior to the study, all interviewers were provided training towards data collection.

3.4.3. Instrumentation

3.4.3.1. Cognitive screening

The six-item Cognitive Impairment Test (6-CIT; Katzman et al., 1983) was used to screen initial cognition for participant inclusion. The 6-CIT has low respondent burden and is not associated with education level. Participants were included if they scored 13 or less. A cut-off less than 14 on the 6-CIT was determined, as previous evidence has suggested that this cut-off has high specificity and good sensitivity for identification of cognitive impairment (Brooke & Bullock, 1999; Tuijl et al., 2011; Upadhyaya, Rajagopal, & Gale, 2010).

3.4.3.2. Primary outcome

The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman,

& Kupfer, 1989) was used to assess the self-reported sleep quality of patients. The tool allows an individual to recollect their sleep quality over the past month. The PSQI is a standardised, 19-item measure that assesses overall sleep quality across seven components. A global PSQI score (range 0-21) is summed from the component scores, where higher scores indicate poorer sleep quality. Buysse et al. (1989) reported that poor and good sleepers could be distinguished by a global PSQI score greater than five (89.6% sensitivity and 86.5% specificity). Confirmation of the appropriateness of this cut-off was provided following advice from the original author (D. Buysse, personal communication, October 22, 2016). The PSQI was administered to participants during their hospital admission to evaluate their sleep quality both at home (pre-hospital) and in hospital (during their admission).

3.4.3.3. Baseline data

General demographic data, including age, gender, culturally and linguistically diverse (CALD) background, education, marital status, financial management, height and weight, history of falls, length of hospital stay, medications, alcohol-intake, smoking status, caffeine consumption, continence, and chronic illnesses were collected for each participant.

Additional constructs considered and measures utilised within the study included: (1) cognition, assessed using the Controlled Oral Word Association Test-semantic version (COWAT-supermarket items; Gladsjo et al., 1999); (2) quality of life, assessed using the EuroQol Quality of Life assessment - 5 dimensions, 5 levels (EQ-5D-5L; Herdman et al., 2011); (3) community participation, assessed using the PhoneFITT (Gill, Jones, Zou, & Speechley, 2008); (4) personality traits, assessed using the Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003); (5) resilience, assessed using the Brief Resilience Coping Scale (BRCS; Sinclair & Wallston, 2004); (6) stoicism and fortitude regarding pain, assessed using the Pain

Attitudes Questionnaire-Revised (PAQ-R) stoicism subscale (Yong, Gibson, Horne, & Helme, 2001); (7) symptoms of anxiety, assessed using the Geriatric Anxiety Inventory (GAI; Pachana et al., 2007); and, (8) symptoms of depression, assessed using the Geriatric Depression Scale-Short Form (GDS-SF; Yesavage & Sheikh, 1986). The PhoneFITT, GDS-SF and GAI were also retrospectively collected regarding participants' pre-hospital participation and mood, in addition to the participants' responses during their hospital admission. Further detail regarding the constructs and psychometrics of each of these measures has been previously published in relation to this study (Lalor et al., 2015).

3.4.4. Statistical analysis

STATA® Version 13.1 (StataCorp., 2013) was used to conduct statistical analyses. Data were inspected for missing values and accuracy. Descriptive statistics were used to calculate means and standard deviations, frequencies and percentages. Summary statistics for all participants were calculated in relation to their sleep quality. For all statistical analyses a *p*-value of <.05 was considered statistically significant.

Stepwise logistic regression analyses (as per Hosmer & Lemeshow, 2004) were used to identify factors independently associated with variance in sleep quality. Univariate regression was used to distinguish potential *contributory* factors for impaired sleep quality. An ANCOVA-style approach was used in the univariate regressions where the dependent variable was sleep quality in hospital (as per PSQI results in hospital), and sleep quality prior to hospitalisation (as per PSQI results pre-hospital) was forced into every statistical model as a covariate (Tabachnick & Fidell, 2013). A relaxed screening threshold of $p<.2$ was used to determine inclusion of 59 independent variables into the multiple regression analyses as per Hosmer and Lemeshow (2004). Twelve independent variables were identified as potential

predictors and were entered into a multivariate model. The variable with the highest *p*-value was progressively removed until only variables with a $p<.05$ remained. This provided a preliminary model of the factors that were statistically significant in *contributing* to impaired sleep quality.

A definitive model was then developed guided by Akaike's Information Criterion (AIC; Bozdogan, 1987). In this, the primary author re-added each variable that had been excluded, one at a time, and retained that variable if the AIC reduced (improved). Use of the AIC in this way maximises the overall explanatory power of the model while simultaneously promoting selection of a parsimonious model. Therefore, the definitive model included variables from the preliminary model that were statistically significant and were considered to be *contributing* factors, in addition to variables that were not statistically significant but improved model fit overall. The addition of these latter variables indicated that they had a *confounding* effect on the association between existing variables in the model with the outcome. *P* values, 95% confidence intervals, and standardised regression coefficients were reported following testing and acceptance of the model fit. Standardised regression coefficients allow for comparison of the relative strength of various predictors within the final model.

3.5. Results

A total of 311 participants consented and completed the survey prior to their discharge from hospital. Initially 2466 hospitalised older adults were assessed for eligibility for the study and of these, 633 had sufficient cognitive skills to proceed. The flow of participants from initial assessment of eligibility through to involvement in the study prior to discharge is outlined in Figure 3.1. Descriptive statistics and global assessment scores for participants recruited for this study are presented in Table 3.1. Participants' mean age was 78.4 (standard deviation [SD] ± 7.7); 58% were female;

24% were from CALD backgrounds; and 50% lived alone. Participants' average length of stay in hospital was 38 days (± 22.5) and the three most common diagnoses in this sample were arthritis (56%), heart disease (35%), and cancer (31%). Average sleep quality pre-hospital, was 6.6 (± 4.1), as reported on the PSQI, while in hospital it was poorer at 7.9 (± 4.4), as reported by participants. Overall, going to hospital decreased mean sleep quality by 1.29 on the PSQI scale (95% confidence interval is 0.79 to 1.78 ($p<0.001$)).

Table 3.2 presents the results of the univariate logistic regressions. Multivariate logistic regression results in Table 3.3 outline the *contributing* and. *confounding* variables for impaired sleep quality during hospitalisation for community-dwelling older adults. Pre-hospital sleep quality, as a covariate, and seven independent variables explained 35.2% of the total variance in reported sleep quality during hospital.

Pre-hospital sleep quality was the largest *contributing* factor to the sleep quality participants reported experiencing during their hospital admission with a standardised regression coefficient (SRC) of .497. Participants with a higher number of years of education reported poorer sleep quality during hospital stay than participants with lower levels of education (SRC=.113). Increased depressive or anxious symptomatology, as reported by participants on the EQ-5D-5L, also contributed to poorer sleep quality while an inpatient (SRC=.116). Participants who reported being a 'conscientious' personality type on the TIPI also reported experiencing poorer quality of sleep while in hospital (SRC=.130), in addition to those individuals not diagnosed with a stroke or transient ischemic attack (TIA) (SRC=-.110).

Variables that were not statistically significant in *contributing* to poorer sleep quality during hospital compared to sleep quality at home pre-hospital were

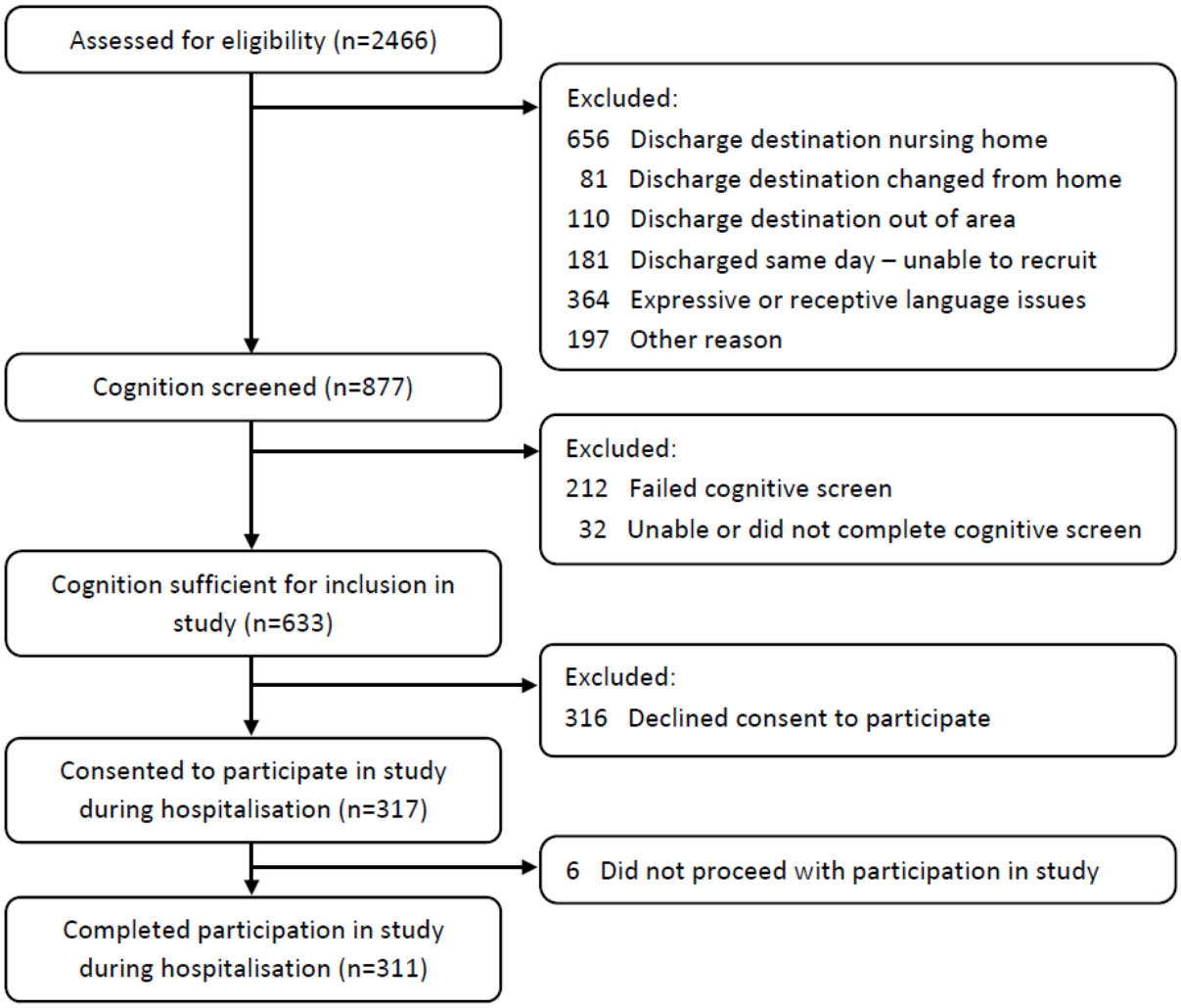

Figure 3.1. Flow of participant involvement throughout study.

Table 3.1 Footnote:
Note. [a]Unless otherwise indicated n=311; CALD=Culturally and Linguistically Diverse background; BMI=Body Mass Index; [b]Stroke includes transient ischemic attack, mini-stroke and aneurysm; [c]Other neurological disorder not including stroke (i.e., Parkinson's Disease); CHF=Congestive Heart Failure; COAD=Chronic Obstructive Airways Disease; BRCS=Brief Resilience Coping Scale; COWAT=Controlled Oral Word Association Test; GAI=Geriatric Anxiety Inventory; GDS-SF=Geriatric Depression Scale-Short Form; PAQR=Pain Attitudes Questionnaire-Revised (Stoicism/Fortitude subscale); EQ-5D-5L=EuroQol Quality of Life assessment (5 dimensions, 5 levels); TIPI=Ten Item Personality Inventory; PSQI=Pittsburgh Sleep Quality Index

Table 3.1.

Participant demographic and background data.

Variable	n[a]	Mean (SD) or n (%)
Age (years; range 65-97 years)		78.4 (7.7)
Gender (female)		180 (57.9%)
Married or defacto relationship		112 (36.0%)
CALD		75 (24.1%)
Non-smoker	295	284 (96.3%)
Non-alcohol drinker	295	168 (54.0%)
Caffeine-drinker	295	280 (94.9%)
Education (years)		11.1 (2.2)
Years lived at home address		23.9 (18.4)
Lives alone	306	152 (49.7%)
Length of stay (days in hospital)		38 (22.5)
Medications (no.)	294	9.8
Polypharmacy (6+ medications)		84.7%
Taking sleep medications	293	49 (16.7%)
Average sleep medications		1.1
Average BMI		26.8 (7.4)
Chronic Illness history	296	
Cancer		93 (31.4%)
Stroke[b]		57 (19.3%)
Other neurological disorder[c]		29 (9.8%)
Heart disease (i.e., CHF)		104 (35.1%)
Osteoporosis and osteopenia		65 (22.0%)
Arthritis		166 (56.1%)
Diabetes		78 (26.4%)
COAD/Chronic lung disease		43 (14.5%)
Kidney disease		35 (11.8%)
Continence - urgency	295	80 (27.1%)
How they manage financially		
Impossible		5 (1.6%)
Difficult all the time		26 (8.4%)
Difficult some of the time		44 (14.1%)
Not too bad		139 (44.7%)
Easy		97 (31.2%)
Resilience-Coping ability (BRCS)	298	14.8 (3.5)
Cognition: Supermarket item naming (COWAT semantic)	298	18.9 (6.8)
Anxiety symptoms (GAI)	309	3.8 (4.8)
Depression symptoms (GDS-SF)	310	4.3 (2.6)
Stoicism-Fortitude regarding pain (PAQR)	311	3.4 (1.2)
Household Activities pre-hospital (PhoneFITT)	299	26.2 (14.6)
Household Activities during hospital (PhoneFITT)	310	1.9 (3.3)
Recreation Activities pre-hospital (PhoneFITT)	302	12.9 (12.8)
Recreation Activities during hospital (PhoneFITT)	310	23.4 (11.8)
Quality of Life (EQ-5D-5L)		
Mobility – no problems walking	296	46 (15.5%)
Self-care – independent		153 (51.7%)
Usual Activities – independent		114 (38.5%)
Pain – no pain or discomfort		151 (51.0%)
Anxiety/Depression – no symptoms		227 (76.7%)
Visual Analogue Scale (0-100)	294	39.1 (19.7)
Personality (TIPI)	311	
Agreeableness		5.2 (1.5)
Conscientiousness		5.6 (1.5)
Emotional Stability		5.0 (1.6)
Extraversion		3.8 (1.7)
Openness		4.1 (1.4)
Sleep Quality pre-hospital (PSQI)	301	6.6 (4.1)
Sleep Quality during hospital (PSQI)	274	7.9 (4.4)

Note. Table 3.1 footnote on previous page.

Table 3.2.
Univariate regression of During Hospital compared to Pre-Hospital Sleep Quality (as self-reported via the PSQI)

			95% CI		
Variable	**n**	**Coefficient**	**Lower**	**Upper**	***p* value**
Age	274	.03	-0.03	0.09	0.265
Alcohol drinker pre-hospital	270	.01	-.15	.16	0.945
Anxiety symptoms (GAI)	274	.04	-.06	.14	0.410
Bedroom partner status change - alone at home to shared room at hospital	274	.37	-.52	1.25	0.417
Bedroom partner status change - shared at home to single room in hospital	274	-.38	-1.92	1.16	0.626
Shared room during hospital	274	.46	-.49	1.40	0.344
Bed or room partner pre-hospital	274	-.12	-1.14	.90	0.812
Bedtime pre 8pm (during hospital)	273	.58	-.68	1.84	0.364
Bedtime between 8pm-10pm (during hospital)	273	-.32	-1.22	.58	0.485
Bedtime between 10pm-midnight (during hospital)	273	-.30	-1.34	.74	0.570
Bedtime post-midnight (during hospital)	273	2.14	-.50	4.77	0.111*
Bedtime pre 8pm (pre-hospital)	274	-.15	-2.96	2.65	0.915
Bedtime between 8pm-10pm (pre-hospital)	274	.46	-.49	1.40	0.343
Bedtime between 10pm-midnight (pre-hospital)	274	-.16	-1.05	.73	0.719
Bedtime post-midnight (pre-hospital)	274	-.64	-2.07	.80	0.385
Body Mass Index	274	.04	-.015	.10	0.142*
Resilience-Coping ability (BRCS)	273	.02	-.10	.15	0.737
Caffeine drinks per hospital pre-hospital	270	-.12	-.30	.06	0.204
Incontinence related to urgency and leakage	271	-.30	-1.33	.73	0.565
Cognition: Supermarket item naming (COWAT semantic)	272	.02	-.04	.09	0.491
Chronic Diagnoses					
Cancer	270	-.67	-1.63	.29	0.172*
Stroke[a]	270	-1.23	-2.35	-.12	0.031*
Other neurological disorder[b]	270	-.41	-1.86	1.03	0.573
Heart disease (i.e., CHF)	270	.69	-.24	1.62	0.145*
Osteoporosis and osteopenia	270	-.53	-1.63	.57	0.344
Arthritis	270	.15	-.75	1.05	0.739
Diabetes	270	.91	-.08	1.90	0.072*
COAD/Chronic lung disease	270	-1.00	-2.25	.24	0.115*
Kidney disease	271	-.86	-2.30	.59	0.244
Culturally and Linguistically Diverse background	274	.58	-.49	1.64	0.289
Depression symptoms (GDS-SF)	274	.00	-.17	.18	0.962
Years of Education	274	.21	-.00	.42	0.050*
Falls pre-hospital	274	-.40	-1.33	.52	0.391
Falls in hospital	274	-.06	-1.52	1.40	0.935
Gender	274	.69	-.21	1.59	0.130*
Ability to manage on Income	274	-.04	-.50	.43	0.875
Lives alone	274	.63	-.25	1.52	0.160*
Length of Stay	274	-.00	-.02	.017	0.744
Not worried about experiencing any major event in the next 12 months	273	-.13	-1.08	.82	0.791

Variable	n	Coefficient	95% CI Lower	95% CI Upper	*p* value
Married	274	-.26	-1.19	.66	0.574
Stoicism-Fortitude regarding pain (PAQR)	274	-.19	-.65	.27	0.422
Household Activities (PhoneFITT)	274	-.01	-.15	.14	0.926
Recreation Activities (PhoneFITT)	274	.02	-.02	.06	0.302
Quality of Life (EQ-5D-5L)					
Mobility	270	.03	-.43	.48	0.911
Self-care	270	.07	-.38	.52	0.748
Usual Activities	270	.16	-.20	.51	0.387
Pain	270	.15	-.35	.65	0.547
Anxiety/Depression symptoms	270	.61	-.09	1.30	0.087*
Visual Analogue Scale (0-100)	269	.01	-.01	.03	0.435
Polypharmacy (6+ medications)	259	-.32	-1.60	.97	0.626
Smoker pre-hospital	271	.22	-2.13	2.58	0.851
Personality (TIPI)					
Agreeableness	274	-.04	-.35	.27	0.784
Conscientiousness	274	.27	-.06	.60	0.109*
Emotional Stability	274	-.02	-.31	.27	0.914
Extraversion	274	.15	-.11	.41	0.247
Openness	274	-.02	-.33	.30	0.924
Total number of medications during hospital	259	.02	-.10	.13	0.775
Total change in number of medications (Pre - During)	243	.05	-.07	.17	0.400
Total number of medications pre-hospital	248	.05	-.06	.15	0.390

Note. * statistical significance (p<.200) for inclusion in step-wise regression for Preliminary and Definitive Models; CI=Confidence Intervals; CALD=Culturally and Linguistically Diverse background; BMI=Body Mass Index; [a]Stroke includes transient ischemic attack, mini-stroke and aneurysm; [b]Other neurological disorder not including stroke (i.e., Parkinson's Disease); CHF=Congestive Heart Failure; COAD=Chronic Obstructive Airways Disease; BRCS=Brief Resilience Coping Scale; COWAT= Controlled Oral Word Association Test; GAI=Geriatric Anxiety Inventory; GDS-SF=Geriatric Depression Scale-Short Form; PAQR=Pain Attitudes Questionnaire-Revised (Stoicism/ Fortitude subscale); EQ-5D-5L=EuroQol Quality of Life assessment (5 dimensions, 5 levels); TIPI=Ten Item Personality Inventory; PSQI=Pittsburgh Sleep Quality Index.

Table 3.3.
Definitive Regression Model: During Hospital v. Pre-Hospital Sleep Quality (as per PSQI) (n=269)

	Coefficient	95% CI Lower	95% CI Upper	SRC	*p* value
Stroke or Transient Ischemic Attack	-1.21	-2.31	-.11	-.11	0.031
Years of Education	.24	.03	.44	.11	0.026
Anxiety/Depression symptoms (EQ-5D-5L)	.78	.09	1.46	.12	0.026
Conscientiousness (TIPI)	.44	.10	.77	.13	0.012
Bedtime after midnight during hospital	1.79	-.78	4.36	.07	0.172
Body Mass Index (BMI)	.06	-.01	.12	.09	0.075
Lives Alone	.73	-.14	1.59	.08	0.100
Pre-Hospital Sleep Quality (PSQI co-variate)	.51	.41	.62	.50	0.000
constant	*-3.34*	*-7.09*	*.41*		*0.080*

Note. CI=Confidence Interval; SRC=Standardised Regression Coefficient; AIC=1457.685; R^2=.352

confounding variables, in that they did not have a direct contributory effect to the sleep quality. However, they had an effect on the association between the *contributing* factors mentioned previously. Going to bed after midnight during hospital admission, or having a higher body mass index, or living alone prior to coming to hospital were all *confounding* factors for poorer sleep quality during hospital than pre-hospital for older adults.

3.6. Discussion

This study identified poor sleep quality pre-hospital as the strongest indicator of poor sleep quality during hospitalisation amongst older adults. Additional, but less significant predictors of poor sleep quality, were symptoms of anxiety and/or depression, higher levels of education, a conscientious personality, and not having a diagnosis of a stroke. In response, the research team strongly recommend that health services consider asking people to describe their sleep quality prior to their admission or during their initial assessment in order to manage the impact on health and wellbeing associated with impaired sleep during hospitalisation. Screening of these factors could occur prior to a hospital admission for an older patient as well.

In a related study, Driscoll et al. (2008) conducted a cross-sectional investigation of 64 healthy older adults (mean age 79 years; 47% female) who had no sleep complaints. They established that sleep quality and daytime alertness in later life were possibly both more important aspects of successful aging than previously thought. Furthermore, Driscoll et al. (2008) suggested that factors that contributed to or protected sleep quality in older adults should be studied further to determine if facilitating these factors promoted successful aging in adults. This study further confirms the importance of determining the factors that impact sleep quality for older adults.

Our supposition that pre-hospital sleep quality was associated with sleep

quality during hospitalisation for older adults was confirmed, although the strength of this association was higher than the research team had anticipated. This assumption and our finding makes sense given that many factors that contribute to poor sleep quality prior to hospitalisation, for example pain or anxiety, are likely to continue during the patient's hospital admission. The findings from this study are consistent with previous research regarding the relationship between sleep quality before hospitalisation with sleep quality during hospitalisation. For example, Martin et al. (2012) recruited 245 older adults (average age: 80.6±7.2; 38.0% female) from inpatient post-acute rehabilitation facilities and used the PSQI to assess pre-illness sleep (mean 5.2±3.8) and sleep during the rehabilitation admission (mean 8.4±4.4). The findings of this study, and those from previously completed investigations (Bano et al., 2014; Dobling, Frolova, McAlister, & Ringrose, 2016; Martin et al., 2012), provide credence for the implementation of routine screening of sleep quality for older adults while they are living in the community. While it was outside the scope of the present study, consideration of how the sleep quality of older adults is screened and managed within the community could assist with the improved management of older adults' sleep upon admission to hospital.

Additional findings from the present study consistent with previous literature relates to the identification of the experience of symptoms of anxiety and/or depression as contributing to poor sleep quality for older adults, and in some cases in hospital settings (Leblanc et al., 2015; Park & Kim, 2016; Sukegawa et al., 2003). In the findings of the current study, it was determined that the symptoms of anxiety and/or depression are associated with poor sleep quality in hospital (11.6%, p=.03). Park and Kim (2016) similarly identified depression as a predictor ($p<.01$, $r^2=0.30$) of sleep quality in their study of 290 hospitalised older adults (average age: 72.4±6.7; 59.3% female). They identified it as the most powerful predictor of in-hospital sleep

quality whereas in the present study, 12% of the variance of sleep quality was attributable to the symptoms of depression or anxiety. Park and Kim's (2016) findings reported a significantly higher contribution of depression with sleep quality. Overall, this suggests, and supports, previous evidence that there is an association between both anxiety and depression symptoms with sleep quality.

Leblanc et al. (2015) however identified that 'finding it difficult to fall asleep' (taking more than 30 minutes) and 'night-time awakenings' were associated with an increased likelihood of anxiety but not depression. Further, quality of sleep, as perceived by the older adult, was not associated with likelihood of experiencing a mental health disorder (Leblanc et al., 2015). While our current data enable us to support the link between sleep quality and symptoms of depression and anxiety, it unfortunately is not able to distinguish between the formal diagnoses of depression and anxiety separately. Therefore, the research team are unable to provide clarification as to whether poorer sleep quality in hospital is associated with anxiety or depression individually. However, the confirmed links between symptoms of these mental health disorders allow us to recognise that the current screening for these conditions during hospital stays could assist in the timely and effective management of older adults' sleep during inpatient admissions.

Unique patterns of relationships were found regarding the sleep quality of older adults that were not consistent with previous findings. One such relationship identified in the present study was that higher levels of education were associated with poorer sleep quality during hospitalisation. While limited evidence exists regarding the association between educational attainment and sleep quality, previously published research by Su, Huang, and Chou (2004) found that low education was associated with sleep problems for older non-institutionalised Chinese females, but not males (n=2045; 43.5% female). Similarly, Dzierzewski et al. (2014)

identified that community-dwelling older adults (n=79; mean age 63.6 years; 83.5% female) with higher levels of education had lower than average levels of sleep onset latency (i.e., took less time to fall asleep). As previously stated, literature linking education levels and sleep quality in older adults is limited. However, the possible difference in results may be attributed to methodological variations including focus of the study and study setting (hospital or community). For example, Su et al. (2004) focused on the diagnosis of insomnia of older adults, and additionally explored community-dwelling, non-institutionalised older adults at one time point in Taipei. Likewise, Dzierzewski et al. (2014) primary focus was on exercise levels and sleep of older adults and their study assessed a small sample of older adults living in the community who, unlike our present study, had not experienced hospitalisation.

Similarly, Moore, Adler, Williams, and Jackson (2002) identified that higher levels of education were associated with higher quality sleep (accounting for 12% of the total variance in sleep quality) in a community-dwelling population. It is possible that differences in the socioeconomic status, daily living routines, health status, and/or living/sleep environments among other factors of the two sample groups in the studies may in part explain the difference with findings of the present study. For example, when older adults are in an environment that they are familiar with (i.e., home) those individuals with higher levels of education appear to experience better sleep quality than when placed in an unfamiliar environment (i.e., hospital). Potentially when a person has a higher level of education they may be more alert and aware within an unfamiliar environment than they are, or require to be, when in a familiar environment. Due to limited literature in this area however it is recommended that education levels be considered in future studies.

Poorer sleep quality during hospitalisation was also uniquely associated in the present study with participants having a ‘conscientious’ personality type. A

conscientious personality type refers to people who are competent, ordered, dutiful, self-disciplined, achievement striving and deliberate (Costa, McCrae, & Dye, 1991), and this group of individuals have previously been shown to sleep better (Huang, Peck, Mallya, Lupien, & Fiocco, 2016). Our findings contrast with the previously published literature conducted in community settings. For example, in their cross-sectional study that involved community-dwelling middle-aged people (mean age=58 years; 77% female), Huang et al. (2016) determined that a conscientious personality type was associated with better sleep quality. In addition to the difference in sample demographics and inclusion criteria between the two studies, it is plausible that the different results may also be due to the difference in environments of the two studies (i.e., hospital-based versus community-based environments). Potentially when conscientious people are in an environment that they can control (such as their home context), they do well at maintaining their own sleep quality, but when placed in a different setting (like a hospital) where they lose control of their daily activities and routines, conscientious individuals may not cope as well or may feel anxious as they cannot control aspects of the context around them.

This study also identified that participants who had no current or previous history of stroke had poorer sleep quality during their hospital admission. This is not to say that patients who have a diagnosis of a stroke do not experience poor sleep; previous literature highlights that people who have had a stroke can experience poorer sleep subsequent to their stroke and can have poorer outcomes if they had a diagnosed or undiagnosed sleep disorder prior to having their stroke (Redline et al., 2010). However, the findings from the present study did not identify a significant association between poor sleep and participants who had reported a current or previous history of a stroke. In relation to our findings the research team hypothesised that stroke medications may influence sleep. However further analyses

did not identify medication use as being an influential factor. Therefore, the sleep quality that stroke patients experience during their hospital stay may not be consistent following the transition to home post-discharge. The clinical ramifications of this might be that those likely to experience impaired sleep quality following discharge are likely to be missed as they experience, and hence report, fewer problems during their hospital stay.

Given the importance and prevalence of this issue, it is imperative to understand the factors that contribute to impaired sleep quality with older adults who have been hospitalised. These data provide insights about the contributing and confounding factors to the issue of poor sleep quality and may assist in the identification of potential subgroups that could be targeted for intervention. This could minimise subsequent health problems by improving the sleep quality and overall health, wellbeing and functioning for older adults who are hospitalised.

3.6.1. Limitations and future research

The strength of this study lies in the large sample size and the inclusion of multiple covariates. Well-validated and reliable measures were used to assess sleep quality, symptoms of depression or anxiety, cognition, personality, quality of life, activity participation, resilience, and stoicism. For the purpose of this study, the research team were only able to collect pre-hospital sleep quality data retrospectively in order to include a broader sample of the 'typical' community-dwelling older adult population. However, if a prospective study design was to be employed it would be limited to older adults who were anticipating a hospitalisation (i.e., for elective surgery). Therefore, the results of such a study may be impacted by the different experience patients anticipating hospitalisation may have compared to those where hospitalisation is not expected. Patients undergoing elective surgery attend pre-hospital clinics in preparation for their hospitalisation and rehabilitation. These

preliminaries may influence their hospitalisation and their sleep quality while an inpatient. Our study however included both patients who anticipated hospitalisation in addition to those who had been hospitalised unexpectedly. Patients who had not anticipated hospitalisation may have raised levels of anxiety regarding the 'unknown' nature of hospitalisation and their future health. Hence, expected or unexpected hospitalisation may have different results for patients and their sleep quality.

In addition, this study did not objectively explore the impact of environmental factors such as sound or lighting both in hospital and at home that may have contributed to impairment of sleep quality for older adults. Future research could focus on characteristics of the environmental settings and how these differed from individual preference and familiarity.

Future research could study the differences in sleep routines for older adults at home and in hospital and how these differences affect their health.

3.7. Conclusion

In summary, our findings suggest that pre-hospital sleep quality is a significant contributor to in-hospital sleep quality experienced by older adults and that older adults face considerably poorer sleep quality in hospital than at home. Future research projects could focus on the patient's environment and compare factors, such as sound and light, to the preferred environment for each individual, as well as comparison of their home environment to that of the hospital. This could ultimately enable clearer identification of certain sub-groups of the population who would benefit from a targeted comprehensive approach for intervention to improve the sleep quality experienced during hospitalisation for older adults. Further research in this area is suggested.

3.8. Chapter conclusion

This chapter presented a detailed outline of the first component within this

research project. This was a cross-sectional study of older adults during hospitalisation regarding their sleep and health and wellbeing during and prior to their hospitalisation. The aim of the study was to identify possible factors that contribute to impaired sleep quality for this population and to expand the understanding of these factors to minimise subsequent health problems that may arise from impaired sleep. The chapter conclusion identifies that pre-hospital sleep quality is a significant contributor to the sleep quality experienced by older adults who were admitted to hospital.

Chapter 4 focuses on impaired sleep quality in older adults post-hospitalisation. It aims to describe the recovery timeframe of the sleep quality of older adults who have had an extended period of hospitalisation, and identifying factors that are associated with impaired sleep quality following an extended period of hospitalisation. The chapter concludes with a summary of findings and implications and links to the mixed methodology regarding management of older adults' sleep during, and following hospitalisation presented in Chapter 5.

CHAPTER 4
CAUSES OF IMPAIRED SLEEP QUALITY POST-HOSPITALISATION

A ruffled mind makes a restless pillow.

(CHARLOTTE BRONTË)

CHAPTER 4 CAUSES OF IMPAIRED SLEEP QUALITY POST-HOSPITALISATION

4.1. Context

The previous chapter reported the results related to research questions 1, 2, and 3, in relation to causes of impaired sleep quality during hospitalisation. The study was cross-sectional and considered factors that were associated with changes in the sleep quality of older adults from community-dwelling to hospitalisation. This chapter reports on the subsequent investigation of factors associated with change in sleep quality of older adults between in-patient and three and six months post-hospitalisation. This study was a prospective cohort study conducted with older adults who had experienced an extended period of hospitalisation and were returning home to community-dwelling.

The following text is adapted from a manuscript that is currently under review with the journal titled *Research on Aging.* The citation for this manuscript is:

> Lalor, A. F., Brown, T., McDermott, F., Stolwyk, R., Russell, G., & Haines, T. P. (2017, under review). Factors of impaired sleep quality post-hospitalisation of older adults. *Research on Aging.*

4.2. Manuscript IV: Introduction and background literature

Sleep has long been considered a fundamental process (Maslow, 1943), an imperative component of life essential to enable good physical and psychological health and wellbeing (Kamdar, Needham, & Collop, 2012), and vital for optimal engagement in everyday activities of daily living. Various hypotheses exist regarding the important role sleep plays in our health and wellbeing. Some of these include assistance with energy conservation, restoration, thermoregulation of the brain, detoxification of the brain, and effects on brain plasticity for learning and memory

(Maquet, 2001). Sleep quality is one important aspect of sleep. Whilst this construct is widely researched, it is complex and difficult to define. Harvey, Stinson, Whitaker, Moskovitz, and Virk (2008) identified tiredness on waking and throughout the day, feeling rested and restored on waking, and the number of awakenings experienced in the night as common factors of sleep quality for both people with insomnia and those identifying as normal sleepers. Overall, if sleep quality is impaired or disturbed, people are at risk of associated negative health outcomes (Martin et al., 2011) and adverse cardio-metabolic results, including obesity, cardiovascular disease, type 2 diabetes mellitus, and hypertension (St-Onge et al., 2016).

Patients in hospital commonly experience poor sleep when admitted, whether for short or extended periods (Pilkington, 2013). Older adults (65 years and older) are of particular concern in relation to impaired sleep quality. Previous research suggests 37% of hospitalised older patients experience a sleep disorder during their hospitalisation (Isaia et al., 2011) whilst approximately 43% have experienced poor sleep during their hospital admission (Matsuda et al., 2016). Older adults may face many challenges during a hospital admission at a time in their life when they are potentially least prepared, both physically and psychologically, to deal with such difficulty. Various factors confront community-dwelling older adults admitted to hospital that could affect their sleep and health outcomes following discharge home. Factors that have shown to affect sleep during hospitalisation in previous research include, but are not limited to, change in environment, difficulty adjusting to hospital processes, hospital noises, lighting, pain, and medication(s) (Bano et al., 2014; Park et al., 2014; Pilkington, 2013; Redeker, 2000; Vitiello, 2012). Each of these factors may additionally interfere with the patient's recovery and rehabilitation. Older adults exposed to an extended hospitalisation are generally more likely to experience ongoing consequences for longer in relation to many factors including their mental

health, hospital readmissions, social isolation, cognition, and mortality (Cappuccio D'Elia, Strazzullo, & Miller, 2010; Martin et al., 2012). There remains however, a paucity of literature within an Australian setting regarding older adults' sleep quality and their health outcomes following discharge from hospital.

As limited evidence is available regarding sleep quality and health outcomes post-hospitalisation for older adults, it is difficult to recommend evidence-based interventions aimed at older adults at increased risk of health issues subsequent to impaired sleep during hospitalisation. Given the importance of quality sleep, this study therefore aimed to (1) determine if there is any change in sleep quality for older adults post-discharge, (2) describe the timeframe of recovery in sleep quality in older adults who have had an extended period of hospitalisation, and (3) identify factors that are associated with impaired sleep quality following an extended period of hospitalisation.

4.3. Method

4.3.1. Study design and setting

This was a prospective, cohort study conducted with older patients from one of five hospitals within south-eastern Victoria, Australia. This study was part of a larger research project (Lalor et al., 2015) of community-dwelling older adults and their mood and experiences before, during, and post extended hospitalisation.

Data regarding the sleep quality of 311 older adults (mean age=78±7.7 years, 58% female) was collected from one of five acute or sub-acute wards of two hospital organisations, Peninsula Health and Monash Health. Participants were followed up for six months with data collected at three time points for each participant: (1) sleep quality prior to, and during, hospital admission was simultaneously collected 48 hours prior to discharge; (2) sleep quality three months post-discharge; and (3) sleep quality six months post-discharge. Each participant completed standardised self-

report measures and open-ended questions regarding sleep quality, mood, previous medical history, and functional wellbeing prior to their discharge. Potential factors that could contribute to impaired sleep quality during or post-hospitalisation were considered and determined during the participant's in-patient admission. If patients (1) were aged 65 years or over; (2) had an extended length of stay in hospital (14 days or more); (3) had lived at home prior to hospitalisation and were returning to community-dwelling post-discharge; (4) had sufficient cognition (score of 13 or less) according to the six-item Cognitive Impairment Test (6-CIT; Katzman et al., 1983), and (5) had sufficient language ability to engage in interviews, they were eligible for inclusion in the study. Hospital interpreters were employed for non-English speaking participants where needed.

4.3.2. Procedure

Recruitment occurred between January 2013 to March 2015 at two publicly funded health services (Peninsula Health and Monash Health) in Victoria, Australia. Patients meeting the inclusion criteria were approached to participate in the study 48 hours prior to their planned discharge from hospital. Four research assistants, in conjunction with the primary author (AL), approached eligible participants and obtained consent for participation. Face-to-face interviews included a number of standardised measures and open-ended questions regarding sleep, mood, falls, functional wellbeing, and various demographic data. Prior to discharge, baseline data relating to sleep quality prior to hospitalisation was collected by retrospectively phrased questions, in addition to data relating to sleep quality during hospitalisation. Follow up data regarding the sleep quality experienced in the month prior were collected at three and six months post-hospitalisation. Participant responses were entered directly into the online survey program SurveyMonkey® (http://www.surveymonkey.com) by interviewers via an iPad. To ensure accuracy,

participants were able to review immediately the verbatim record transcriptions on the iPad of their verbal response. Prior to the study commencing, all interviewers received training regarding data collection. The Human Research Ethics Committees of Monash University (HREC:0834), Monash Health (HREC:12182B) and Peninsula Health (HREC/13/PH/51) all provided ethics approval for this study. All patients recruited for the study provided written, informed consent.

4.3.3. Instrumentation

4.3.3.1. Cognitive screening

To screen potential participants' level of cognition to determine eligibility for inclusion in the study, the six-item Cognitive Impairment Test (6-CIT, Katzman et al., 1983) was used. Participants were included if they scored 13 or less. Previous literature identifies that a cut-off less than 14 has high specificity and good sensitivity for identification of cognitive impairment (Brooke & Bullock, 1999; Tuijl et al., 2011; Upadhyaya et al., 2010). The 6-CIT is not associated with level of education and is brief to administer ensuring minimal respondent burden.

4.3.3.2. Primary outcome

Participant self-reported sleep quality was assessed by using the standardised 19-item Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI provides a global sleep quality score by assessing seven components of sleep quality and allows an individual to recall their previous month's sleep. Component scores are summed to provide a global PSQI sleep quality score (range 0-21). Higher global PSQI sleep quality scores indicate poorer sleep quality. The PSQI is a widely used tool that measures multiple dimensions sleep quality (Smith & Wegener, 2003). A systematic review and meta-analysis of use of the PSQI as a screening tool for sleep dysfunction showed strong reliability and validity, and

moderate structural validity (Mollayeva et al., 2016).

4.3.3.3. Baseline data

Additional constructs measured included cognition, quality of life, community participation, personality traits, resilience, stoicism and fortitude regarding pain, and symptoms of depression and anxiety. Table 4.1 outlines the instrumentation used to measure additional constructs. Community participation and symptoms of depression and anxiety were also retrospectively collected regarding pre-hospital mood and community participation for comparison with the participant's responses regarding these constructs during their hospital admission. The psychometrics of individual instruments included in this study have been previously published (Lalor et al., 2015). During his or her hospital admission, each patient provided additional background data. These data included age, gender, height and weight, length of hospital stay, history of falls, chronic illnesses, medications, continence, alcohol-intake, smoking status, caffeine consumption, marital status, education, culturally and linguistically diverse (CALD) background, and financial management.

Table 4.1.

Instrumentation used to measure constructs associated with sleep quality

Construct	Instrument
Cognition	Controlled Oral Word Association Test-semantic version (COWAT-supermarket items)[a]
Quality of life	EuroQol Quality of Life assessment – 5 dimensions, 5 levels (EQ-5D-5L)[b]
Community participation	PhoneFITT[c]
Personality traits	Ten Item Personality Inventory (TIPI)[d]
Resilience	Brief Resilience Coping Scale (BRCS)[e]
Stoicism and fortitude regarding pain	Pain Attitudes Questionnaire-Revised (PAQ-R) stoicism subscale[f]
Anxiety symptoms	Geriatric Anxiety Inventory (GAI)[g]
Depression symptoms	Geriatric Depression Scale-Short Form (GDS-SF)[h]

Note. [a] Gladsjo et al., 1999; [b] Herdman et al., 2011; [c] Gill, Jones, Zou, & Speechley, 2008; [d] Gosling, Rentfrow, & Swann, 2003; [e] Sinclair & Wallston, 2004; [f] Yong, Horne, & Helme, 2001; [g] Pachana et al., 2007; [h] Yesavage & Sheikh, 1986.

4.3.4. Statistical analysis

The primary author examined whether mean sleep quality scores taken at discharge from hospital, and at three and six months post-discharge, returned to premorbid levels using a multi-level, mixed effect generalised linear model. PSQI global scores from each of these time points were treated as the dependent variable, with assessment point as a categorical fixed effect independent variable, and participant study number as a random effect within this model. The primary author also examined whether sleep quality scores taken three and six months following discharge from hospital were different from those taken at hospital discharge using a similar multi-level, mixed effects model, just excluding the scores taken for the premorbid period.

Linear regression analyses were undertaken with sleep quality scores at three and six month post-hospitalisation as the dependent variable to explore their univariate associations with 65 independent variables that potentially contribute to impaired sleep quality at these time points. Each potential contributing factor was examined in a separate model, and was adjusted for pre-hospital sleep quality (as per pre-hospital PSQI results) as a covariate (Tabachnick & Fidell, 2013).

Stepwise logistic regression analyses (as per Hosmer & Lemeshow, 2004), were then used to identify independent factors associated with variance in sleep quality. Factors included in the initial multiple regression model were those with a univariate regression $p<.2$, as per Hosmer and Lemeshow (2004). Nine independent variables were identified as potential predictors of impaired sleep quality at three or six months post-hospitalisation. Variables were progressively removed from the analyses, based on their p-value (highest p-value variable was removed each time), until only variables with a $p<.05$ remained. This preliminary model identified factors that were statistically significant contributors to impaired sleep quality post-

hospitalisation. A final definitive model, guided by Akaike's Information Criterion (AIC), was then developed by re-inputting variables, one by one, that had been removed (Bozdogan, 1987). Each re-entered variable was retained if the AIC reduced (improved) or removed if the AIC increased (worsened). The AIC was used in this way to simultaneously maximise overall explanatory power of the model and promote selection of a parsimonious model. Hence, statistically significant contributing factors of the preliminary model were complemented with factors that were not statistically significant, but that improved the overall model fit. Non-statistically significant factors, while not direct contributors to impaired sleep quality, had confounding effects on factors that did and on their association with this outcome. Relative strength of various predictors within the definitive model were reported via standardised regression coefficients, in addition to p-values and 95% confidence intervals.

Descriptive statistics of the mean and standard deviation of the average PSQI global scores were analysed to establish the timeframe of recovery in sleep quality in older adults who have had an extended period of hospitalisation.

Statistical software STATA® Version 13.1 (StataCorp., 2013) was used to conduct statistical analyses. A p-value of <.05 was considered statistically significant for all analyses.

4.4. Results

The participants' demographic characteristics, descriptive statistics, global assessment scores and other variables are presented in Table 4.2. The flow of participant involvement with 2466 hospitalised older adults initially assessed for eligibility is outlined in Figure 4.1. Of these, 633 failed the cognitive screening test used for this study. Approximately half of the remaining eligible participants declined to participate in the study with a final sample of 311 older adults (mean age 78.4

years ± 7.7; 58% female) consenting and completing the initial survey prior to their discharge from hospital. Participant retention at 3 months was 77.5% (n=241; mean age 77.7 years ± 7.5; 56% female) and 70.1% at 6 months (n=218; mean age 78.0 ± 7.4; 58% female). Most participant characteristics and summary scores remained relatively constant over the course of the study.

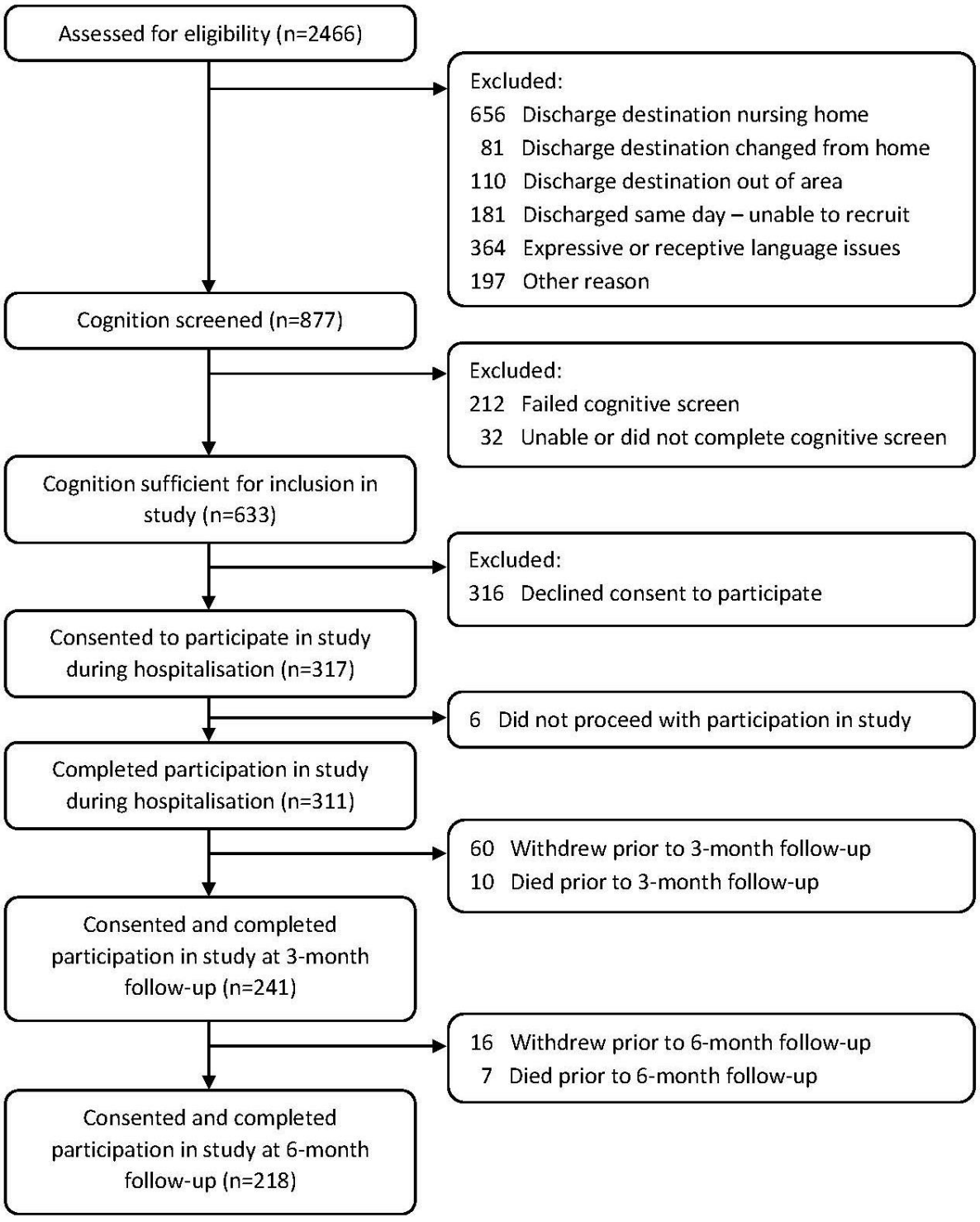

Figure 4.1. Flow of participant involvement throughout study.

Table 4.2.

Participant demographic and background data.

	Total baseline sample		3-months post-hospital		6-months post-hospital	
Variable	**n (n=311*)**	**Mean (SD) or n (%)**	**n (n=241*)**	**Mean (SD) or n (%)**	**n (n=218*)**	**Mean (SD) or n (%)**
Age (years; range 65-97 years)		78.4 (7.7)		77.7 (7.5)		78.0 (7.4)
Gender (female)		180 (57.9%)		136 (56.4%)		126 (57.8%)
Married/Defacto		112 (36.0%)		87 (36.1%)		78 (35.8%)
CALD		75 (24.1%)		54 (22.4%)		48 (22.0%)
Non-smoker	295	284 (96.3%)	239	221 (92.5%)	217	199 (91.2%)
Non-alcohol drinker	295	168 (54.0%)	239	159 (66.5%)	217	132 (60.8%)
Caffeine-drinker	295	280 (94.9%)	239	224 (93.7%)	217	206 (94.9%)
Years of Education		11.1 (2.2)		11.3 (2.0)		11.3 (2.0)
Years lived at home address		23.9 (18.4)		23.6 (18.3)		23.6 (18.7)
Lives alone	306	152 (49.7%)	239	114 (47.7%)	217	104 (47.9%)
Days in hospital		38.3 (22.5)		37.1 (19.8)		36.7 (19.3)
No. of medications	287	9.8 (4.2)	239	8.6 (4.5)	217	7.9 (4.4)
Polypharmacy (6+ medications)	287	243 (84.7%)	239	175 (73.2%)	217	149 (68.7%)
Taking sleep medications	287	49 (17.1%)	239	26 (10.9%)	217	29 (13.4%)
Average sleep medications		1.1		1.2		1.1
BMI		26.8 (7.4)		26.9 (7.2)		27.1 (7.4)
Chronic Illness history						
Cancer	297	93 (31.3%)	240	68 (28.3%)	217	58 (26.7%)
Stroke[b]	298	57 (19.1%)	240	44 (18.3%)	217	40 (18.4%)
Other neurological disorder[c]	297	29 (9.8%)	240	28 (11.7%)	217	23 (10.6%)
Heart disease (i.e., CHF)	297	104 (35.0%)	239	83 (34.7%)	216	73 (33.8%)
Osteoporosis and osteopenia	297	65 (22.0%)	239	54 (22.6%)	216	47 (21.8%)
Arthritis	297	166 (55.9%)	240	135 (56.3%)	217	125 (57.6%)
Diabetes	297	78 (26.3%)	239	61 (25.5%)	216	56 (25.9%)
COAD/Chronic lung disease	297	43 (14.5%)	240	31 (12.9%)	217	30 (13.8%)
Kidney disease	298	35 (11.7%)	237	26 (11.0%)	214	22 (10.3%)
Incontinence	297	80 (26.9%)	237	64 (27.0%)	214	62 (29.0%)

Note. [a]Unless otherwise indicated n=311; CALD=Culturally and Linguistically Diverse background; BMI=Body Mass Index; [b]Stroke includes transient ischemic attack, mini-stroke and aneurysm; [c]Other neurological disorder not including stroke (i.e., Parkinson's Disease); CHF=Congestive Heart Failure; COAD=Chronic Obstructive Airways Disease.

Variable	Total baseline sample		3-months post-hospital		6-months post-hospital	
	n (n=311*)	Mean (SD) or n (%)	n (n=241*)	Mean (SD) or n (%)	n (n=218*)	Mean (SD) or n (%)
How they manage financially						
Impossible		5 (1.6%)		4 (1.7%)		3 (1.4%)
Difficult all the time		26 (8.4%)		20 (8.3%)		19 (8.7%)
Difficult some of the time		44 (14.1%)		35 (14.5%)		35 (16.1%)
Not too bad		139 (44.7%)		108 (44.8%)		93 (42.7%)
Easy		97 (31.2%)		74 (30.7%)		68 (31.2%)
Resilience-Coping ability (BRCS)	298	14.8 (3.5)	238	15.0 (3.5)	217	15.0 (3.5)
Cognition: Supermarket items (COWAT)	298	18.9 (6.8)	225	20.0 (6.6)	203	20.7 (6.7)
Anxiety symptoms (GAI)	309	3.8 (4.8)		3.0 (4.3)		2.5 (3.7)
Depression symptoms (GDS-SF)	310	4.3 (2.6)		3.9 (3.2)		3.6 (3.0)
Stoicism-Fortitude regarding pain (PAQR)		3.4 (1.2)		3.6 (1.0)		3.5 (1.0)
Household Activities (PhoneFITT)	310	1.9 (3.3)		22.5 (14.9)		22.2 (14.5)
Recreation Activities (PhoneFITT)	310	23.4 (11.8)		16.4 (16.1)		15.9 (14.9)
Quality of Life (EQ-5D-5L)	296		209		218	
Mobility - no problems walking		46 (15.5%)		57 (27.3%)		54 (24.8%)
Self-care – independent		153 (51.7%)		141 (67.5%)		138 (63.3%)
Usual Activities - independent		114 (38.5%)		98 (46.9%)		105 (48.2%)
Pain – no pain or discomfort		151 (51.0%)		95 (45.5%)		98 (45.0%)
Anxiety/Depression – no symptoms		227 (76.7%)		161 (77.0%)		160 (73.4%)
Visual Analogue Scale (0-100)	294	39.1 (19.7)	209	64.6 (20.8)		64.9 (21.3)
Personality (TIPI)						
Agreeableness		5.2 (1.5)		5.2 (1.4)		5.2 (1.4)
Conscientiousness		5.6 (1.5)		5.7 (1.4)		5.8 (1.3)
Emotional Stability		5.0 (1.6)		5.1 (1.6)		5.1 (1.6)
Extraversion		3.8 (1.7)		3.9 (1.7)		4.0 (1.8)
Openness		4.1 (1.4)		4.2 (1.5)		4.2 (1.5)
Sleep Quality pre-hospital (PSQI)	301	6.6 (4.1)		6.9 (4.2)		6.9 (4.1)
Sleep Quality during hospital (PSQI)	274	7.9 (4.4)	236	7.1 (4.1)	214	7.0 (4.2)

Note. [a]Unless otherwise indicated n=311; BRCS=Brief Resilience Coping Scale; COWAT=Controlled Oral Word Association Test; GAI=Geriatric Anxiety Inventory; GDS-SF=Geriatric Depression Scale-Short Form; PAQR=Pain Attitudes Questionnaire-Revised; FITT=Frequency, Intensity, Time, Type; EQ-5D-5L=EuroQol Quality of Life assessment (5 dimensions, 5 levels); TIPI=Ten Item Personality Inventory; PSQI=Pittsburgh Sleep Quality Index.

Participants however with higher cognitive skill, lower symptoms of depression and/or anxiety, incontinence, and lower medication use (i.e., less than six medications) were more likely to remain involved at the six month follow-up. The three most common diagnoses in this sample similarly fluctuated over the follow-up period with baseline, three and six-month frequencies for participants with arthritis increasing (55.9%, 56.3%, 57.6%, respectively), yet decreasing for participants with either heart disease (35.0%, 34.7%, 33.8%, respectively), or cancer (31.3%, 28.3%, 26.7%, respectively).

Average (±SD) sleep quality, as reported on the PSQI, was 6.6 ± 4.1 prior to hospital, 7.9 ± 4.4 during hospitalisation, 7.1 ± 4.1 at three months post-hospitalisation, and 7.1 ± 4.2 at six months post-hospitalisation. Sleep quality prior to hospital was better than sleep quality during hospital [mixed effects coefficient (95% CI): 1.3 (0.8, 1.7), p<0.001], while sleep quality during hospital was worse than 3 [mixed effects coefficient (95% CI): -0.8 (-0.2, -1.4), p=0.005] and 6 months [mixed effects coefficient (95% CI): -0.8 (-0.3, -1.4), p=0.004] post-discharge. Sleep quality at three and six months post-discharge was not different from sleep quality prior to hospital. Overall, average sleep quality was poorest during hospital, and while it improved post-hospitalisation it did not return to the mean pre-hospital sleep quality level.

Table 4.3 outlines the results of the 65 univariate logistic regression analyses undertaken at each time point. Results of the subsequent multiple logistic regression analyses are outlined in Table 4.4 and include *contributing* and *confounding* variables for impaired sleep quality post-hospitalisation for community-dwelling older adults.

Pre-hospital sleep quality, as a covariate, and six independent variables explained 36.2% of the total variance in reported sleep quality at three months post-hospitalisation.

Table 4.3.

Univariate regression of During Hospital compared to Post-Hospital Sleep Quality (as self-reported via the Pittsburgh Sleep Quality Index (PSQI))

	3 months post-hospital v pre-hospital					6 months post-hospital v pre-hospital				
			95% CI					95% CI		
Variable	**n**	**Coeff.**	**Lower**	**Upper**	***p* value**	**n**	**Coeff.**	**Lower**	**Upper**	***p* value**
Age	236	.00	-.06	.06	.929	216	.01	-.05	.08	.723
Alcohol drinker pre-hospital	233	-.10	-.26	.07	.235	213	-.07	-.24	.10	.430
Shared room (hospital)	236	-.42	-1.35	.50	.367	216	-.47	-1.44	.49	.336
Bedroom partner pre-hospital	236	-.14	-1.15	.88	.794	216	-.67	-1.74	.41	.223
Bedtime Pre-Hospital										
- pre 8pm	236	-2.59	-5.24	.06	.055*	216	-2.06	-4.92	.80	.157*
- 8pm-10pm	236	.73	-.23	1.69	.136*	216	.14	-.87	1.14	.785
- 10pm-midnight	236	-.05	-.95	.86	.923	216	.32	-.62	1.27	.503
- post-midnight	236	-.73	-2.15	.69	.311	216	.56	-2.06	.94	.463
Bedtime during Hospital										
- pre 8pm	216	-.44	-1.85	.98	.542	197	.68	-.86	2.21	.384
- 8pm-10pm	216	-.61	-1.56	.35	.213	197	-1.11	-2.13	-.09	.034*
- 10pm-midnight	216	.73	-.37	1.82	.193*	197	.80	-.39	1.99	.186*
- post-midnight	216	1.72	-.76	4.20	.174*	197	1.39	-1.34	4.11	.317
Bedtime 3-months Post-Hospital										
- pre 8pm	236	1.53	-.83	3.87	.202					
- 8pm-10pm	236	.56	-.40	1.51	.250					
- 10pm-midnight	236	-.60	-1.50	.30	.191*					
- post-midnight	236	-.28	-1.63	1.08	.689					
Bedtime 6-months Post-Hospital										
- pre 8pm						214	3.05	.72	5.39	.011*
- 8pm-10pm						214	.62	-.43	1.66	.246
- 10pm-midnight						214	-.66	-1.61	.29	.172*

* statistical significance (p<.200) for inclusion in step-wise regression for Definitive Model; Coeff.=coefficient; CI=Confidence interval.

- post-midnight						214	-.72	-2.09	.65	.303
BMI	236	.04	-.02	.10	.192*	216	.03	-.04	.09	.443
Resilience-Coping ability (BRCS)	235	-.10	-.23	.03	.130*	215	-.15	-.29	-.02	.026*
Caffeine drinks per day pre-hospital	234	.11	-.06	.29	.205	214	.19	-.00	.38	.051*
CALD	236	-.92	-1.99	.15	.092*	216	-.76	-1.89	.37	.187*
Incontinence	234	-1.48	-2.48	.48	.004*	213	-.93	-1.98	.11	.080*
Cognition: COWAT semantic	231	.01	-.06	.08	.873	211	-.04	-.11	.04	.338
Chronic Diagnoses										
Cancer	235	.62	-.39	1.64	.225	215	1.03	-.03	2.08	.056*
Stroke[a]	235	.18	-.99	1.34	.765	215	.13	-1.09	1.35	.835
Other neurological disorder[b]	235	1.12	-.28	2.51	.115*	215	.89	-.64	2.40	.252
Heart Disease (i.e., CHF)	234	.48	-.47	1.43	.321	214	.32	-.69	1.33	.537
Osteoporosis or Osteopenia	234	.30	-.78	1.38	.588	214	.38	-.78	1.53	.522
Arthritis	235	.46	-.46	1.38	.322	215	.49	-.47	1.45	.313
Diabetes	234	.08	-.95	1.10	.885	214	-.20	-1.28	.89	.721
COAD/Chronic lung disease	235	-.05	-1.41	1.31	.941	215	.03	-1.33	1.39	.963
Kidney disease	234	1.36	-.06	2.78	.061*	213	.31	-1.32	1.94	.704
Years of Education	236	-.03	-.25	.20	.796	216	-.14	-.37	.09	.242
Falls pre-hospital	236	-.75	-1.69	.19	.116*	216	-1.17	-2.14	-.20	.018*
Anxiety symptoms (GAI)	236	.03	-.07	.13	.581	216	.06	-.05	.16	.299
Depression symptoms (GDS-SF)	236	.10	-.08	.28	.281	216	.13	-.06	.33	.186*
Gender	236	.24	-.68	1.16	.609	216	.73	-.23	1.68	.136*
Falls in hospital	236	-.99	-2.46	.47	.183*	216	-.38	-1.85	1.10	.617
Ability to manage on Income	236	-.08	-.55	.39	.737	216	.12	-.36	.61	.614
Lives alone	236	.24	-.67	1.15	.601	216	1.12	-2.05	2.05	.020*
Length of Stay	236	-.01	-.03	.02	.616	216	-.02	-.02	.00	.042*
Not worried about experiencing any major event in the next 12 months	235	.38	-.59	1.35	.437	215	-.13	-1.17	.90	.802
Married/Defacto	236	-.61	-1.55	.32	.197*	216	-.69	-1.67	.29	.165*

Note. * statistical significance (p<.200) for inclusion in step-wise regression for Definitive Model; Coeff.=coefficient; CI=Confidence interval; BMI=Body Mass Index; BRCS=Brief Resilience Coping Scale; CALD=Culturally and Linguistically Diverse background; COWAT=Controlled Oral Word Association Test; [a]Stroke includes transient ischemic attack, mini-stroke and aneurysm; [b]Other neurological disorder not including stroke (i.e., Parkinson's Disease); CHF=Congestive Heart Failure; COAD=Chronic Obstructive Airways Disease; GAI=Geriatric Anxiety Inventory; GDS-S=Geriatric Depression Scale-Short form.

	3 months post-hospital v pre-hospital					6 months post-hospital v pre-hospital				
			95% CI					95% CI		
Variable	**n**	**Coeff.**	**Lower**	**Upper**	***p* value**	**n**	**Coeff.**	**Lower**	**Upper**	***p* value**
Stoicism-Fortitude regarding pain (PAQR)	236	.41	-.05	.88	.082*	216	.47	-.01	.95	.053*
Household Activities (PhoneFITT)	236	-.03	-.16	.10	.640	216	.21	-08	.34	.002*
Recreation Activities (PhoneFITT)	236	-.01	-.04	.03	.725	216	-.02	-.06	.02	.381
Quality of Life (EQ-5D-5L)										
Mobility	234	-.22	-.67	.23	.333	214	-.59	-1.06	-.13	.013*
Self-care	234	-.07	-.51	.37	.757	214	-.04	-.50	.43	.870
Usual Activities	234	-.34	-.68	.00	.049*	214	-.37	-.73	-.01	.042*
Pain	234	-.33	-.82	.17	.198*	214	-.31	-.84	.22	.254
Anxiety/Depression symptoms	234	.01	-.62	.63	.984	214	.59	-.08	1.26	.083*
Visual Analogue Scale (0-100)	233	-.01	-.03	.02	.700	213	.00	-.03	.02	.821
Smoker pre-hospital	233	.07	-.15	2.29	.953	213	-.67	-3.16	1.83	.599
Personality (TIPI)										
Agreeableness	236	.05	-.27	.38	.745	216	.01	-.33	.34	.970
Conscientiousness	236	-.08	-.42	.26	.643	216	.10	-.25	.46	.572
Emotional Stability	236	.06	-.24	.35	.705	216	.18	-.12	.48	.244
Extraversion	236	-.06	-.32	.20	.656	216	-.01	-.28	.26	.926
Openness	236	-.04	-.35	.26	.776	216	-.18	-.50	.15	.285
Medications										
- During hospital	226	-.02	-.13	.09	.729	207	-.02	-.14	.10	.751
- Pre-hospital	218	.05	-.06	.15	.364	200	.04	-.08	.15	.539
- Change (Pre-During)	213	.09	-.03	.21	.126*	196	.06	-.08	.20	.399
- Polypharmacy (6+ medications)	226	-.92	-.17	.33	.147*	207	-.65	-1.99	.70	.345

Note. * statistical significance (p<.200) for inclusion in step-wise regression for Definitive Model; Coeff.=coefficient; CI=Confidence interval; PAQR=Pain Attitudes Questionnaire Revised; FITT=Frequency, Intensity, Time, Type; EQ-5D-5L=Quality of Life, 5 dimensions, 5 levels; TIPI=Ten Item Personality Inventory.

Table 4.4.

Definitive Regression Model: During Hospital compared to Post-Hospital Sleep Quality (as per PSQI) (n=234 at 3 months, n=214 at 6 months)

	3 months post-hospital v pre-hospital					6 months post-hospital v pre-hospital				
			95% CI					95% CI		
Variable	**Coeff.**	***p* value**	**Lower**	**Upper**	**SCR**	**Coeff.**	***p* value**	**Lower**	**Upper**	**SCR**
Pre-Hospital Sleep Quality (PSQI)	.54	.000*	.44	.65	.55	.55	.000*	.45	.66	.55
Stoicism-Fortitude regarding pain (PAQR)	.55	.019*	.09	1.02	.13	.49	.033*	.04	.94	.12
Bedtime										
- pre 8pm (pre-hospital)	-2.27	.080	-4.81	.28	-.10	-5.55	.001*	-8.67	-2.43	-.20
- pre 8pm (at 6 months post-hospital)						6.03	.000*	3.45	8.61	.29
CALD	-.93	.074	-1.96	.09	-.10					
Kidney disease	1.46	.006*	.07	2.85	.11					
Other neurological disorder[a]	1.56	.023*	.22	2.90	.12					
Fall(s) pre-hospital						-1.00	.031*	-1.92	-.09	-.10
Incontinence	-1.36	.006*	-2.33	-.39	-.20					
Household activity participation (PhoneFITT)						.21	.001*	.09	.33	.18
constant	*1.70*	*.081*	*-.21*	*3.62*		*2.63*	*.040**	*.12*	*5.15*	

Note. 3-months: AIC=1233.156; R^2=.362; 6-months: AIC=1117.694; R^2=.414; Coeff.=coefficient; CI=Confidence interval; PSQI=Pittsburgh Sleep Quality Index; PAQR=Pain Attitudes Questionnaire-Revised; CALD=Culturally and Linguistically Diverse background; [a]Other neurological disorder not including stroke (i.e., Parkinson's Disease); FITT=Frequency, Intensity, Time, Type.

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Similarly, pre-hospital sleep quality, again as a covariate, and five independent variables explained 41.4% of the total variance in reported sleep quality at six months post-hospitalisation. Variables found to have an association with sleep quality at both three and six months post-hospitalisation were sleep quality prior to hospitalisation (as reported per the PSQI), stoicism and fortitude regarding pain (as per the PAQ-R), and going to bed post-8pm prior to hospitalisation.

Pre-hospital sleep quality was the largest contributing factor to the sleep quality participants reported experiencing at both three and six months post-hospitalisation with a standardised regression coefficient (SRC) of .554 and .547 respectively. Participants with higher levels of stoicism and fortitude regarding pain reported poorer sleep quality at both three and six months post-hospitalisation than participants with lower levels of stoicism and fortitude regarding pain (SRC=.128 and .115, respectively). Participants who reported a bedtime later than 8pm prior to their hospitalisation also reported poorer sleep quality at both follow-up time points than participants who reported going to bed before 8pm before their hospitalisation (SRC=-.095 and -.220). Bedtime pre-8pm prior to hospital was however, a *confounding* factor at three months post-hospitalisation and a *contributing* factor at six months post-hospitalisation to sleep quality at these time points.

Additional *contributing* factors to poorer sleep quality at three months post-hospitalisation included participants who reported: (1) having kidney disease (SRC=.112); or (2) a neurological disorder other than stroke (i.e., Parkinson ’s disease) (SRC=.124); or (3) not experiencing incontinence (SRC=-.148). A *confounding* factor for poorer sleep quality at three months post-hospitalisation was reported by participants who did not identify as being from a Culturally and Linguistically Diverse (CALD) background. (SRC=-.096).

Additional *contributing* factors to poorer sleep quality at six months post-

hospitalisation time point included participants who reported: (1) going to bed pre-8pm at six months post-hospitalisation (SRC=.291); or (2) not having had a fall prior to their hospitalisation (SRC=-.116); or (3) participating in more household activities (as per the PhoneFITT) (SRC=.180). There were no *confounding* factors to sleep quality at six months post-hospitalisation retained in the final model.

4.5. Discussion

Mean sleep quality levels at three and six months following hospitalisation are similar to those reported for the pre-hospitalisation period. This result is somewhat inconsistent with previous research identifying the resolution of impaired sleep post-hospitalisation for older adults as an extended process (Martin et al., 2012). Considering sleep quality levels across our sample in this way means that it is still possible that many participants did not have their sleep quality return to pre hospital levels, as their scores could have been compensated for by participants whose sleep quality improved over their pre hospital levels. Further analyses classifying participants as “worse than pre hospital”, “equivalent to pre hospital”, or “better than pre hospital” would be required to examine this.

The present study further identified poor sleep quality prior to hospital as the strongest indicator of poor sleep quality at both three and six months post-hospitalisation amongst older adults. This was also consistent with previous findings where poor sleep quality prior to illness (hospitalisation) was associated with poor sleep quality post-hospitalisation, up to one year post (Martin et al., 2011). The finding that prior levels of impaired sleep quality was most predictive of post-discharge levels of impaired sleep quality provides little direction for understanding why sleep quality worsens on average while in hospital, and what potential interventions may be. Other factors that were also found to be associated with poor sleep quality following discharge were higher levels of stoicism and fortitude

regarding pain, and going to bed after 8pm in the period before hospitalisation. The concept of stoicism generally includes three key characteristics: (1) lacking emotional expression; (2) lacking emotional involvement; and, (3) exercising emotional control or endurance (Wagstaff & Rowledge, 1995). The association between pain and sleep disturbance is well recognised across the lifespan (Breau & Camfield, 2011; Edwards, Almeida, Klick, Haythornthwaite, & Smith, 2008; Foley, Ancoli-Israel, Britz, & Walsh, 2004). It is possible that older adults who are reluctant to report their problems remain stoic while in hospital and may not receive investigations and interventions for these problems, sleep disturbance possibly being one.

Our study also identified not having an early bedtime (pre-8pm) in the period before hospitalisation as a significant predictor of poorer sleep at both three and six months post-hospitalisation. There is a lack of other evidence related to this however Ancoli-Israel and Ayalon (2006) reported older adult's bedtimes predominantly relate to the circadian rhythm sleep-wake cycle. They indicated that patients with an advanced sleep-wake cycle (causing them to be awake or asleep at times others are usually asleep or awake) impacts on them 'achieving' societal norms. Older adults may feel sleepy in the early evening and therefore restrict their social interaction at this time. This in turn may affect their level of social engagement and contribute to feelings of loneliness. Limited evidence however exists regarding the potential positive health effect an early bedtime prior to hospitalisation may have on a person's sleep quality post-hospitalisation. It is possible that the restorative component of sleep may be beneficial to a person's health outcome and an early bedtime be recommended for older adults expecting a hospital admission. However, as our results also indicated that going to bed prior to 8pm at six months post-discharge contributes to poorer sleep quality, a pre-8pm bedtime may be dependent on a particular period of time in an older adult's life. As some older adults experience

extended hospitalisation unexpectedly it is difficult to recommend or reject a pre-8pm bedtime prior to a hospitalisation that is not anticipated. Therefore, the period of time where a particular bedtime may be beneficial to an older adults' sleep, and subsequent health, compared to detrimental to their sleep, requires further exploration.

4.5.1. Limitations

This study has several acknowledged limitations. Firstly, due to the age, health and wellbeing of participants recruited, and/or the length of time participants were engaged with the study, there were dropouts. Given the population sampled (i.e., older adults who have already experienced an extended inpatient acute hospitalisation who are at increased risk of getting sick again), it was expected that some participants would need to withdraw due to ongoing health issues, hospital readmission, or transition to an aged care facility, and that others would die. The retention rate for the study was 70% from baseline to six months follow-up. It is possible that those participants that were not retained in the study until completion may have altered the outcome of this study had they remained. Additional or alternate factors may have been identified that could assist with better understanding of the impact of impaired sleep quality for older adults transitioning home to community-dwelling following extended hospitalisation.

Additional limitations of the study related to the lack of data collected regarding environmental factors that could contribute to the sleep quality of an older adult. It is possible that factors relating to the environment contributed to the sleep impairments of older adults in this study, despite these factors not being assessed in the present study. Future research would therefore benefit from data that consider both the physical (lighting, noise, temperature, space) and social (isolation, engagement in activities, and engagement with institutional staffs or groups)

environments. Data regarding sleep routines, general sleep hygiene, and perceptions and beliefs related to sleep would also be beneficial for future studies to consider.

4.6. Conclusion

Our in-depth longitudinal study of sleep experiences in older adults returning to community-dwelling after an extended hospitalisation found that sleep quality prior to admission was the strongest predictor of sleep quality at three and six months post-hospitalisation. Key factors that were contributory to poor sleep quality at both three and six months post-hospitalisation included a pre-8pm bedtime prior to hospitalisation and a higher level of stoicism-fortitude regarding pain. There is potential for advocating for a targeted approach of older adults who have poor sleep quality prior to hospital, in addition to those who are stoic in relation to their pain, to reduce sleep impairments, optimise health outcomes, and improve the trajectory of recovery. The impact of timing of bed needs further investigation in relation to the impact this may have on older adults' quality of sleep, and subsequent health outcomes.

4.7. Chapter conclusion

This chapter presents a detailed outline of the second component of study within this research project. This study was a prospective cohort study of older adults during hospitalisation regarding their sleep and health and wellbeing during and post-hospitalisation. The aim of the study was to identify possible factors that contribute to impaired sleep quality for this population and to expand the importance of understanding these factors in order to minimise subsequent health problems that may arise from impaired sleep. The chapter conclusion identifies that pre-hospital sleep quality is the biggest predictor to the sleep quality experienced by older adults at three and six months post-hospitalisation.

Chapter 5 focuses on the consultations older adults had with health

professionals regarding their sleep before, during, or following their hospitalisation. The aim of the following chapter is to determine what consultations older adults are having with health professionals regarding their sleep, what is discussed about sleep during these consultations, and what is being done because of these discussions to manage the sleep of older adults. The chapter concludes with a summary of findings and implications and links to the consequences of impaired sleep quality of hospitalised older adults sleep post-discharge presented in Chapter 6.

CHAPTER 5
SLEEP CONSULTATIONS

A good laugh and a long sleep
are the best cures in the doctor's book.
(IRISH PROVERB)

CHAPTER 5 SLEEP CONSULTATIONS

5.1. Context

This chapter reports on the qualitative and quantitative component of this project regarding the consultations older adults had with health professionals regarding their sleep before, during, or following their hospitalisation. The following text is adapted from a manuscript currently under review with *Behavioural Sleep Medicine.* The findings reported in this chapter supplement our understanding of the causes of impaired sleep quality reported in Chapters 3 and 4 and elaborate on what older adults understand about sleep and approaches to deal with impaired sleep. The citation for this manuscript is:

> Lalor, A. F., Brown, T., McDermott, F., Stolwyk, R., Russell, G., & Haines, T. P. (2017, under review). Management of older adults' sleep following hospitalisation: Are health professional consultations working? *Behavioural Sleep Medicine.*

5.2. Manuscript V: Introduction

Sleep provides an important restorative function for everyone, essential for optimal health and wellbeing. Older adults are particularly *at risk* to poorer sleep due to a greater likelihood of mental and physical issues with age, rather than aging per se. Without sufficient sleep, older adults can experience poorer health outcomes and possible hospitalisations. The National Sleep Foundation recommends that for healthy individuals with normal sleep, the appropriate sleep duration for older adults be between 7 to 8 hours of sleep (Hirshkowitz et al., 2015). Research shows that sleep is essential to preserve cognitive function (Yaffe et al., 2011), and poor sleep in older adults can lead to increased risk of heart conditions (Calhoun & Harding, 2010), obesity and diabetes (Knutson & Van Cauter, 2008), depressed mood (Cho et al.,

2008), falls (Brassington, King, & Bliwise, 2000), and lower quality of life (Ancoli-Israel, Ayalon, & Salzman, 2008). This population is also more likely to experience hospitalisations for medical illnesses. Some research indicates that hospital admissions may further disturb sleep and this disturbance may continue to post-discharge (Krumholz, 2013). Additionally, sleep disturbance may increase the length of hospital admission for a patient and contribute to the associated economic burden of hospitalisations as a result. Much research indicates that sleep is disturbed during hospitalisations however most of this research focuses on '*select populations'*. These studies select participants for inclusion that: (1) either already have or are at a higher risk of a sleep issue; (2) have a specific or severe health condition (i.e. study sample includes only patients experiencing one health condition); (3) have been exposed to a more intrusive hospital environment like an Intensive Care Unit (ICU); or, (4) or only consider one time point (Gabor et al., 2003; Khayat et al., 2015). With the increasing number of older adults, it is imperative to consider better management strategies of sleep for hospitalised older adults.

Sleep disturbance of older adults can result from direct and indirect factors. Direct factors that are associated with sleep disturbance include the sleeping environment or sleep hygiene and routine. Indirect factors that are associated with sleep disturbance include pain, depression, or anxiety. Pain is of particular importance as pain and sleep are mediated by the hypothalamic pituitary adrenal (HPA) axis (the central stress response system). This mediation is important for older adults – particularly those with comorbidities – given many comorbidities are often pain related. Older age is one of the main risk factors for insomnia (Edinger & Means, 2005), and adults with insomnia are more likely than 'normal sleepers' to have higher levels of cortisol and adrenocorticotrophic hormones (ACTH), which are released by the HPA axis following exposure to stressors (Vgontzas et al., 2001). Chrousos,

Vgontzas, and Kritikou (2016) highlighted that whether an individual will experience deep sleep/sleepiness or poor sleep/fatigue is determined by the interaction and disturbance between the HPA axis and cytokines. While the sleep disturbance for older adults might be a secondary concern for example, pain from surgery that then impacts on the quality of an individual's sleep, if the primary issue is adequately managed then sleep quality may improve. Therefore, targeting both direct and indirect factors could improve the sleep quality overall. Various treatment options to assist in managing sleep quality can include pharmacological and non-pharmacological approaches. Presently there is evidence to support various non-pharmacological approaches like exercise and cognitive behavioural therapy, particularly in the longer term (Riemann & Perlis, 2009; Sivertsen et al., 2006; Yang, Ho, Chen, & Chien, 2012). Evidence to support pharmacological approaches is mixed and varies due to factors like age, gender, or comorbidities that may interact with possible pharmacological solutions (Lie, Tu, Shen, & Wong, 2015).

Solverson, Easton, and Doig (2016) assessed sleep quality in survivors of critical illness (aged 17 years and over) in a multidisciplinary ICU. They determined that critical illness severity was predictive of reduced sleep duration and disruption at three months following hospitalisation. This research however did not consider sleep quality before or during hospitalisation. Selan, Hellström, and Fagerström, (2016) reviewed nutritional status and sleep quality of 90 oldest old adults following diagnosis of heart failure. They found hospital utilisation is increased where nutritional status is impaired and recommend that systematic evaluation of nutritional status and sleep quality was required. Müller, Kundermann, and Cabanel (2016) similarly considered the sleep quality of 57 patients hospitalised for depression and concluded that higher depression severity was directly associated with eveningness (most active and alert during the evening) and poor subjective sleep quality. These

studies do not fully consider the implications of what an older person's sleep was like before, during and after hospitalisation. This paper will examine consultations between older adults and health professionals and recall from discussions regarding sleep and the management of sleep impairments during and following their hospitalisation.

5.3. Design and methods

This study is part of a larger project that has been published elsewhere, that examined the mood and experiences of older adults following extended hospitalisation (Lalor et al., 2015). This study utilised a prospective cohort study design to gather data regarding discussions older adults had during and post-hospitalisation. A standardised self-report scale regarding sleep quality and additional structured open ended questions regarding consultations about their sleep were presented to each participant at each time point to elicit quantitative and qualitative participant information. During the participant's hospital admission, personal or environmental factors that could affect sleep were considered and ascertained.

5.3.1. Participants and setting

Participants in this study were recruited from one of five hospitals or sub-acute wards within the southeast region of Victoria, Australia, between January 2013 and March 2015. Eligible participants had to be aged 65 years or over who had been hospitalised for a minimum period of two weeks and were returning to community-dwelling following discharge. Participants were further excluded if their discharge destination from hospital was other than community-dwelling (i.e., nursing home or equivalent), was more than 60 kilometres from the hospital that the participant was discharged from, or they had speech impairment that would cause difficulties with participation. The six-item Cognitive Impairment Test (6-CIT) was used to screen

participants to ascertain if they demonstrated sufficient cognition skills that would enable them to recall and reflect on their consultations. The 6-CIT was chosen as it has a low respondent time burden and does not require participants to read, write or copy items and can therefore be administered in full to anyone who may have a visual impairment, tremor, arthritis, or physical impairment preventing them from using their hands (Tuijl et al., 2011; Upadhyaya et. al, 2010).

Results from the 6-CIT are furthermore not associated with education level. Participants in this study were excluded if they had a score greater than 13 on the 6-CIT as a cut-off of 13 on this scale has shown to have good sensitivity (76.3%, 79% and 64%) and high specificity for identifying cognitive impairment (92.4%, 100% and 99%) (Brooke & Bullock, 1999; Tuijl et al., 2011; Upadhyaya et al., 2010). Non-English speaking participants were provided with a qualified interpreter employed by the hospital where required to consent and participate in the interview and to ensure high level translation.

5.3.2. Measurement approach

Open-ended, structured questions were used to investigate the discussions and consultations that participants had had regarding their sleep with health care professionals. Participants were requested to complete interviews with researchers at three time points: prior to their discharge from hospital, at three and six months post-discharge. Participants were initially interviewed in a quiet location on the ward they were on whilst in hospital to ensure confidentiality. Three- and six-month follow-up interviews were conducted in the participant's home and when this was not possible the interviews were conducted via the telephone. Participants were asked questions to elicit information of: (1) their consultation with a health professional; and, (2) characteristics of the sleep discussions. (See Table 5.1 for specific questions asked).

Investigators developed the question set based on previous research

Table 5.1.

Question set for qualitative structured interviews regarding consultations.

Question
Initial question participant answers Yes or No to each option provided
1. Have you consulted any of the following health professionals in the last three months? a. General Practitioner (GP) or Doctor b. Psychiatrist c. Other medical practitioner d. Occupational therapist e. Physiotherapist f. Psychologist g. Podiatrist or chiropodist h. Social worker i. Nutritionist or dietician j. Sleep clinician k. An alternative health practitioner (i.e., herbalist, chiropractor, naturopath, meditation teacher, acupuncturist) (please state which if known) l. Other (please state if other than those listed)
2. Did you discuss your sleep with any of the health professionals you consulted in the last three months?
If participant answered No they were asked:
2a. Was there any reason why your sleep was not discussed?
If participant answered Yes they were asked:
3. Who did you discuss your sleep with?
4. Who initiated the discussion about your sleep? a. I did b. They did c. Family member/carer d. Can't remember e. Other (please state)
5. Can you tell me what was discussed in relation to your sleep? *(participant answer transcribed verbatim)*
6. What was done or decided to address this issue (i.e., your sleep) either by yourself or the health professional? *(participant answer transcribed verbatim)*

regarding provision of feedback to patients (Lee, McDermott, Hoffmann, & Haines, 2013). Lee et al. (2013) highlighted that older adults believed "they will tell me if there is a problem" in relation to falls prevention education provided during health professional consultations. The question set was provided to a project reference committee, including consumer advocates and relatives of previous hospital patients that met the inclusion criteria, for review and feedback. Following minor revision, the reviewed question set was piloted with three older adults to ensure clarity prior to finalisation of the questions and commencement of data collection.

During his or her hospital admission, each patient provided additional background data that could influence sleep (personal or environmental factors). Data considered and ascertained included age, gender, height and weight, length of hospital admission, chronic illnesses, history of falls, medications, smoking and alcohol intake, caffeine consumption, continence, marital status, education, culturally and linguistically diverse (CALD) background, familiar home environment, and ability to manage on their income.

Participants were also requested to complete the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) in order to ascertain their self-reported perception of their sleep quality. The PSQI is a 19-item self-report measure of sleep quality and assesses seven domains of sleep quality including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The PSQI has good psychometric properties that have been reported in other published studies (Carpenter & Andrykowski, 1998; Spira et al., 2012).

5.3.3. Procedure

This study was approved by the Monash Health, Monash University (HREC: 12182B), and Peninsula Health (HREC/13/PH/51) Human Research Ethics Committees. Participants were approached during their hospital admission. If patients met the inclusion criteria consent was obtained to proceed with the study. Recruitment took place between January 2013 and March 2015.

The principal investigator (AL) and four research assistants recruited eligible participants. Face-to-face interviews were undertaken with participants within 48 hours prior to planned discharge and at their discharge destination at three- and six-months. The initial face-to-face interview took approximately one hour, and the follow-up sessions took approximately 30 minutes. On occasion when it was not

possible to complete the follow-up interviews in person, interviews were conducted by telephone.

Participants were advised that participation was voluntary and could be discontinued at any stage of the study. Co-investigators (FM, TH), experienced in interviewing, provided training on the interview protocol to the principal investigator (AL) and four research assistants. The online survey program SurveyMonkey® (http://www.surveymonkey.com) was used to record participants' responses verbatim by iPad. Participants were able to confirm their responses at the time of data collection.

5.3.4. Analysis

A qualitative description, which took a descriptive and exploratory approach, was used to pool and analyse the recalled discussions about sleep at the in-patient, three- and six-month time points. The aim of qualitative description is "neither thick description (ethnography), theory development (grounded theory), nor interpretative meaning of an experience (phenomenology), but a rich, straight description of an experience or an event" (Neergaard, Olesen, Andersen, & Søndergaard, 2009, p. 53). This approach allowed conceptualisation and analysis of the frequency of different response types to these questions whilst permitting flexibility in interpretation and expression of interrelationships between the emergent response codes and categories. Participant responses were coded into individual subcategories and frequencies recorded (see Appendix M). Each response could potentially have more than one subcategory depending on the extent of the participant's response.

The first author initially completed the identification of the subcategories before secondary review by co-author (TPH) in order to ensure trustworthiness and consistency of the interpretation of participant responses. Both investigators, to conceptualise links between categories, collaboratively defined grouping categories

and subcategories. Bubble tree diagrams were constructed to illustrate connections between categories and subcategories in response to questions asked. Frequency of each subcategory within each time point was also considered. Categories that were more or less prevalent over the time points were identified through inspection of the changing subcategory and category frequencies.

To ensure the trustworthiness of the qualitative research component of this study, four criteria, as per Guba (1981), were considered: a) credibility; b) transferability; c) dependability; and, d) confirmability. Shenton (2004) considered each criteria in detail and the suggested provisions for qualitative researchers were employed in this study. Credibility was ensured by: a) adoption of a well-established research method; b) familiarity with participating organisation culture; c) broad random sampling; d) triangulation through the data collection method: wide range of informants, and inclusion of multiple sites; e) voluntary consent and right to withdraw by participants; f) frequent debriefing between data collectors and research investigators; and, most importantly (as per Guba and Lincoln (1989)), g) member checking by participants reviewing the data collected to ensure it represented what they actually had intended.

Transferability of the study was promoted through the provision of information, as recommended by Shenton (2004): a) the location and number of organisations in the study; b) exclusion and inclusion criteria for participants; c) sample size; d) outline of the data collection methods; e) number and duration of data collection time points; and, f) overall data collection time period required. Dependability has been addressed by provision of the outline of the study, how and what data were collected, to enable repetition of the work by a future researcher if they should so wish.

Furthermore, Lincoln and Guba (1985) argue that demonstration of credibility goes some way in promoting the dependability of the study by default. Lastly,

confirmability was promoted through detailed description of the methodology of this project. The figures presented in the results section provide an “audit trail” of how the collected data lead to the formation of the concepts that are reported and how they were processed.

5.4. Results

The flow of participants throughout the study from assessment of eligibility to inclusion to six-month follow-up is presented (Figure 5.1). There were initially 311 participants eligible and consented to complete the interview at three time points: during hospitalisation, three-month follow-up, and six-month follow-up. At three-month follow-up, there were 241 participants, and 218 participants at six-month follow-up. Over the course of the study, 76 participants withdrew and a further 17 died prior to completion of the study.

Table 5.2 provides the demographic and background data relating to recruited participants. The mean age of the participants at baseline was 78 years and 57.9% of participants were female (n=180). Over a third of participants were widowed (n=121) and a further third married or in a long-term relationship (n=117).

Only a quarter of participants self-identified as being from culturally and linguistically diverse backgrounds (n=75) despite nearly half the sample being born overseas (n=135). The average length of stay in hospital was 38 days. Prior to discharge, each participant was taking an average 9.8 medications and 16.7% of participants were on a medication to assist their sleep.

At the three-month follow-up, participants were averaging 8.7 medications and 11.7% of participants were on medication to assist their sleep. At the six-month follow-up, participants were averaging 7.9 medications and 13% of participants were on medication to assist their sleep. Most participants were non-smokers (96.5%) and drank caffeine daily (94.9%). By the six-month follow-up, less non-smokers were still participating in the study (91.7%) whilst daily caffeine intake remained the same. Just

over half the participants (54%) did not consume alcohol at the commencement of the study, however, this percentage increased at the three-month follow-up (66%), and decreased again by the six-month follow-up (60.6%). Participant mean BMI of 26.8 at discharge increased slightly to 27.1 at the six-months.

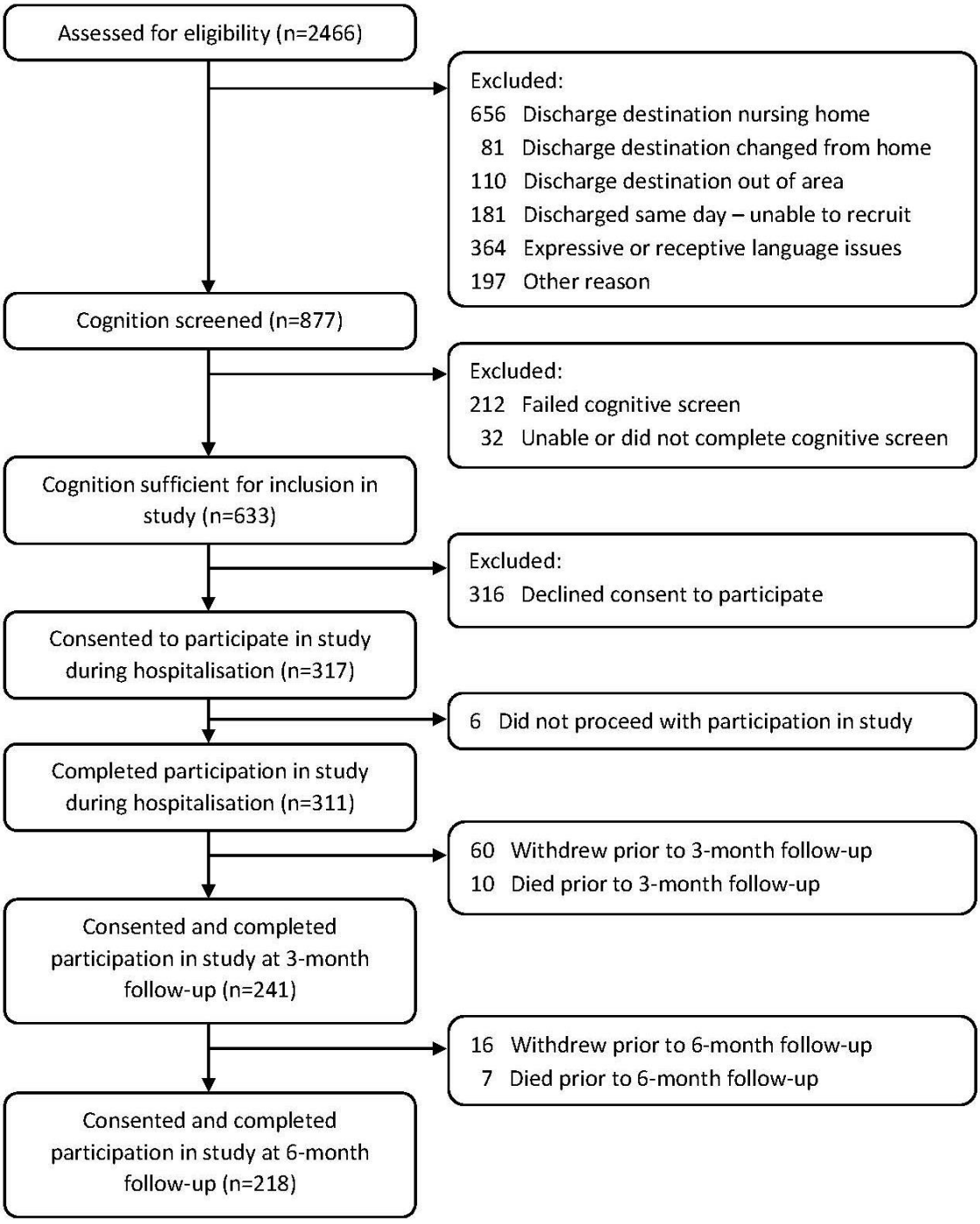

Figure 5.1. *Flowchart beginning from participant inclusion to the completion of the study.*

Table 5.2.

Participant demographic and background data

Variable	Included Participants at Each Time Point		
	During Hospitalisation (n=311)	**Three-Month Follow-Up (n=241)**	**Six-Month Follow-Up (n=218)**
Age (years; range 65-97 years)	78.4 (7.7)	77.7 (7.5)	78.0 (7.4)
Gender (female)	180 (57.9%)	136 (56.4%)	126 (57.8%)
Marital status			
Married/defacto	117 (37.6%)	91 (37.8%)	82 (37.6%)
Not married	194 (62.4%)	150 (62.2%)	136 (62.4%)
CALD[a]	75 (24.1%)	54 (22.4%)	48 (22.0%)
Born overseas	135 (43.4%)	106 (44.0%)	97 (44.5%)
English as second Language	70 (22.5%)	51 (21.2%)	44 (20.2%)
Non-smoker	300 (96.5%)	223 (92.5%)	200 (91.7%)
Non-alcohol drinker	168 (54.0%)	159 (66.0%)	132 (60.6%)
Caffeine-drinker	280 (94.9%) (n=295)	224 (93.7%) (n=239)	206 (94.9%) (n=217)
Average caffeinate drinks/day	3.9 (range 0-17 cups/day)	4.6 (range 0-17 cups/day)	4.7 (range 0-13 cups/day)
Years of Education	11.1 (2.2)	11.3 (2.0)	11.3 (2.0)
Years lived at home address	24.5 (n=303)	24.3 (n=234)	24.4 (n=211)
Days in hospital	38 (22.5)	37 (19.8)	37 (19.3)
No. of medications	9.8 (n=294)	8.7 (n=240)	7.9 (n=216)
Polypharmacy (6+ medications)	84.7%	73.3%	69.0%
Taking sleep medications	49 (16.7%) (n=293)	28 (11.7%) (n=240)	28 (13.0%) (n=216)
Average sleep medications	1.1	1.2	1.1
Average BMI[b]	26.8 (7.4)	26.6 (7.2)	27.1 (7.4)
Chronic Illness history	(n=297)	(n=240)	(n=217)
Cancer	93 (31.4%)	68 (28.3%)	58 (26.7%)
Arthritis	166 (56.1%)	135 (56.3%)	125 (57.6%)
COAD[c]/Chronic lung Disease	43 (14.5%)	31 (12.9%)	30 (13.8%)
Other neurological disorder	29 (9.8%)	28 (11.7%)	23 (10.6%)
Continence - urgency	80 (27.1%) (n=295)	65 (27.4%) (n=237)	64 (29.6%) (n=216)
How they manage financially			
Impossible	5 (1.6%)	4 (1.7%)	3 (1.4%)
Difficult all the time	26 (8.4%)	20 (8.3%)	19 (8.7%)
Difficult some of the time	44 (14.1%)	35 (14.5%)	35 (16.1%)
Not too bad	139 (44.7%)	108 (44.8%)	93 (42.7%)
Easy	97 (31.2%)	74 (30.7%)	68 (31.2%)

Note. [a]=Culturally and Linguistically Diverse background; b=Body Mass Index; c=Chronic obstructive airways disease.

Of the 311 participants interviewed during their hospital stay, 296 participants agreed to answer questions regarding their chronic diseases, with arthritis as the most frequent, in over half of the participants (56.1%), 14.5% reported chronic lung disease. Over a quarter of participants (27.1%) indicated that they had continence issues related to urgency. Participants had completed 11.1 years of education on average and had lived a mean of 24.5 years at their present address. Nearly a quarter of the participants (24.1%) reported having some difficulty managing on their present income level at commencement in the study and this decreased slightly by six months (26.2%).

Results of three open-ended, structured sleep consultation questions and the PSQI are reported in Table 5.3. The topic of sleep was primarily raised by the participant (53.9%), and this remained constant over the six-month period (54.8%). Participants reported that their sleep quality, as per their PSQI global score, improved following hospitalisation, reducing from 7.9 during hospital stay to 7.1 at three- and six-months. A higher PSQI score indicates poorer sleep quality.

Table 5.3.

During their hospital stay 270 participants completed open-ended, structured questions as to whether or not they had had any consultations regarding their sleep in the three months prior (see Table 5.4). Consultations with a health professional within the last three months were reported by 13.5% of participants at commencement of the study, which rose at the three- and six-months, 15.1% and 19.4%, respectively. Approximately one quarter (n=65) of these participants provided a “particular reason” as to why there was no consultation regarding their sleep whilst 41 participants reported having had a consultation regarding their sleep. Over half (n=23) reported having discussed “poor sleep” at this consultation.

Table 5.3.

Consultation and sleep quality data for participants (Data presented are mean (SD) or n (%)).

	Included Participants at Each Follow-Up Time Point		
Variable	**During Hospitalisation**	**Three-Month Follow-Up**	**Six-Month Follow-Up**
Unable to see regular GP in last three months when needed	29 (10.3%) (n=282)	27 (11.3%) (n=239)	16 (7.7%) (n=207)
Consulted sleep clinic in last three months	2 (0.7%) (n=287)	2 (0.8%) (n=239)	0 (n=217)
Consultation (non-sleep clinic) regarding sleep in last three months	39 (13.5%) (n=288)	36 (15.1%) (n=239)	42 (19.4%) (n=216)
GP[a]/Doctor consulted	33 (64.7%)	31 (73.8%)	39 (83.0%)
Non GP[a]/Doctor consulted	18 (35.3%)	11 (26.2%)	8 (17.0%)
Initiator of sleep discussion			
Participant	21 (53.9%)	21 (58.3%)	23 (54.8%)
Consultant	16 (41.0%)	14 (38.9%)	18 (42.8%)
Family member/carer	0	0	0
Couldn't remember	2 (5.1%)	1 (2.8%)	1 (2.4%)
PSQI[b] Global score[c]	7.9 (4.4)	7.1 (4.1)	7.1 (4.2)
Subjective Sleep Quality	1.3 (0.9)	1.0 (0.9)	1.0 (0.9)
Sleep Latency	1.6 (1.2)	1.2 (1.2)	1.3 (1.1)
Sleep Duration	1.0 (1.2)	1.0 (1.2)	1.0 (1.2)
Habitual Sleep Efficiency	1.7 (1.2)	1.5 (1.2)	1.5 (1.3)
Sleep Disturbances	1.1 (0.5)	1.1 (0.4)	1.2).5)
Use of Sleeping Medication	0.8 (1.3)	0.7 (1.2)	0.6 (1.1)
Daytime Dysfunction	0.5 (0.8)	0.6 (0.7)	0.5 (0.6)

Note. [a]=General practitioner; [b]=Pittsburgh Sleep Quality Index; [c]=Higher scores indicate poorer sleep.

Table 5.4.

Number of participants who answered open-ended, structured questions regarding consultations for their sleep in the three months prior to assessment.

Variable	During Hospital	Three-Month Follow-Up	Six-Month Follow-Up
n for Q[a]2.	311	241	218
n who reported No to Q2.	270 (86.8%)	207 (85.9%)	177 (81.2%)
n who provided a reason for "No" consultation	65 (24.1%)	74 (35.7%)	95 (53.7%)
n for Q3. and Q4.	41 (13.2%)	34 (14.1%)	41 (18.8%)
n who discussed "poor sleep" in Q3.	23 (56.1%)	24 (70.6%)	26 (63.4%)
- n provided "no outcome" in Q4.	4 (17.4%)	8 (33.3%)	11 (42.3%)
- n provided "medication" in Q4.	18 (78.3%)	12 (50.0%)	10 (38.5%)
- n provided "other outcome" in Q4.	1 (4.3%)	4 (16.7%)	5 (19.2%)

Note. [a]=Question.

At three- and six-months, an increasing number of participants (35.7% and 53.7% respectively) provided a “particular reason” as to why they had no consultation regarding sleep in the three months prior. More participants reported having had a consultation regarding sleep post-discharge from hospital, than in hospital (14.1% and 18.8% at three- and six-months) and had discussed “poor sleep” (70.6% and 63.4% respectively). The majority of those who discussed “poor sleep” whilst in hospital reported a medication-based intervention (n=18, 78.3%) however this decreased post-discharge (50.0% and 38.5% at three- and six-months). Participants reported an increase of other interventions as the strategy to deal with their poor sleep (16.7% and 19.2% at three- and six-months). However, an increasing number reported having no strategy to manage their reported poor sleep (33.3% and 42.3% at three- and six-months).

Sleep quality of participants as per the PSQI and whether or not participants had had a consultation in the three months prior to their assessment regarding their sleep were compared (see Figure 5.2). Poor sleep quality was reported by 187 participants during their hospital stay and 155 (82.9%) reported having had no consultation regarding their sleep in the three months prior. Similarly, 161 participants reported poor sleep quality at three-months and 133 (82.6%) had had no consultation regarding their sleep in the three months prior. At six-months 136 participants reported poor sleep quality and 105 (77.2%) having had no consultation regarding their sleep in the three months prior. Over the course of the study, 484 participants reported poor sleep quality, yet only 91 (18.8%) had a consultation with a health care professional regarding their sleep.

5.4.1. Any particular reason why sleep was not discussed during a consultation in the last three months?

Where participants reported they had had a consultation with a health

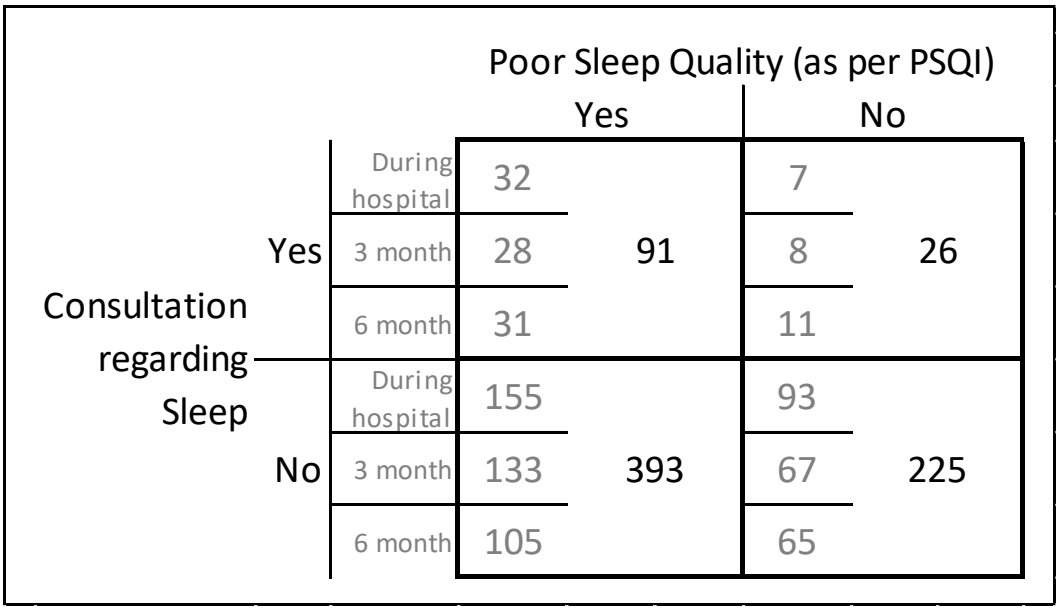

Figure 5.2. Matrix of participants sleep quality as per the PSQI and consultations regarding sleep in the 3 months prior to review. *Note.* Cut-off score of >5 indicates poor sleep quality on the PSQI as per Buysse et al. (1989); Subtotal scores for each time point are indicated in grey.

professional in the past three months however had not discussed sleep, reasons were classified into two broad categories of: (1) “not required”; and, (2) “required, but…”. Reasons provided were classified into subcategories within these overall categories.

5.4.1.1. Discussion “not required”

Where a discussion was “not required”, reasons provided by participants included (1) anticipating an improved trajectory with their sleep without additional intervention; and, (2) satisfactory management of their sleep. Anticipation of improved trajectory of their sleep without additional intervention remained constant over the three periods of time: during hospital, three- and six-months. Participants however increasingly reported satisfactory management of their sleep at each time point and required no further input.

5.4.1.2. Discussion “required, but…”

There were a larger proportion of reasons in the second subcategory

"required, but…" where no discussion was undertaken although a discussion would have been beneficial. During hospital, participants predominantly reported an absence of communication in the previous three months. Eleven participants expected the health professional to initiate discussion about sleep. This expectation remained constant at each follow-up. The biggest changes in responses over the study were that participants did not believe that treatment would work for them (6, 7, 22) and normalisation of sleep problems by participants (2, 2, 10).

Figure 5.3 visually conceptualises categories and subcategories of reasons that participants reported not discussing their sleep when they had a consultation in the last three months. Two sections are delineated within Figure 5.3 to represent whether or not a discussion was required ("not required" or "required, but…"); the first section indicates the reasons why no discussion was necessary, and therefore not undertaken.

The second section depicts the reasons why no discussion was undertaken although a discussion would have been appropriate.

5.4.2. Can you tell me what was discussed in relation to your sleep?

Where participants reported what was discussed in relation to their sleep, three broad categories were identified: (1) there was discussion, however "no action required" in relation to the participant's sleep; (2) there was "no action…yet! [Due to] inadequate discussion" even though discussion regarding sleep was undertaken; and, (3) there was "action! [Due to] adequate discussion".

5.4.2.1. "No action required"

Four participants reported no action was required because of discussion regarding their sleep issue with a health professional in the three months prior to their six-month follow-up.

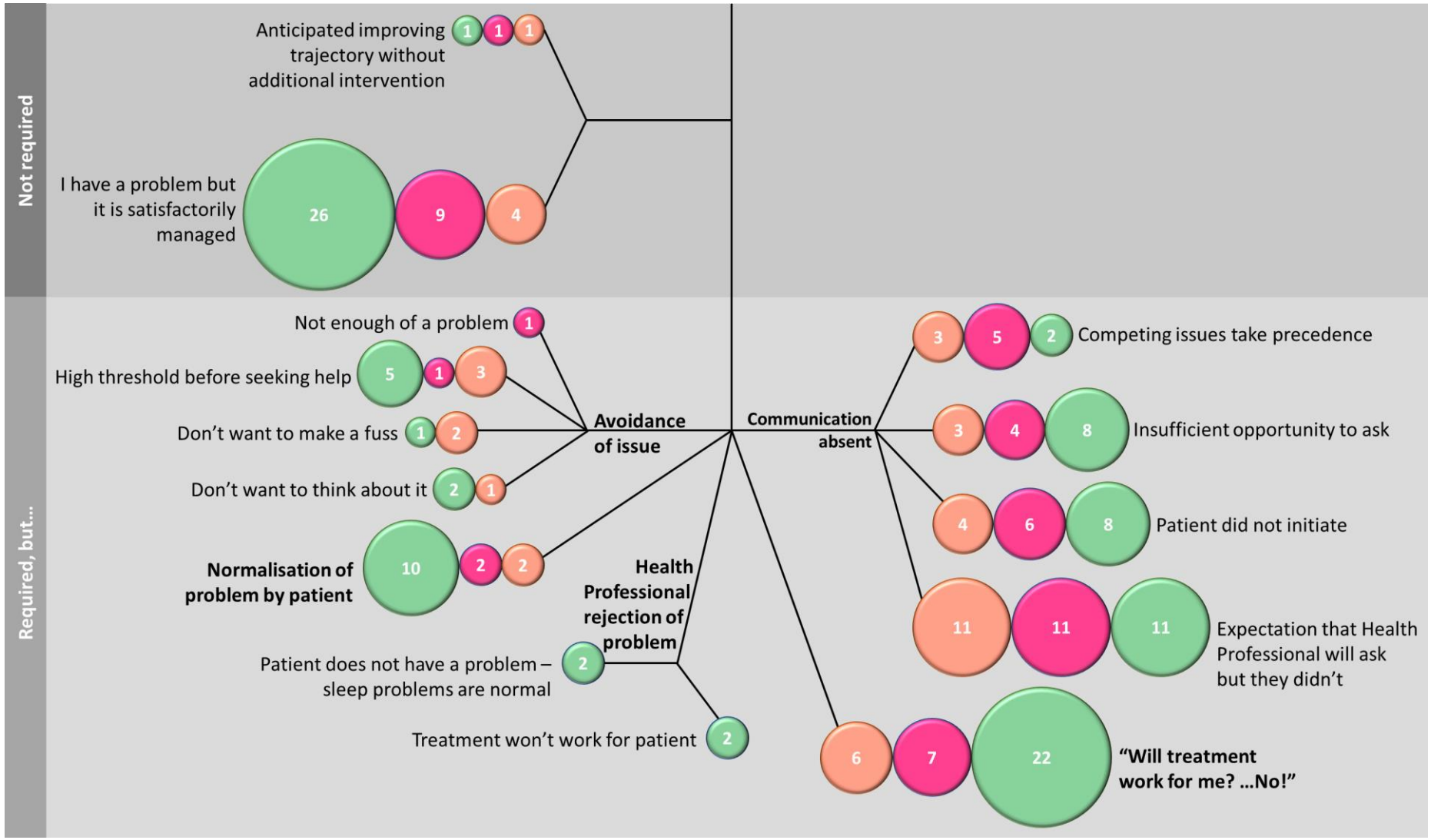

Figure 5.3. "Bubble-Tree" conceptualisation of reasons for lack of discussions about sleep.

Note. Key: (n) Number of responses pre-discharge; (n) Number of responses at three-months; (n) Number of responses at six-months; Subcategories in bold.

5.4.2.2. “No action…yet! – inadequate discussion”

The most responses provided by participants regarding discussions related to their sleep were that they were had, but they felt they were inadequate. Overall, comments for inadequate discussions progressively increased over the time of follow up from 43 to 47 to 65 comments at the during hospital, three- and six-month follow ups respectively. Initial subcategories within this category highlight that the majority of discussions related to the “severity or nature or impact of sleep patterns” of a participant’s sleep (38, 45, and 63 at each time point). The predominant comments within this subcategory related to general discussion about having “poor or disturbed sleep” and again, increased at each time point (23, 24, and 30).

5.4.2.3. “Action! – adequate discussion”

The third category highlights discussions participants had with a health professional that were adequate to assist with management of their sleep. This category accounted for a much lower proportion of the overall comments received with only 17, 19, and 9 comments during hospital, and at three- and six-months respectively, that discussed potential areas for action. Primarily participants reported “requesting” medication to assist their sleep (9, 3, 2). “Adverse impacts” of medication to assist sleep were only discussed post-discharge. One participant reported if she took sleep medication she would not be able to care for her husband with dementia, who frequently woke during the night, whilst another reported that sleeping medication affected her Parkinson’s disease and contributed to more falls. The “paucity of potentially beneficial treatment options” were also more prominent post-discharge (1, 8, and 4 comments at each time point). Figure 5.4 visually conceptualises the categories and subcategories of what was discussed regarding sleep when a participant had a consultation with a health professional in the previous three months.

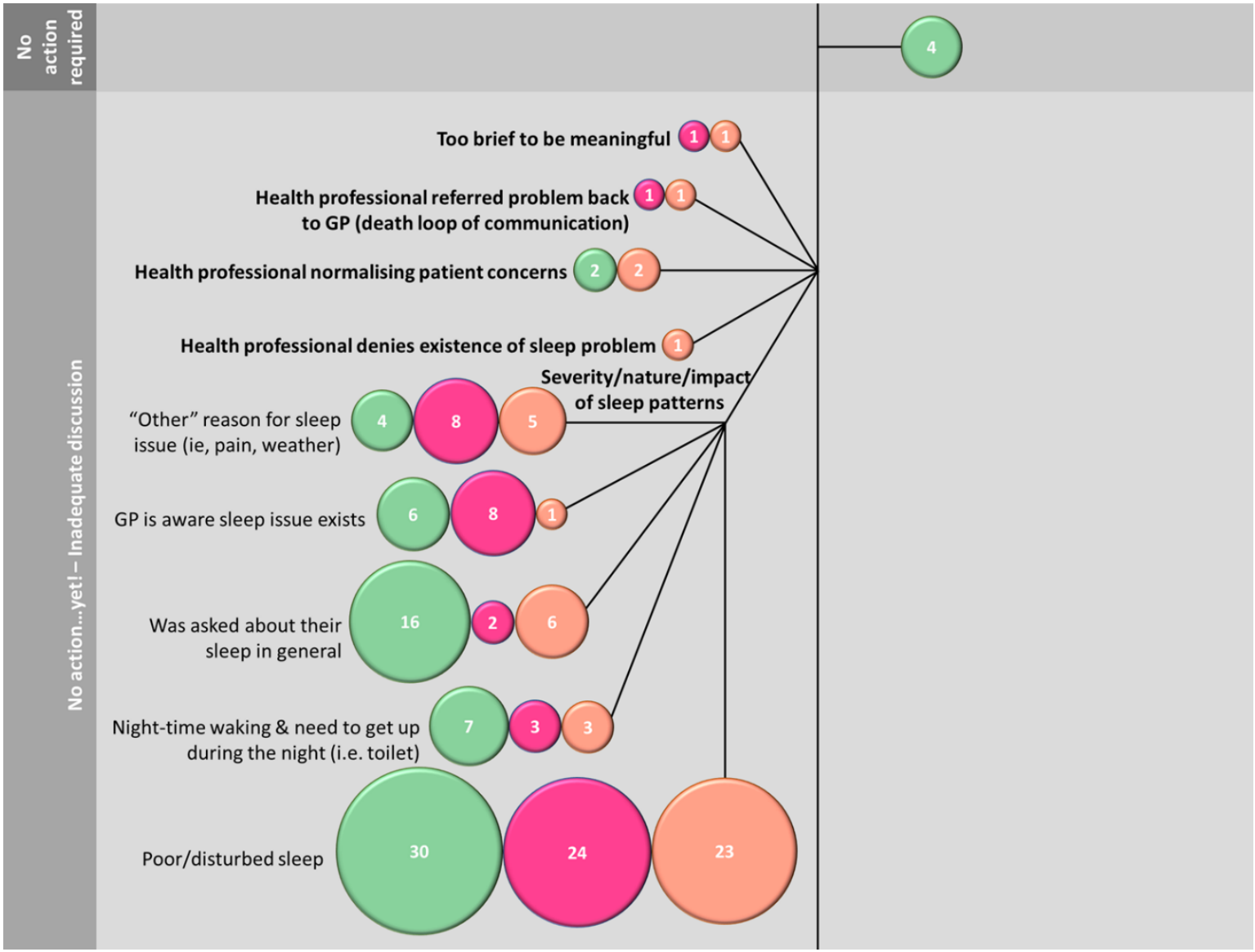

Figure 5.4. "Bubble-Tree" conceptualisation of participants' sleep discussions.

Note. Key: n Number of comments pre-discharge; n Number of comments at three-months; n Number of comments at six-months; Subcategories in bold.

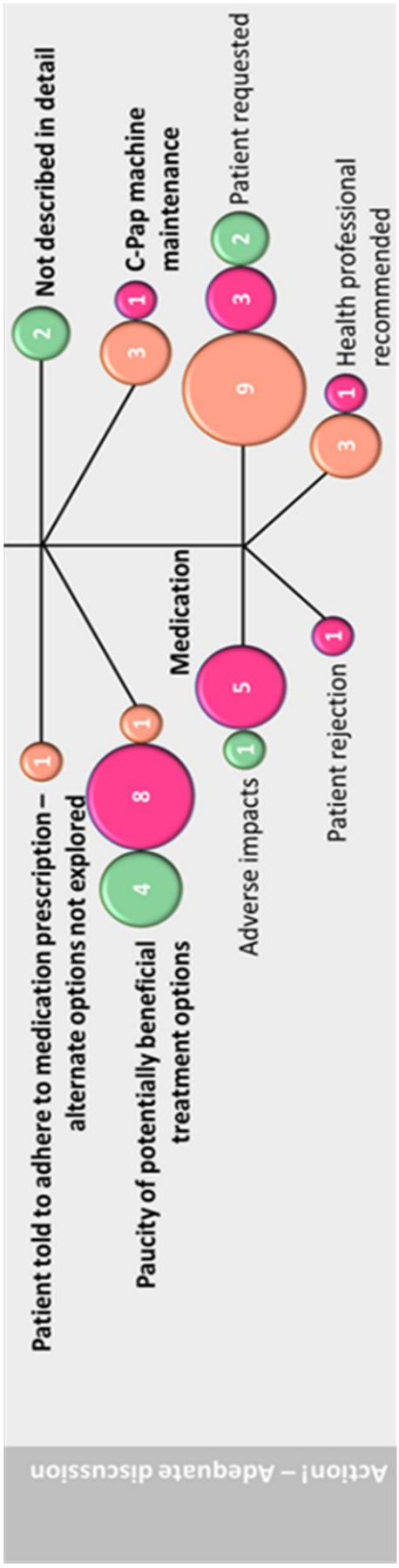

Figure 5.4. continued…

5.4.3. What was done or decided to address this issue (i.e., your sleep) either by yourself or the health professional?

Where participants reported what was done or decided to address their sleep, either by themselves or their health professional, three broad categories were identified: (1) “no action”; (2) “no action…yet!”; and, (3) “action!”.

5.4.3.1. “No action”

One participant during hospital was unable to recall what had been decided upon during discussion with their health professional, despite recalling that sleep had been discussed.

5.4.3.2. “No action…yet!”

The second category included discussions regarding interventions undertaken however was divided into two subcategories: (1) “further investigation” was required; or,

(2) that there was no additional action that could be undertaken following the “discussion”. The primary comments were within the second subcategory related to “no change to existing management” of the sleep issue where 10 comments were reported during hospital and three-months, and increased to 17 comments at six-months. Overall, participants reported increasing non-action at each time point (18 during hospital, and 28 and 44 at three- and six-months respectively).

5.4.3.3. “Action!”

The third category highlights two subcategories being either: (1) “Pharmacological”; or, (2) “Non-pharmacological” action discussed by the participant with their health professional. Commencement of a new sleeping medication was the primary action (20, 12, and 10 at each consecutive time point) within the pharmacological subcategory. "Pharmacological” actions decreased over the time course however were still discussed considerably more than “Non-pharmacological” actions, with 26, 16, and 13 comments reported during hospital, and at three- and six-months. Ten “non-pharmacological” actions were reported at different time points with ‘reassurance’, ‘sleep position’, and ‘C-Pap or oxygen’ the only actions reportedly discussed at each time point. “Non-pharmacological” actions were discussed 6, 11, and 7 times during hospital, and at three-and six-months, respectively.

Figure 5.5 visually conceptualises the categories and subcategories of what was done or decided upon to address the sleep issue of the participant by either themselves or the health professional they consulted.

5.5. Discussion

The main finding on this research is that over 80% of people with impaired sleep quality, recently discharged from hospital, were not discussing it with a health professional either during their inpatient hospital stay, or following their discharge home. People who did discuss having impaired sleep quality were mostly being

directed towards pharmacological management approaches despite the evidence that non-pharmacological approaches, such as psychotherapy (Sivertsen et al., 2006), exercise (Yang et al., 2012), and behavioural therapies (Riemann & Perlis, 2009) focusing on sleep hygiene, can be just as effective, if not even more effective in the long term, for management of this problem. Previous randomised trials about sleep have demonstrated that exercise and cognitive behavioural therapy can be very effective for managing sleep quality problems in older adult populations yet these strategies were only listed by 1 participant out of 288 during hospital, of whom 150 had impaired sleep quality (Riemann & Perlis, 2009; Sivertsen et al., 2006; Yang et al., 2012). From our results, rarely are non-pharmacological treatments discussed or considered. This is important as the participants included were discharged following extended inpatient period in which older adults have been found to have increased likelihood of having impaired sleep routines.

This disconnect between evidence and practice appears to be contributed to by both patients and health professionals. Some patients perceived that sleep disturbance was a normal part of aging, that nothing could be done, or that there was an absence of interventions available that could be of assistance. Equally, health professionals were not addressing sleep with patients frequently enough, based on the older adult's recall of consultations and discussions with health professionals. Our data indicate that health professionals initiated discussions of this nature with only 5.6% of our sample (n=288) whilst only 7.3% of the participants themselves initiated discussions of this nature. This indicates that a problem that can negatively affect the health and wellbeing of older adults is largely ignored and is potentially mismanaged.

Previous literature has investigated consultations in relation to sleep but are limited. Morin, LeBlanc, Daley, Gregoire, and Mérette (2006) conducted a telephone

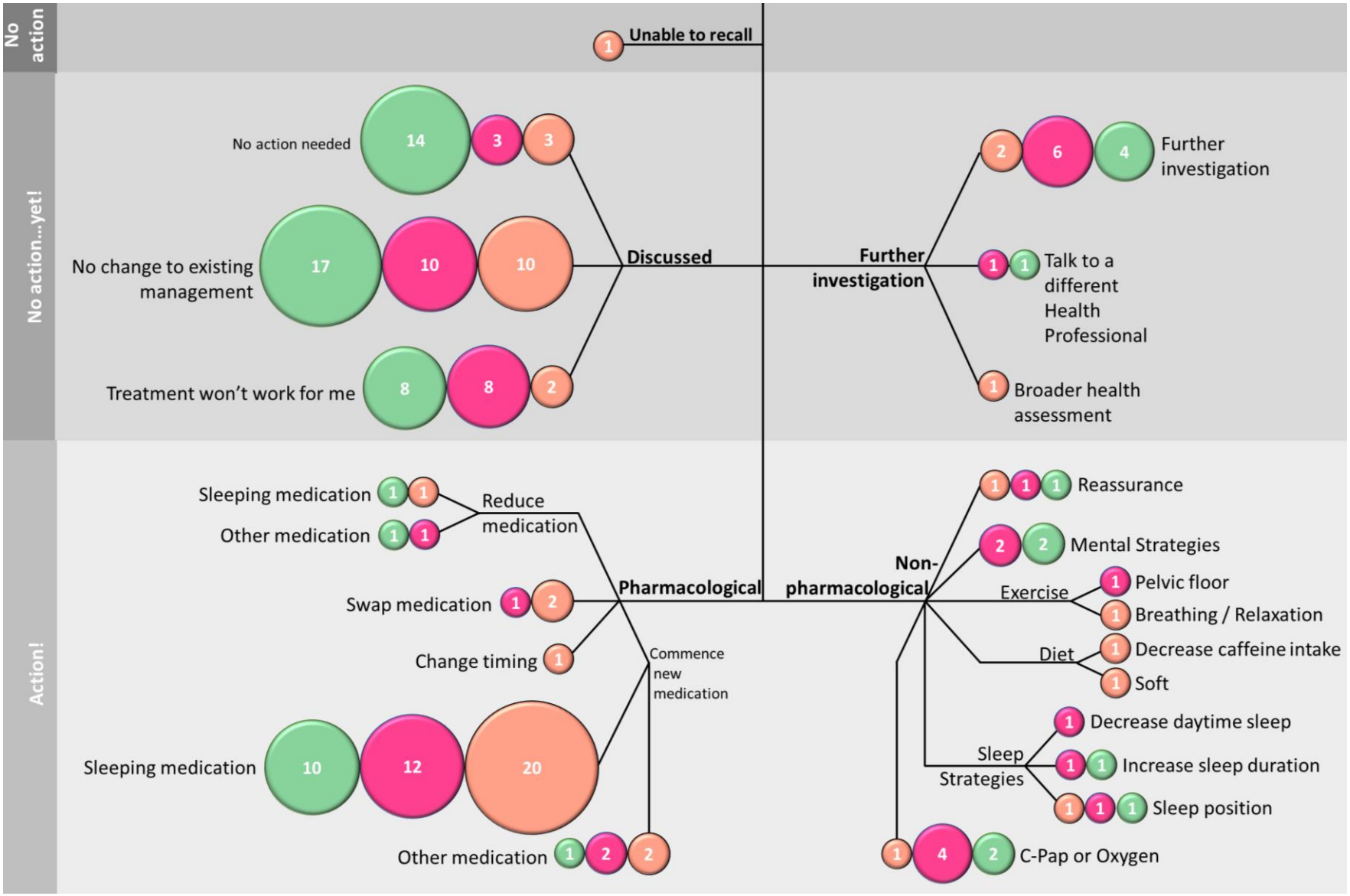

Figure 5.5. "Bubble-Tree" conceptualisation of what was decided upon to address sleep issue.

Note. Key: (n) Number of comments pre-discharge; (n) Number of comments at three-months; (n) Number of comments at six-months; Subcategories in bold.

survey with 2001 adults regarding sleep, insomnia, and its treatments. They reported that 13% of participants had consulted a healthcare provider specifically for insomnia in their lifetime. However, this research focused on the determinants prompting individuals to seek treatment for their insomnia and not on health professionals initiating discussion regarding the sleep of the patient. Sarkisian, Hays, and Mangione (2002) collected data of 529 community dwelling older adults from a self-administered mail survey regarding expectations regarding aging. Sarkisian et al. (2002) identified older age was “independently associated with lower expectations regarding aging” (p. 1837) and this was further “independently associated with not believing it important to seek health care” (p. 1837). Similar results were identified by Venn and Arber (2012) who conducted in-depth interviews with 62 older adults and explored factors that deter older adults seeking help professionally for impaired sleep. Venn and Arber (2012) identified that older adults perceive poor sleep to be expected as one ages, in addition to their desire to maintain control and autonomy over their lives, both day and night. Limited additional literature was located by the present authors regarding sleep consultations with older adults and health professionals. While work in these other areas has been demonstrated and older adults may seek information regarding their sleep from sources other than health professionals, our results indicate that without effective discussions with health professionals, older adults have little idea as to what evidence-based strategies are available and how they may help them in dealing with sleep.

5.5.1. Limitations

The first limitation of this study is that patients may not have been able to recall completely their discussions with health care providers. It is possible that discussions regarding sleep were had and that patients did not recall. However, even if this was the case, patients were not benefiting from such discussions because they

were not remembering and actioning any potential strategies raised. If strategies were discussed but not remembered, then a different approach to these discussions by health professionals using memory aids or devices may be needed to help people recall discussions and actions discussed.

It is possible that patients may have increased reporting of their sleep issues at the three- and six-months following the questions asked during their hospitalisation about the consultations that they had regarding their sleep. This may have prompted some patients to follow-up their sleep with their health professional in the following three months. However, whilst this may have been the case, patients at the six-month follow-up reported a considerably higher number of discussions that lead to no action being taken (44) than during their hospitalisation (18), whereas, patients reported a similar number of discussions resulting in action at both the six-month follow-up and during hospital time points, 20 and 22 respectively. This indicates that health professionals are potentially not providing possible evidence-based treatment options that are available to assist patients with their sleep issues during hospital and post-discharge.

Additionally, data regarding help-seeking behaviour of older adults was not collected in this study. Morin et al.'s (2006) study highlighted that factors including psychological distress, physical discomfort, and daytime fatigue were the motivators for seeking treatment or assistance with impaired sleep. Morin et al. (2006) also note that many individuals undertake self-help strategies to facilitate their sleep rather than consult a health professional. This would be beneficial to consider in future research to assist the understanding of older adults' help seeking behaviours, particularly in regard to sleep, and in regards to health professionals identifying older adults in need of assistance to aid sleep.

Finally, it is unknown if previous research focusing on different interventions to

manage impaired sleep quality in otherwise generally well populations applies to the post-discharge population. It is possible that the factors that emerged in our data, such as pain, might be an important effect modifier as to whether different interventions work. There may also be restrictions that various conditions might place on some interventions, for example exercise, for someone who has a dense hemiplegia following a stroke and they may not be able to participate in the same program that was tested in previous research.

5.6. Implications

Older adults report having sleep problems but perceive that they are not being addressed. It is uncertain as to whether sleep is prioritised as a topic for discussion with patients in the hospital settings studied. It is possible that this topic is being discussed, but that this discussion is not being recalled. Previous research has demonstrated that patients have difficulty recalling information when provided in large amounts or at difficult times (e.g. when provided with a diagnosis) (Cornwell, Dicks, Fleming, Haines, & Olson, 2012). It could be argued that discussion of issues that are directly related to the hospital admission should be prioritised ahead of those that might take place targeting other issues such as sleep disturbance. It may be better to reserve these discussions for the post-discharge period when patients may be more focused on returning to their previous level of function and independence, rather than just getting out of hospital. Further research would be required however to determine if this is the better model of communication. This, and other non-pharmacological approaches to enhancing the recovery of sleep quality following a period of hospitalisation, need to be investigated for efficacy and cost-effectiveness to establish their place in health service models of care.

The focus of this paper related to consultations older adults had with health professionals regarding their sleep. Older adults were not asked questions regarding

their sleep environment characteristics or their sleep beliefs or practices. Information regarding these aspects may have further informed the results of this study and would be beneficial to consider in future research in this area.

5.7. Chapter conclusion

This chapter presents a detailed outline of the consultations older adults have with health professionals before, during, and following their hospitalisation regarding their sleep. The aim of the study was to determine what consultations older adults are having with health professionals regarding their sleep, what is discussed about sleep during these consultations, and what is being done because of these discussions to manage the sleep of older adults. The chapter conclusion identifies that older adults report having sleep problems however they are largely not addressed. Additionally, less than 20% of people with impaired sleep quality, recently discharged from hospital, were discussing it with a health professional either before or during their inpatient hospital stay or following their discharge home. Pharmacological management approaches were predominantly recommended for older adults as a method for management of sleep issues despite evidence that non-pharmacological approaches is as good as, if not better, than pharmacological approaches.

Chapter 6 focuses on the final study within this doctoral research project. The aim of the following chapter is to determine what the consequences of poor sleep for older adults during hospitalisation are on their outcomes post-discharge. The chapter concludes with a summary of findings and implications prior to the final chapter of this thesis summarising the main findings of this study and discussing the implications for the sleep quality of older adults.

CHAPTER 6
CONSEQUENCES OF IMPAIRED SLEEP QUALITY POST-HOSPITALISATION

A little insomnia is not without its value in making us appreciate sleep, in throwing a ray of light upon that darkness.
(PROUST, "SODOM & GOMORRAH")

CHAPTER 6 CONSEQUENCES OF IMPAIRED SLEEP QUALITY POST-HOSPITALISATION

6.1. Context

The previous chapters have outlined the causes of impaired sleep quality during and following extended hospitalisation for older adults and that over 80% of older adults with impaired sleep quality are not discussing it with a health professional. The findings reported in this chapter extend the current understanding of the consequences of impaired sleep quality, and the causes of impaired sleep quality reported in Chapters 3 and 4. Specifically, this chapter reports on the final study of this doctoral research project regarding the consequences of impaired sleep quality during hospital on the outcomes post-hospital for older adults.

The following text is adapted from a manuscript currently under review with *Age and Ageing.* The citation for this manuscript is:

> Lalor, A. F., Brown, T., McDermott, F., Stolwyk, R., Russell, G., & Haines, T. P. (2017, under review). Could losing sleep quality in hospital be good for your health? Results of a prospective cohort study. *Age and Ageing.*

6.2. Manuscript VI: Introduction

Sleep is imperative to maintaining good health and wellbeing throughout the life span (Hirshkowitz et al., 2015). What happens while you sleep impacts on the way you feel when you wake up and throughout the course of your day (Vandekerckhove & Cluydts, 2010). It impacts on cognitive function, physical abilities and psychological performance. Poor sleep is associated with various health issues including impaired cognitive skills, risk of Alzheimer's disease, hypertension, mood disorders, and obesity (Bubu et al., 2017; Calhoun & Harding, 2010; Miyata et al.,

2013; Nielsen, Danielsen, & Sorensen, 2011). As adults age, complaints of impaired sleep increase, particularly relating to initiating and staying asleep (Ancoli-Israel, 2009). Older adults experiencing sleep difficulties are at increased risk of falls, depression, social isolation, and impaired concentration and memory (Ancoli-Israel & Ayalon, 2006; Harrington & Lee-Chiong, 2007). Further evidence indicates that if left untreated impaired sleep can impact daytime functioning, recovery, and overall health-related quality of life (Haimov & Vadas, 2009; LeBlanc et al., 2007). The underlying active and controlled physiological processes that occur while you sleep are therefore vital and promote restorative processes (Paterson, 2012).

Sleep, while important to people of all ages, is particularly important for older adults. As one ages, the process of sleep alters with increased length of 'lighter' sleep, and decreased length of 'deeper' and rapid-eye movement (REM) sleep (Ohayon et al., 2004). Due to shallower sleep, older adults are more easily roused or disturbed while sleeping, and experience variable durations of sleep. Other factors that are increasingly probable with increasing age, including physical or psychological co-morbidities and associated medications to treat theses illnesses, further exacerbate the ability for older adults to sleep well and feel rested when they awake (Ancoli-Israel, 2006).

Older adults who have been hospitalised are potentially at greater risk of the negative consequences of impaired sleep compared to community-dwelling older adults. They have had a recent health event, be it an illness or a surgery that has necessitated their hospital admission, have had changes to their living environment and routines brought about, and they are more likely to have recently been exposed to changes in their medication regimes arising from their hospitalization. This population could also be justified as being of importance for this line of investigation due to their increased propensity to have had disturbed sleep quality. Hospitalisation

can also affect sleep quality due to personal factors (i.e. anxiety, depression, fear, co-morbidities, pain, medication side effects, social isolation) and extraneous factors (i.e. environmental noise, medical equipment, care routines, lighting, invasive tests) (Palmisano-Mills, 2007). Therefore, it is of importance to consider the consequences of older adults experiencing poor sleep quality amongst those who have recently been hospitalised as distinct from the broader older adult population.

This study aimed to examine the associations between sleep quality and a range of health outcomes in a sample of older adults who had recently been discharged from hospital. It was hypothesised that older adults who experience poor sleep quality during a hospital inpatient admission will have poorer health outcomes post-hospitalisation.

6.3. Method

6.3.1. Study design and setting

This prospective, cohort study was part of a broader longitudinal cohort project (Lalor et al., 2015) that examined older adult's mood and experiences before and after an extended hospitalisation. This study gathered data regarding the sleep quality, health outcomes, and activity participation of patients 65 years or older, from one of five hospitals located in south eastern Victoria, Australia. Participants were surveyed during their hospital stay and followed-up at home at three and six months post-discharge. Each participant completed standardised self-report measures and open-ended questions. Patients were eligible for inclusion in the study if they: (1) were aged 65 years or more; (2) had an extended hospitalisation (14 days or more); (3) were previously community-dwelling and were returning to community-dwelling post-discharge; (4) had sufficient cognition (less than 14 on the six-item Cognitive Impairment Test (6-CIT; Katzman et al., 1983); and (5) had sufficient language ability to undertake interviews. Interpreters were employed for non-English speaking

participants as required.

6.3.2. Procedure

Older patients (n=311) were recruited across two publicly funded health services (Peninsula Health and Monash Health) in Victoria, Australia, between January 2013 to March 2015. Potential participants, who met inclusion criteria, were approached 48 hours prior to their planned discharge from hospital. Eligible participants were approached to obtain consent, by one of five interviewers (including the primary author). Interviews were conducted face-to-face including a combination of standardised assessments and open-ended questions regarding sleep, demographic data, mood, history of falls, functional wellbeing, and activity participation. Data collected from participants during hospitalisation ('baseline') related to their in-hospital sleep experience in addition to retrospectively phrased questions related to their pre-hospital sleep experience. Data regarding participants' post-hospital sleep experience was followed up at three and six months post-discharge. Interviewers used iPads to enter participants' responses directly into the online survey program SurveyMonkey® (http://www.surveymonkey.com). Prior to the study commencing, all interviewers received training regarding data collection. Ethics approval for this study was provided by the Human Research Ethics Committees of Monash Health (HREC:12182B), Peninsula Health (HREC/13/PH/51) and Monash University (HREC:0834). All participants recruited for the study provided written, informed consent.

6.3.3. Instrumentation

6.3.3.1. Predictor variable

The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) was used to obtain a measure of each participant's recalled sleep

(over the previous month) at each time point. The PSQI, a standardised 19-item self-report measure of sleep quality, provides a global sleep quality score across seven components of sleep quality (range 0-21). Higher global PSQI sleep quality scores indicate poorer sleep quality. Smith and Wegener's (2003) review of sleep measures, acknowledged the PSQI as a widely used tool that measures multiple dimensions sleep quality. Mollayeva et al. (2016) conducted a systematic review and meta-analysis of the PSQI as a screening tool for sleep dysfunction and reported that it had strong reliability and validity, and moderate structural validity.

6.3.3.2. Measures of health consequences

The health consequences considered included lower levels of physical activity, symptoms of anxiety, symptoms of depression, falls, hospital readmissions, social isolation, and health related quality of life, and were measured at each time point. Physical activity was measured using the PhoneFITT instrument and broken down into household and recreational activity subscales (Gill, Jones, Zou, & Speechley, 2008). Symptoms of depression were measured using the Short Geriatric Depression Scale (GDS-SF; Yesavage & Sheikh, 1986). Symptoms of anxiety were measured using the Geriatric Anxiety Inventory (GAI; Pachana et al., 2007). Social isolation was measured using the Friendship Scale (FSS; Hawthorne, 2006). Health-related quality of life was measured using the EuroQol-5 Dimensions-5 Levels (EQ-5D-5L; Herdman et al., 2011). The psychometrics of individual instruments included in this study have been previously published (see Lalor et al., 2015). Additional background data including age, gender, height and weight, length of hospital stay, history of falls, chronic illnesses, medications, continence, alcohol-intake, smoking status, caffeine consumption, marital status, education, culturally and linguistically diverse (CALD) background, and financial management were provided by each participant during their hospital admission. Data regarding falls and hospital readmissions subsequent

to hospitalisation were collected at three and six month follow-ups.

6.3.4. Statistical analysis

Data from all participants were summarised and calculated for three- and six-months post-hospitalisation in relation to their sleep quality during hospital. For all statistical analyses, a *p*-value of <0.05 was considered to indicate statistical significance. Statistical analyses were conducted using STATA® Version 13.1 (StataCorp., 2013).

Linear regression analyses were used to explore whether reporting low sleep quality during hospitalisation was predictive of later health outcomes being investigated. The primary author constructed separate models for outcome data measured at 3 months, from that measured at 6 months post-discharge. A baseline, within hospital score, was included as a covariate in these models for all but two health outcomes creating an ANCOVA-style analysis approach. The outcomes of hospital readmission and falls post-discharge were not considered in this approach, as there was no comparable “baseline score” that could be used.

6.4. Results

The flow of participants throughout the study from assessment of eligibility to take part in the study through to six-month follow-up post-discharge is presented (Figure 6.1). Eligibility for inclusion in the study initially assessed 2466 hospitalised older adults. Following cognitive screening and obtaining consent, 311 older adults completed the study at baseline during their hospitalisation. Of these, 241 completed the three-month follow-up, and 218 completed the six-month follow-up.

Table 6.1 outlines participant demographic and background characteristics, global assessment scores, and other variables of the total sample (n=311; mean age 78.4 years ± 7.7; 58% female). Participant retention at three months was 77.5% (n=241; mean age 77.7 years ± 7.5; 56% female) and 70.1% at six months (n=218;

mean age 78.0 ± 7.4; 58% female). Over the six-month period of follow-up, participant characteristics and summary scores remained relatively constant. Participants were more likely to remain involved at the six month follow-up if they had higher cognitive skills, lower symptoms of depression or anxiety, incontinence, and were taking less than six different medications.

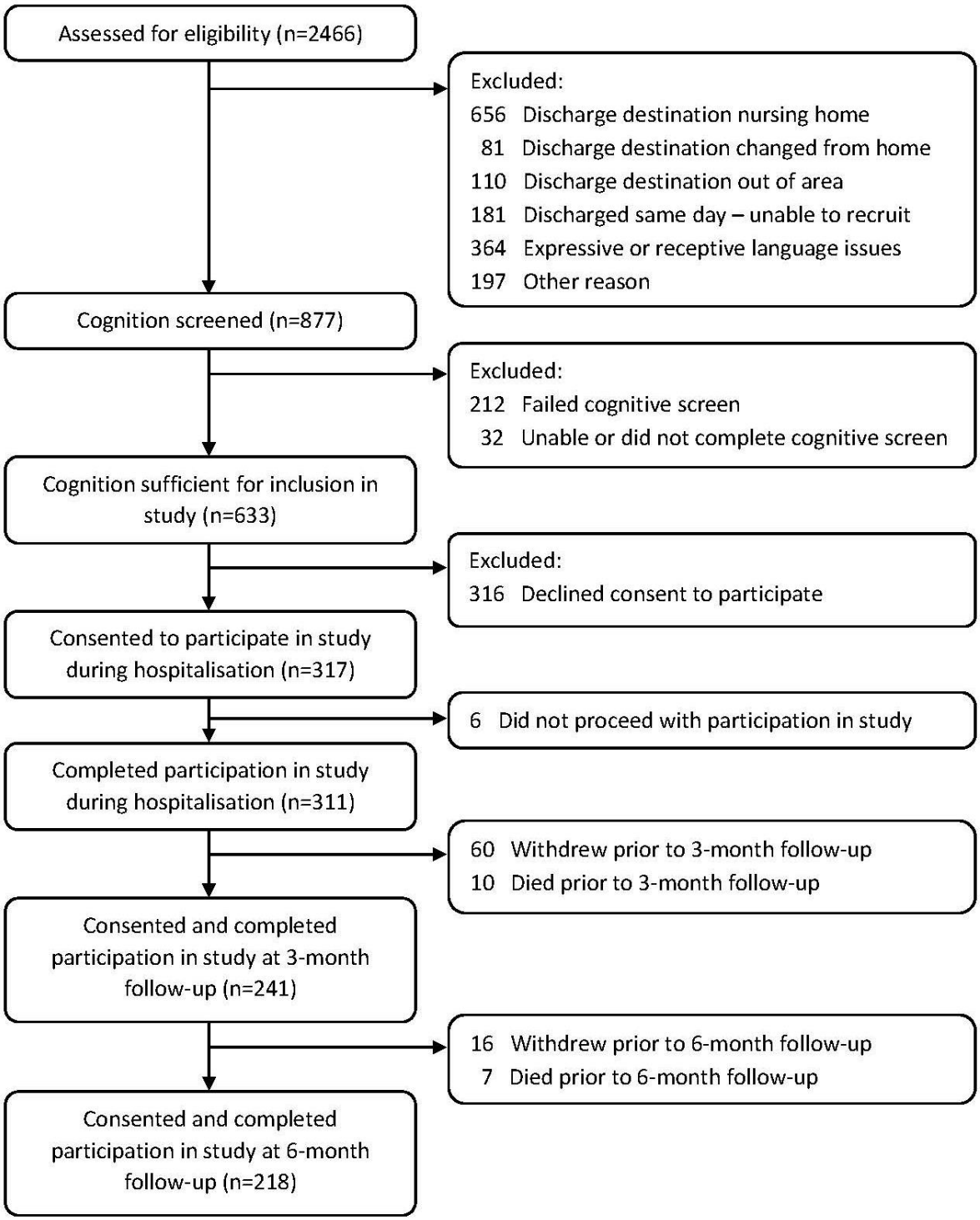

Figure 6.1. Flowchart of participant involvement within the study.

Table 6.1.

Participant demographic and background data.

Variable	Total baseline sample (n=311)		3-months post-hospital (n=241)		6-months post-hospital (n=218)	
	n[a]	Mean (SD) or n (%)	n[a]	Mean (SD) or n (%)	n[a]	Mean (SD) or n (%)
Age (years; range 65-97 years)		78.4 (7.7)		77.7 (7.5)		78.0 (7.4)
Gender (female)		180 (57.9%)		136 (56.4%)		126 (57.8%)
Married/defacto		112 (36.0%)		87 (36.1%)		78 (35.8%)
CALD[b]		75 (24.1%)		54 (22.4%)		48 (22.0%)
Non-smoker	295	284 (96.3%)	239	221 (92.5%)	217	199 (91.2%)
Non-alcohol drinker	295	168 (54.0%)	239	159 (66.5%)	217	132 (60.8%)
Caffeine-drinker	295	280 (94.9%)	239	224 (93.7%)	217	206 (94.9%)
Years of education		11.1 (2.2)		11.3 (2.0)		11.3 (2.0)
Years lived at home address		23.9 (18.4)		23.6 (18.3)		23.6 (18.7)
Lives alone	306	152 (49.7%)	239	114 (47.7%)	217	104 (47.9%)
Days in hospital		38 (22.5)		37.1 (19.8)		36.7 (19.3)
No. of medications	287	9.8 (4.2)	239	8.6 (4.5)	217	7.9 (4.4)
Polypharmacy (6+ medications)	287	243 (84.7%)	239	175 (73.2%)	217	149 (68.7%)
Taking sleep medications	287	49 (17.1%)	239	26 (10.9%)	217	29 (13.4%)
Average sleep medications		1.1		1.2		1.1
Average BMI[c]		26.8 (7.4)		26.9 (7.2)		27.1 (7.4)
Chronic Illness history						
Cancer	297	93 (31.4%)	240	68 (28.3%)	217	58 (26.7%)
Stroke[d]	298	57 (19.3%)	240	44 (18.3%)	217	40 (18.4%)
Other neurological disorder[e]	297	29 (9.8%)	240	28 (11.7%)	217	23 (10.6%)
Heart disease (i.e., CHF[f])	297	104 (35.1%)	239	83 (34.7%)	216	73 (33.8%)
Osteoporosis & osteopenia	297	65 (22.0%)	239	54 (22.6%)	216	47 (21.8%)
Arthritis	297	166 (56.1%)	240	135 (56.3%)	217	125 (57.6%)
Diabetes	297	78 (26.4%)	239	61 (25.5%)	216	56 (25.9%)
COAD[g]/Chronic lung disease	297	43 (14.5%)	240	31 (12.9%)	217	30 (13.8%)
Kidney disease	298	35 (11.8%)	237	26 (11.0%)	214	22 (10.3%)
Incontinence	297	80 (27.1%)	237	64 (27.0%)	214	62 (29.0%)
How they manage financially						
Impossible		5 (1.6%)		4 (1.7%)		3 (1.4%)
Difficult all the time		26 (8.4%)		20 (8.3%)		19 (8.7%)
Difficult some of the time		44 (14.1%)		35 (14.5%)		35 (16.1%)
Not too bad		139 (44.7%)		108 (44.8%)		93 (42.7%)
Easy		97 (31.2%)		74 (30.7%)		68 (31.2%)
Sleep Quality (PSQI[h])	274	7.9 (4.4)	236	7.1 (4.1)	213	7.1 (4.2)

Note. [a]Unless otherwise indicated n=311 during hospital, n=241 three-months post-hospital, and n=218 six-months post-hospital; [b]=Culturally and Linguistically Diverse background; [c]=Body Mass Index; [d]=Stroke includes transient ischaemic attack, mini-stroke and aneurysm; [e]=Other neurological disorder not including stroke (i.e., Parkinson's disease); [f]=Congestive Heart Failure; [g]=Chronic Obstructive Airways Disease; [h]=Pittsburgh Sleep Quality Index.

Table 6.2 presents the predictive association between low levels of reported sleep quality during hospitalisation and subsequent health outcomes. Only symptoms of anxiety at three months post-discharge were significantly associated with subjective sleep quality during hospitalisation, for older adults (n=220; coefficient=0.134 (95% CI), *p*=.040).

Table 6.2.

Univariate regression analyses: Association between subjective sleep quality during hospital and outcomes at three- and six-month time points post-hospital

			95% Confidence Interval		
Variable	**n**	**Coefficient**	**Lower**	**Upper**	***p* value**
Three-month outcomes					
Hospital readmission	230	.002	-.012	.016	0.749
Falls	227	-.001	-.015	.013	0.884
Depression symptoms	221	.030	-.060	.121	0.514
Anxiety symptoms	220	.134	.006	.262	0.040
Quality of Life	219	.919	-.225	2.063	0.115
Household activity participation	220	.105	-.344	.554	0.646
Recreational activity participation	220	.114	-.475	.703	0.704
Social isolation	220	-.113	-.257	.030	0.121
Six-month outcomes					
Hospital readmission	222	.008	-.007	.02	0.307
Falls	218	-.009	-.025	.006	0.239
Depression symptoms	201	.061	-.036	.157	0.217
Anxiety symptoms	200	.114	-.016	.245	0.085
Quality of Life	200	.903	-.197	2.004	0.107
Household activity participation	200	.011	-.464	.486	0.964
Recreational activity participation	200	.088	-.511	.687	0.773
Social isolation	200	-.057	-.205	.090	0.442

Table 6.3.

Association between subjective sleep quality during hospital and change scores between outcomes at three- or six-month time points post-hospital

			95% Confidence Interval		
Variable	**n**	**Coefficient**	**Lower**	**Upper**	***p* value**
Change between discharge and three-months post-hospital					
Depression symptoms	221	-.006	-.093	.081	0.895
Anxiety symptoms	220	.003	-.109	.116	0.955
Quality of Life	219	-.034	-.806	.737	0.930
Household activity participation	220	.101	-.349	.551	0.658
Recreational activity participation	220	-.006	-.515	.503	0.982
Social isolation	220	-.087	-.223	.049	0.211
Change between discharge and six-months post-hospital					
Depression symptoms	201	.027	-.064	.117	0.564
Anxiety symptoms	200	-.015	-.119	.089	0.775
Quality of Life	200	.014	-.701	.730	0.968
Household activity participation	200	.027	-.446	.501	0.910
Recreational activity participation	200	-.016	-.509	.477	0.949
Social isolation	200	-.040	-.183	.104	0.586

Table 6.3 outlines the association between subjective sleep quality during hospital for older adults and the change scores between health outcomes at three- and six-months post-hospitalisation. There were no associations between sleep quality during hospital, with change in health and wellbeing outcomes over the three- or six-months discharge periods.

6.5. Discussion

Poor sleep quality during a hospital admission for older adults was not a predictor of poorer health outcomes related to quality of life, symptoms of depression and/or anxiety, social isolation, or household or recreational activity participation at three- and six-months post-discharge. The investigative team, who had anticipated that previous research linking poor sleep quality to negative health outcomes would be replicated in the present investigation (Institute of Medicine (US) Committee on Sleep Medicine and Research, Colten, & Altevogt, 2006; Lichtenstein, 2015), did not expect this finding. The implications of this finding are less clear-cut however. It is possible that this study was underpowered to detect an effect size that may be of clinical importance for some outcomes. It is also possible that there were confounding factors at play, which may have obscured the nature of the relationship between sleep quality and the health and wellbeing outcomes measured. For example, people with a more stoic personality type may have been less inclined to report dissatisfaction with their sleep quality when using the Pittsburgh Sleep Quality Index, but then gone on to experience poor health outcomes. Furthermore, some authors suggest caution when interpreting the link between negative health outcomes as a result of poor sleep quality, particularly those linked to mortality (Bliwise & Scullin, 2015). Bliwise and Scullin (2015) highlight briefly the various differences in designs, methods, and analyses across various studies, and that initial conclusions may be premature.

Furthermore, older adults are a *'difficult'* population, in that, they experience a larger proportion of health issues than younger populations and are more likely to have unstable health in comparison. In the present study, most participants (93%) had one or more chronic illnesses, and a third (33%) had one or more health concerns requiring hospital re-admission within six months of discharge. This age group is also closer to the end stage of life. This was noted within the present study with nearly one in five participants (n=17) of the 93 that did not complete data collection through to six months who died during the follow-up period. It is possible that data from these participants, had it been collected, may have influenced the results of this study.

It is also possible that these results could be taken at face value, and that poor sleep quality while in hospital for older adults is not '*that bad*'. Such a finding would suggest that there may be little benefit in trying to improve the sleep quality of older adults during a hospital stay. However, such a conclusion should be treated with caution as the important question that needs to be answered is whether interventions to improve sleep quality in this population can do this and whether this in turn leads to improved health outcomes at later time points. Observational studies such as the present study are unable to address this question, merely generate hypotheses that later experimental studies are needed to confirm. Beyond this, poor sleep quality, in and of itself, can be distressing and be a justifiable target for intervention in its own right.

6.6. Limitations and future directions

Despite the large sample size, inclusion of multiple covariates and the prospective study design employed, the population recruited, being older adults, meant that withdrawals were to be expected. Participants included required an extended hospitalisation for eligibility, however this also may have contributed to

participants being more likely to experience poorer health post-hospitalisation and be unfit to continue with the study over the six-month follow up. It is possible with a similar population sampled (i.e., older adults who did not require a minimum two-week hospitalisation), that they may have better health outcomes enabling them to remain in the study. As a result, this may have altered the findings of this result with a greater proportion of participants retained. A comparable study conducted by Alessi et al. (2008) experienced poorer retention rates with a similar population, with an initial sample size of 245, however at six months follow-up had 125 participants remaining (51% retention rate).

Future research of community-dwelling older adults who experience poor sleep quality, not due to hospitalisation, would be beneficial to examine factors that contribute to their poor sleep and the associated health outcomes resulting from their poor sleep. This may assist with informing the present study results and determining if indeed hospitalisation is a factor that needs consideration in relation to sleep quality of older adults.

6.7. Chapter conclusion

This chapter presents a detailed outline of the final study of this doctoral research. This project was a prospective cohort study of older adults during and following hospitalisation regarding the impact poor sleep quality during hospital has on the health outcomes post-discharge for older adults. The chapter conclusion identifies that poor sleep quality during hospitalisation was not a predictor of poorer health outcomes of older adults at three and six-month post-hospitalisation.

The following chapter (Chapter 7) summarises the main findings of all the studies included in this doctoral research. The implications of these findings in relation to the sleep quality for older adults following extended hospitalisation are outlined with future clinical and research considerations.

CHAPTER 7
INTEGRATED FINDINGS, CONCLUSIONS & IMPLICATIONS

There is a time for many words,
and there is also a time for sleep.
(HOMER, "THE ODYSSEY BOOK XI")

CHAPTER 7 INTEGRATED FINDINGS, CONCLUSIONS & IMPLICATIONS

7.1. Context

This chapter summarises and integrates the key findings of each component of this doctoral research project outlined in Chapter 1. As outlined in Chapter 2, this doctoral research adopted a longitudinal cohort design, wherein there were retrospective and prospective data collection and methods of analysis. The research aim and research questions were investigated using predominantly quantitative methods. Data regarding sleep quality and additional factors that can contribute to, or be a result of, impaired sleep quality were collected across four time points and analysed.

Overall, this doctoral research identified that sleep quality during and following extended hospitalisation worsens compared to pre-hospital levels and does not return to pre-hospital levels even at the six-month follow-up mark. Older adults who are most likely to experience poor sleep quality during hospitalisation are likely to have pre-existing poor sleep quality prior to hospitalisation, symptoms of depression and/or anxiety, higher levels of education, a ‘conscientious’ type personality, and not have had a stroke. Older adults who are most likely to experience low levels of sleep quality post-hospital stay relative to their pre-hospital sleep quality are likely to have pre-existing poor sleep quality prior to hospitalisation, high levels of stoicism and fortitude regarding pain, and a bedtime post 8pm prior to their hospitalisation.

Despite the prevalence of impaired sleep quality, 80% of people who experience impaired sleep quality did not speak to any health professional about it. Similarly, there appears to be little initiation or discussion of this issue by health professionals when engaging with older adults, as recalled by older adults within this study. When impaired sleep was addressed, pharmacological approaches were more

commonly considered over evidence-based non-pharmacological approaches.

This doctoral research also found that there was not a relationship between sleep quality during hospital and a range of health and wellbeing outcomes post-hospitalisation.

7.2. Synthesis of study findings across chapters of this thesis

7.2.1. Factors associated with sleep quality

Theories of sleep presented in the introduction to this thesis, including is the *Restoration Theory of Sleep, Adaptive Theory of Sleep* (or *Evolutionary Theory of Sleep*; Webb, 1974), and the *Consolidation Theory of Sleep* (Ellenbogen, Hulbert, Stickgold, Dinges, & Thompson-Schill, 2006), acknowledge that sleep is essential for repair and restoration of the brain and body and consolidates information acquired during wakefulness, and without it, the functioning of the brain and body would gradually deteriorate. Furthermore, that humans, like many species, have adapted their sleep periods to occur when least hazardous and that cycling between activity and inactivity aids conservation of energy.

Previous research identified personal factors (i.e., pain, existing morbidities, mood) relating to routines, health status, and emotional response were impacted by the hospital processes and hospital environment, as well as the home environment (refer to systematic review in Chapter 1). A visual representation of the conceptualisation of these interactions was presented in Figure 1.9 (Chapter 1). Limited existing literature was available considering at least two time points of sleep quality for older adults (i.e., pre-hospital, during hospitalisation, and/or post-hospitalisation), however such literature indicated hospitalisation was detrimental to the sleep quality of older adults when compared to their pre-hospital sleep and suggested that sleep quality improves post-hospitalisation (Alessi et al., 2008; Arora et al., 2011; Bakken, Kim, Finset, & Lerdal, 2014; Bihari et al., 2012). Findings of the

current doctoral research are congruent with this previous literature, highlighting that sleep quality is more impaired during hospitalisation for older adults and does improve post-hospitalisation. However, the sleep quality of older adults may not revert to pre-hospitalisation levels. Previous literature identified personal factors (like 'conscientious' personality and higher education levels) to be contributors of *better* sleep quality of older adults (Huang, Peck, Mallya, Lupien, & Fiocco, 2016; Moore, Adler, Williams, & Jackson, 2002). These contradict the findings of this doctoral research where a 'conscientious' personality and higher education levels contributed to *poorer* sleep quality experienced by older adults. Differences between the study design, study location, and populations sampled, may partially account for the variation of the results derived in this thesis with results from previously published refereed literature. For example, Huang et al. (2016) conducted their study in a community-based environment (not hospital) when exploring personality traits and sleep quality for older adults, while Moore et al. (2002) also conducted their study in a community-based environment (not hospital) when exploring education levels and sleep for older adults. Potentially when a person is in an unfamiliar environment, like hospital, they may be more alert to what is occurring during their admission if they have a higher level of education, or conscientious people may not cope or may feel anxious, as they cannot control aspects of the hospital environment.

Poor sleep quality during a hospital admission for older adults was not a predictor of poorer health outcomes related to quality of life, symptoms of depression and/or anxiety, social isolation, or activity participation, post-hospitalisation. The results of this doctoral research indicated that a number of factors contributed to poor sleep quality for older adults. However, this research also revealed that the consequences were not as severe as had been anticipated. Therefore, this may impact the interpretation of suggestions highlighted from the findings of studies

outlined in Chapters 3 and 4.

7.2.2. Future need for intervention studies

Initial recommendations for future research were based on targeted intervention regarding factors contributing to the poor sleep quality of older adults who had been hospitalised. However, the case for future intervention studies is not quite as compelling given the low levels of consequence identified regarding poor sleep quality during hospitalisation indicate that it does not predict poor health outcomes post-hospitalisation. This does not mean that a randomised controlled trial of an intervention would be certain to fail. While the observational study did not find a relationship between sleep quality during hospitalisation and health outcomes for older adults, patients' outcomes could still be improved through intervention. Had the findings of this doctoral research determined that poor sleep quality for older adults during hospital was a predictor of health outcomes post-hospitalisation, the justification for a randomised controlled trial of an intervention focusing on factors that contribute to impaired sleep quality for older adults would be more compelling. That said, this research project acknowledges that numerous factors contribute to poor sleep quality and not all these factors were explored or controlled for in this study. Hence, further research could be undertaken to consider additional factors, including those relating to environmental factors like sound, noise, light, in the future to ascertain whether these impact sleep quality for older adults during and following extended hospitalisation.

This doctoral research has focused on a number of factors that may be associated with sleep quality of older adults. However, it is possible that there are factors that were not measured or adjusted for within the overall design and analysis that were important. However, it does not infer that older adults should have to live with poor sleep quality. Poor sleep quality could be a sufficient reason in and of itself

to justify intervention.

7.2.3. Enhanced conceptual model for understanding sleep quality during the hospital and home interface

This thesis provides insights to the multi-dimensional aspects affecting the sleep quality experienced by older adults, particularly when transitioning between environments over time. The research findings from this thesis can be amalgamated with the previously presented characterisation of the community-dwelling older adult's sleep quality that were impacted by hospitalisation (see Figure 1.10). This amalgamated conceptualisation has been presented in Figure 7.1 and identifies a broader recognition of the person's health status, in conjunction with their emotional response and background environment.

Occupational adaptation, as outlined in Chapter 1, is the "process through which the person and the occupational environment interact when the person is faced with an occupational challenge calling for an occupational response reflecting an experience of relative mastery" (Schkade & Schultz, 1992, p. 831).

Results from this doctoral research highlight the factors of the person (i.e., symptoms of anxiety/depression or level of stoicism) in conjunction with the habits and routines of the person (i.e., usual bedtime and associated routine) that can impact the sleep quality of an older adult. This varies further as the environment is altered (whether hospital or home). The visual conceptualisation of the results of this doctoral research, (integrated with the MOHO) is presented within Figure 7.1. This conceptual model provides the opportunity for health professionals, including occupational therapists, to understand better the interaction between the aspects of a person and their environment, when considering their occupation of sleep. The International Classification of Functioning, Disability and Health (ICF; World Health Organization [WHO], 2001) further enhances this understanding. Personal and

environmental factors influence participation with the activity of sleep. Each component and factor has multi-directional influences on each other. Again, the person, environment and occupation are interlinked and sleep outcomes are dependent on the balance between these elements. All these models and frameworks rely on a basic assumption to understand the complexity of human occupation, being that the human (person) is a dynamic system. Behaviour and engagement in occupations (i.e. sleeping) are dynamic and dependent on the context or environment (including physical, whether hospital or home, as well as sociocultural and temporal environments). Engagement in occupations continuously alter and change in order to make the most of opportunities provided, in addition to meeting the demands presented, within the context of that occupation. Occupational performance is therefore dynamic and reflects the underpinnings of Dynamic Systems Theory (Thelen & Smith, 2006).

7.3. Strengths and limitations

This study was commenced with some working assumptions regarding sleep and in particular, sleep for older adults. While it is acknowledged that there is an overwhelming weight of evidence as to the negative consequences of sleep deficiency, one of the assumptions of this study included the postulation that poor sleep (including sleep quality) is generally viewed as a ‘bad’ thing. This assumption was considered to be reasonable at the study outset given previous literature had identified that sleep problems do have negative consequences for older adults – although was considered less reasonable as the study progressed. This working assumption drove the investigating team to design the research so that data regarding causes and consequences were collected simultaneously. An alternative method could have considered if poor sleep quality in hospital impacted on health outcomes post-hospitalisation first, before proceeding with consideration of the

Figure 7.1. Conceptual model of sleep quality of older adults transitioning between hospital and home environments.

factors that were associated with poor sleep. Using this alternative method would have been a much more resource intensive approach to collect data to answer these research questions, as it would have required a two-step process and recruitment of twice the number of patients. Furthermore, poor sleep quality in and of itself is still an issue, which would still justify investigation of factors associated with it. Older adults report that they dislike experiencing poor sleep quality yet regard it as "to be expected as part of the process of 'normal' ageing" (Venn & Arber, 2012, p. 1218). Venn and Arber (2012) determined that older adults hold two perspectives on their sleep: 1) poor sleep is not seen as a health problem, while paradoxically good sleep is considered important for maintaining good health; and, 2) poor sleep is considered 'normal' and to be expected as part of ageing.

Other identified limitations of the project include the subjective measurement of sleep quality via the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Objective sleep measures are considered to be the 'gold standard' for sleep measurement by some (Smith & Wegener, 2003). For this research the PSQI was selected as being most appropriate as it allowed older adults who perceived their sleep as being impaired to report it as such. Previous literature has highlighted discrepancies between the objective and subjective measurement of sleep quality (Harvey, Stinson, Whitaker, Moskovitz, & Virk, 2008; Krystal, Edinger, Wohlgemuth, & Marsh, 2002). Therefore, it would be beneficial in future studies to include both subjective and objective measures of sleep. Despite the PSQI being the best available measure of the construct of sleep quality (Mollayeva et al., 2016; Smith & Wegener, 2003), the investigative team had some concerns regarding the content validity of the tool. The item asking whether the participant took sleep medication as a domain of sleep quality could be argued as being an unrelated construct.

The retention rate of participants over the six months was 70% (n=311 at baseline, n=241 at three-months post-hospital, and n=218 at six-months post-hospital). Some of the findings for this project, particularly in relation to the consequences of impaired sleep quality at three- and six-months post-hospitalisation, may have altered had there been a higher rate of retention. However, with an older cohort and participants who had experienced an extended hospitalisation, it was anticipated that there would be an increased risk of withdrawals. A comparable study (Martin et al., 2012) had a retention rate of 34% at their six-month follow-up (n=245 at baseline, n=84 at six-months), indicating our retention rate was relatively good.

Initially the aim for this research project was to recruit 50% male and 25% from CALD backgrounds. Potentially, the overall results may have been influenced given that 42% of participants recruited were male and 24% were from CALD backgrounds. It is likely that the 1% difference in CALD background would have minimal effect on the overall results. However, various evidence highlights gender differences in sleep for older adults, including increased sleep latency for women and decreased sleep efficiency for men (Luca et al., 2015; van den Berg et al., 2009). Therefore, the overall results may have been different had the project recruited 50% male and 50% female.

As recognised in the introduction, both worry and rumination have been well researched and demonstrate strong association with sleep disturbance (Harvey, 2002; Harvey, 2005; Pillai et al., 2014; Zoccola et al., 2009), however aspects of rumination and worry were not collected in this project, other than symptoms of depression or anxiety which tend to follow on from rumination and worry. Future research would benefit from inclusion and recognition of these indicators. Lastly, in-depth interviews were not undertaken to assist in better reflecting the client-centred ethos of the occupational therapy profession. Future research could consider in-

depth interviews to explore the qualitative methodology and experiences and perspectives of older adults regarding their sleep and help-seeking behaviour.

7.4. Implications and future directions

One key implication arising from this thesis is that health professionals may not be having the desired impact on the investigation of the sleep of older adults. Based on the recall of older adults within this research project, health professionals do not appear to be investigating sleep with enough commensurate to the proportion of older adults who are experiencing impaired sleep. The consideration of sleep, and in particular sleep quality, for older adults is of particular importance. As previously mentioned in this doctoral thesis, it is well acknowledged that the numbers and longevity, of the population aged 65 years and over, is increasing. Continued awareness of the factors contributing to impaired sleep and the evidence of the lack of consultations within this field, despite the prevalence of impaired sleep, provides an opportunity for health professionals (including occupational therapists). Health professionals could regularly consider the assessment of sleep in their review with older adults, and the implications for other health outcomes (not necessarily evident or measured in this thesis [i.e., depression, cardiovascular disease, cognitive decline, etc.]). If health professionals are investigating sleep, more possibly could be undertaken so that older adults are aware of this and able to recall these efforts.

At this point, we do not have sufficient evidence based on the findings of this doctoral research to generate clear recommendations for practice guidelines. More work needs to be undertaken to identify and develop interventions, and evaluate the effectiveness of such interventions, before we can determine that screening, based on the risk factors identified in this thesis, can be used to promote a cost effective model of care that improves sleep outcomes.

There is a need to provide training programs for health professionals to be

able to identify, and then manage, sleep disturbance of older adults. Such training would assist health professionals to recognise the implications impaired sleep has on the health and wellbeing of older adults and the benefit assessment and management can have. Recent sleep research conducted within Australia, when compared to previous sleep research in Australia, highlights an increase in prevalence of impaired sleep and daytime consequences across all age ranges, including older adults (Adams, Appleton, Taylor, McEvoy, & Antic, 2017). This report also highlighted the substantial economic and social costs that sleep problems can have, beyond that of the healthcare system (Adams, Appleton, Taylor, McEvoy, et al., 2017).

Effective and successful identification of interventions that improve sleep quality for older adults would be beneficial. There is potential for a review of the interventions that are currently implemented to assist with treatment of impaired sleep quality and the development of a systematic approach to address the treatment and management of sleep quality of older adults. A more extensive, sleep-specific research project could then be undertaken to trial the intervention. Identified interventions for sleep may be more successful, and potentially more likely to be implemented, if they have synergy with other geriatric concerns. For example, Drager et al. (2015) identified that the standard treatment for obstructive sleep apnoea (OSA), CPAP, promotes significant increase in weight. However, Mitchell et al. (2014) highlighted that intensive lifestyle interventions are effective in the treatment of severe OSA. Research is being conducted to determine the effectiveness of using CPAP to treat OSA in conjunction with lifestyle interventions to assist with weight loss. Similarly, if an intervention is identified that can improve sleep, but has a detrimental effect on balance, the intervention could be combined with a balance program to improve the health outcomes. Such synergies may also have additional

benefits beyond the primary intended benefit (i.e., exercise can assist with general health and wellbeing, in addition to assisting with balance and function).

Presently geriatric care has an episodic rather than a preventative focus. Geriatric care in the community is comprehensive and multi-factorial. However, when older adults attend hospital the care in an acute situation predominantly focuses on episodic care for one diagnosis and preparation for discharge. There is potential during the acute stage for more to be done for patients presenting with various issues and risk factors. For instance, a patient may have diabetes and be at risk of falls, in addition to poor sleep due to continence issues. All these factors are affecting their health and quality of life and could be factors that could be targeted comprehensively in order to reduce their need for future readmissions. At present, the primary focus is on addressing the one factor the patient is admitted for, providing treatment to enable discharge. Older adults however could benefit from a more comprehensive and preventative approach.

Further exploration of the role health professionals can have regarding sleep in everyday living and across a variety of environments would be additionally beneficial. Within the occupational therapy profession, there is a growing recognition of the importance of sleep as an occupation (i.e., through the Occupational Therapy Practice Framework-III, 2014), or at least as imperative for engagement in everyday occupations. Occupational therapists, in conjunction with other health professionals, have an opportunity to highlight the expertise they have in assisting people with their everyday occupations. Occupational therapists demonstrate sophisticated understanding of people in their everyday life, their environments, and their occupations. This role is emphasised within the older population. Older adults, post retirement, are less likely to have a structured routine predicated by work or education. Occupational therapists, in conjunction with other health professionals,

have the skills to enable the establishment of a meaningful and regular routine for day-to-day activities.

7.5. Thesis conclusion

This doctoral research project has highlighted that pre-hospital sleep quality is the singularly most important indicator of sleep quality experienced during and post-hospitalisation. Furthermore, sleep quality levels on average did not return to pre-hospital sleep quality level by three- or six-months post-hospitalisation. Evidently, impaired sleep is an issue for older adult's pre-admission, during admission, and at three- and six-months post-hospitalisation. Furthermore, it appears that the present approach to management of sleep quality for older adults is not systematic despite availability of evidence supporting non-pharmacological approaches to the management of impaired sleep. This research project has identified to some degree the older adults who are potentially at greater risk for impaired sleep quality. These include older adults who have symptoms of depression and/or anxiety, higher levels of education, a conscientious personality, not have had a stroke, have high levels of stoicism and fortitude regarding pain, and have a bedtime post 8pm prior to their hospitalisation.

Over 80% of older adults with impaired sleep quality are not discussing it with a health professional either during or following extended hospitalisation. This doctoral research has expanded the knowledge base of the sleep quality community-dwelling older adults experience pre-, during-, and post-hospitalisation. The studies presented within this doctoral research are of particular importance. They demonstrate the necessity for continued recognition and management of sleep quality for older adults, particularly those who are potentially at greater risk for impaired sleep quality. Older adults should not have to live with poor sleep quality and poor sleep quality could be a sufficient reason in and of itself to justify effective and successful intervention.

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Concept Paper

Anxiety and Depression during Transition from Hospital to Community in Older Adults: Concepts of a Study to Explain Late Age Onset Depression

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Abstract: The transition between extended hospitalization and discharge home to community-living contexts for older adults is a critical time period. This transition can have an impact on the health outcomes of older adults such as increasing the risk for health outcomes like falls, functional decline and depression and anxiety. The aim of this work is to identify and understand why older adults experience symptoms of depression and anxiety

post-discharge and what factors are associated with this. This is a mixed methods study of adults aged 65 years and over who experienced a period of hospitalization longer than two weeks and return to community-living post-discharge. Participants will complete a questionnaire at baseline and additional monthly follow-up questionnaires for six months. Anxiety and depression and their resulting behaviors are major public health concerns and are significant determinants of health and wellbeing among the ageing population. There is a critical need for research into the impact of an extended period of hospitalization on the health status of older adults post-discharge from hospital. This research will provide evidence that will inform interventions and services provided for older adults after they have been discharged home from hospital care.

Keywords: hospitalization; older adult; anxiety; depression; community-living; post-discharge; health; wellbeing; falls

1. Introduction

The transition between extended hospitalization and discharge to home for older adults is a critical period characterized by poor health outcomes, hospital re-admissions and gaps in healthcare service provision [1–4]. It is a period of change and adjustment for the patient, their carers and family, their social support network, and the health care system that provides services to them. This transition from hospital to community-living is important as individuals move from having their cares met for them to having to self-manage their health once home. The increased risk of functional decline and loss of independence are high and often permanent and are reflected in outcomes including increased falls, poor nutrition, functional decline, reduced activities of daily living (ADL) and depressed mood [3,5−8].

Management of these problems can be difficult. Screening for anxiety or depression is not routinely employed at discharge from hospital despite symptoms of anxiety and depression being common at this point. It is unknown whether these symptoms resolve, persist or worsen over the months that follow. Indications from disease-specific research such as diabetes, age-related comorbidities, and Parkinson's Disorder, suggest they are likely to persist and that these patients are not inclined to specifically seek mental health services to assist in their management [9–13]. Thus, anxiety and depression could be common mental health concerns that are not systematically being identified nor adequately managed despite a prolonged period of care for older adults within the health care system.

The aim of this current paper is to describe the concepts and design of a study aiming to:

- Assess the time-course of symptoms of anxiety and depression amongst older adults who have been discharged to the community following at least two weeks of hospitalization.
- Identify and understand inter-relationships between factors that may cause older adults to experience symptoms of anxiety and depression during the six months following an extended period of hospitalization.
- Develop a predictive index to identify older adults, at the point of hospital discharge, who are likely to experience clinically significant symptoms of anxiety or depression following discharge to the community.

2. Experimental Section

2.1. Study Design

This will be a mixed methods investigation comprised of an observational, prospective cohort study, and a qualitative investigation with thematic analysis from a phenomenological perspective.

2.2. Participants and Setting

Participants in the prospective cohort study will be adults aged 65 years and over who are transitioning home to community living following a period of extended hospitalization (two or more weeks). Study exclusion criteria will be cognitive impairment, discharge location to a residential aged care facility, length of stay in hospital of less than two weeks. Patients with cognitive impairment will be excluded due to the cognitive demands for completing the largely survey-based data collection approaches in this study. Cognitive ability will be determined by the investigator with the participant in person via completion of the 6-item Cognitive Impairment Test (6-CIT) [14]. Patients being discharged directly to a residential aged care facility will be excluded as they are returning to a care arrangement where many decisions regarding their health are determined by others on their behalf.

Participants will be recruited through Monash Health at the Kingston Rehabilitation Centre, Dandenong Hospital, and Casey Hospital, Melbourne, and Peninsula Health at the Golf Links Road Rehabilitation Centre, the Mornington Centre, and the Rosebud Rehabilitation Centre, Mornington Peninsula. These health services are suburban health networks in Victoria, Australia that provide tertiary level care to residents of that area.

Consecutive sampling of eligible patients from identified study wards will be employed until 300 participants have been recruited. In this study, the investigators seek to have 50% of the total sample being male and 25% identifying as being from culturally and linguistically diverse backgrounds. Use of quotas in this manner will ensure that sufficient data is available in the overall study sample so that if there are significant differences in outcomes between these sub-groupings they can be identified. There is evidence indicating that the incidence and response to mood disturbance is different between men and women, while people from culturally and linguistically diverse backgrounds have been found to encounter additional barriers in accessing health services which may affect their health outcomes following hospitalization.

Participants in the qualitative investigation will be drawn from the larger sample participating in the prospective cohort study. These participants will be purposively sampled on the basis of having experienced a "clinically significant" level of anxiety or depression symptoms during the six month period following their discharge from hospital.

2.3. Measurements

2.3.1. Prospective Cohort Study Measurements

The investigators decided to capture a broad range of potential predictor/criterion variables in this study (given the relatively small amount of quantitative information currently available) on factors found to be associated with mood disturbance, particularly late age onset depression. As a starting point, the

"Behavioral model depicting onset and maintenance of depression in late life" [15] was used to guide the selection of data-gathering tools (refer to Figure 1). This model proposes an explanation for the development of late age onset depression and anxiety and depicts various domains related to aging including: the interaction between longstanding vulnerabilities (e.g., genetic factors) and stressful events that are more likely in later life (e.g., spousal bereavement, loss of roles); in addition to biological factors (physical or cognitive) [15]. This interplay can limit both the capacity and the participation levels of an older adult and lead to reduced activities. Potential further compounding factors include self-critical cognitions, low rate of positive outcomes and mood disturbance (e.g., a depressed person may be overly critical of their engagement in an activity, feel they performed poorly, and this then leads them to further reduce their participation in activities they previously engaged in). Negative reinforcement can occur of this behavior as future attempts to engage in activities may be considered to result in failure and therefore a feedback loop of negative cognitions is established. This study will operationalize the three input domains and the negative feedback loop as the output feedback loop domain.

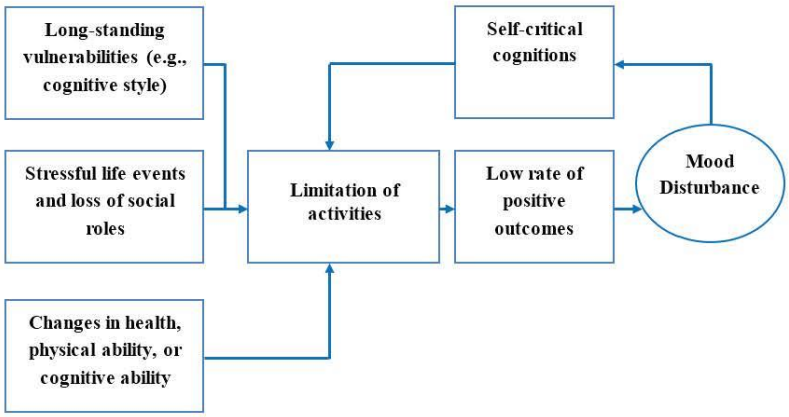

Figure 1. Behavioral model depicting onset and maintenance of depression in late life [15].

To measure these three input and one output domains, a suite of measures across a range of fields were pilot tested and subjected to review by a Project Reference Committee. Pilot testing of the initial baseline questionnaire was conducted with five non-hospitalized, community-dwelling older adults that are representative of our target population. Feedback we received from our consumers was that the survey was overly burdensome and that there were several items that appeared repetitious that could be removed and this led to modification of some measures. The Short Geriatric Depression Scale (GDS15) [16], Geriatric Anxiety Inventory (GAI) [17], EuroQol-5 Dimensions-5 Levels (EQ-5D-5L) [18], PhoneFITT [19], Epworth Sleepiness Scale (ESS) [20], Pittsburgh Sleep Quality Index (PSQI) [21], and the Death Anxiety Questionnaire (DAQ) [22], along with items relating to current falls and exercise program adherence were used to capture the output feedback loop domain. The Intrinsic Spirituality Scale (ISS) [23], DAQ, Pain Attitudes Questionnaire (Revised; PAQ-R) [24], Brief Resilient Coping Scale (BRCS) [25], and Ten-Item Personality Inventory (TIPI) [26] along with single item questions relating to demographic data, housing and financial situation, and medical history were used to capture the long-standing vulnerabilities domain. The Friendship Scale [27] and Lubben Social Network Scale

Abbreviated (LSNS-6) [28] along with single item questions relating to services received, caring or volunteering roles, computer use, transport options and stressful life events were used to capture the stressful life events and loss of social roles domain. The Controlled Oral Word Association Test—Semantic (category) version (COWAT-S) [29], Color Trails Test (CTT) [30], and Urogenital Distress Inventory (UDI-6) [31], along with single item questions relating to demographic data and health and wellbeing history were used to capture the changes in health, physical activity and cognitive ability domain. The variables and domains that are measured by the tools mentioned above are summarized in Table 1. This table also highlights at which time points during the study these measures are proposed to be utilized. The measures selected within each domain are now presented and highlight any modifications that were made as a result of the pilot and review process. Appendix Table A1 has also been provided summarizing the psychometric properties of the summarized measures.

Table 1. Summary of the key domains assessed via questionnaire in the study of older adults.

Domain	Questionnaire Data (Measurement Tool)	Measurement Points							
		R	B	1	2	3	4	5	6
Output feedback loop	Depression symptoms (GDS15, EQ-5D-5L)	X	X	X	X	X	X	X	X
	Anxiety symptoms (GAI, EQ-5D-5L)	X	X	X	X	X	X	X	X
	Physical capacity and participation (PhoneFITT)	X	X	X	X	X	X	X	X
	Quality of life (EQ-5D-5L)					X			X
	Falls		X	X	X	X	X	X	X
	Sleepiness and sleep quality (ESS, PSQI)	X	X			X			X
	Perception of death * (DAQ)		X						
	Exercise program		X			X			X
Long-standing vulnerabilities	Gender		X						
	Culturally and Linguistically Diverse (CALD)		X						
	Marital status		X						
	Housing situation		X						
	Financial situation		X						
	Primary occupation		X						
	Education level		X						
	Existing chronic conditions *		X						
	Religiosity/spirituality (ISS)		X						
	Perception of death * (DAQ)		X						
	Pain and stoicism (PAQ-R)		X						
	Resilience and coping style (BRCS)		X						
	Personality (TIPI)		X						
Stressful life events and loss of social roles	Services received		X						
	Social isolation (LSNS-6, Friendship Scale)		X			X			X
	Computer use		X			X			X
	Driving/transport		X			X			X
	Carer/volunteering		X						
	Stressful life events		X			X			X

Table 1. *Cont.*

Domain	Questionnaire Data (Measurement Tool)	Measurement Points							
		R	B	1	2	3	4	5	6
Changes in health, physical ability, or cognitive ability	Cognition (COWAT-S, CTT)		X			X			X
	Vision and visual aids		X						
	BMI		X						
	Falls history	X							
	Physical capacity and participation * (PhoneFITT)	X	X	X	X	X	X	X	X
	Continence (UDI-6)		X			X			X
	Reason for hospital admission		X						
	Existing chronic conditions *		X						
	Nutrition		X						
	Caffeine intake		X			X			X
	Alcohol intake		X			X			X
	Smoking intake		X			X			X
	Health professional consultations		X			X			X
	Medication		X			X			X

Note: * denotes questionnaire data relevant to two or more domains; B: Baseline questionnaire; R: Retrospective questionnaire; 1: 1 month questionnaire; 2: 2 month questionnaire; 3: 3 month questionnaire; 4: 4 month questionnaire; 5: 5 month questionnaire; 6: 6 month questionnaire; GDS15: Short Geriatric Depression Scale; EQ-5D-5L: EuroQol-5 Dimensions-5 Levels; GAI: Geriatric Anxiety Inventory; ISS: Intrinsic Spirituality Scale; DAQ: Death Anxiety Questionnaire; PAQ-R: Pain Attitudes Questionnaire (Revised); BRCS: Brief Resilient Coping Scale; TIPI: Ten-Item Personality Inventory; LSNS-6: Lubben Social Network Scale Abbreviated; COWAT-S: Controlled Oral Word Association Test—Semantic (category) version; CTT: Color Trails Test; UDI-6: Urogenital Distress Inventory; ESS: Epworth Sleepiness Scale; PSQI: Pittsburgh Sleep Quality Index.

2.3.2. Initial Cognitive Screen

An initial cognitive screen is proposed prior to participants being recruited for the study in order to ensure sufficient cognitive ability to partake in the study over the six months. The 6-CIT [14], also known as the Short Orientation-Memory-Concentration Test, is a brief cognitive test used in primary care and involves three orientation items.

2.3.3. Output Feedback Loop Domain

This domain contains several different measures that address aspects of a person's health and activities that form part of a negative feedback loop thought to culminate in mood disturbance. Previous authors proposed that both the "lack of opportunity for positive outcomes and the aversive experience of self-critical cognitions may intensify and maintain a depressive state" [15]. In addition the investigators hypothesize that falls, sleep disturbance, and loss of physical capacity are additional compounding factors that will be important factors within this feedback loop for older adults. Symptoms of depression will be measured using the GDS15. The GDS15 [16] is a shortened version of the original 30 item Geriatric Depression Scale (GDS). The GDS was created for use in geriatrics as its items were based on characteristics of depression in the elderly [32]. The GDS15 is a 15 item yes/no questionnaire

devised to detect depression in later life, specifically within the older population (65 years and over). To determine clinically significant symptoms of depression, a cut-off of six or more was used, in accordance with recommendations by the original authors [16,33]. Symptoms of anxiety will be measured using the GAI. The GAI is a 20-item agree/disagree questionnaire that was developed as a simple instrument to allow measurement of anxiety symptom severity in older adults in varied settings [17]. While a score of eight correctly identified 78% of patients with any anxiety disorder in a group of older adults with psychiatric disorders, a cut-off score of nine or greater was used to determine clinically significant symptoms of anxiety, as per original author suggestion [17]. The EQ-5D-5L is a 5-item measure that will assess depression and anxiety symptoms and quality of life in the Output Feedback Loop.

Physical capacity and participation will be assessed with the Phone-FITT. This measure is a brief physical activity interview for use with older adults [19]. It was designed to measure dimensions of physical activity including: Frequency, Intensity, Time and Type (FITT) as identified as the most familiar dimensions required in the context of aerobic endurance training by the American College of Sports Medicine [34]. Activities included are those prevalent among older Canadians (where the scale was developed) and those that have demonstrated importance in falls prevention (e.g., balance and strengthening exercises) [19].

A participant's perception of death will be assessed via the DAQ within this study. The DAQ is a 15-item, three point scale ("not at all", "somewhat", "very much") reported to assess the specific fears that individuals may have when thinking about death or dying [22]. The 15-items are classified across five factors: fear of the unknown; fear of suffering; fear of loneliness; fear of personal extinction; and, unclassified. Items were removed from the DAQ on the judgment of investigators as they were deemed as being least relevant to the overall study aims and in an attempt to reduce overall respondent burden. Daytime sleepiness and overall sleep quality will be assessed in this domain via the ESS and PSQI. The ESS is an 8-item subjective measure of daytime sleepiness [20,35]. Using a 4-point Likert scale (0 = "No chance" to 3 = "High chance of dozing") respondents rate their likelihood of falling asleep or dozing during eight common situations in life (e.g., sitting and reading). A score greater than 10 (out of a possible 0–24) is considered clinically significant in relation to daytime sleepiness [20]. The PSQI is a 19-item measure of retrospective sleep quality and disturbances relating to the individual's recollection of night-time sleep quality over the past month [21,36]. The PSQI yields scores across 7 equally weighted component domains including: (1) Subjective Sleep Quality; (2) Sleep Latency (time it takes to fall asleep); (3) Sleep Duration; (4) Habitual Sleep Efficiency (ratio of total sleep time to time in bed); (5) Sleep Disturbances; (6) Use of Sleep-Promoting Medication (prescribed or over-the-counter); and, (7) Daytime Dysfunction. The PSQI uses a combination of open-ended questions and a 4-point Likert scale (0 = "Not during the last month" to 3 = "Three or more times a week" in relation to problem frequency; or 0 = "Very good" to 3 = "Very bad" in relation to overall sleep quality). Overall points are summed (range 0 to 21) where a higher overall score (Global Score) indicates poorer sleep quality. Component scores range from 0 to 3 and are summed to obtain the Global Score. A cut-off score of >5 was empirically derived and distinguishes poor sleepers from good sleepers [21].

Falls in the study will be assessed through subjective recall over the past month. Participants are provided with the World Health Organization definition of a fall. Evidence from a systematic review of falls methodology has shown that there is no "gold standard" for documenting falls, however, if

retrospectively collected it is recommended that details are ascertained at least once a month (as is proposed in the present study) to reduce limitation of recall bias [36].

2.3.4. Long-Standing Vulnerabilities Domain

This domain reflects background traits and experiences that are thought to predispose, or protect against, older adults from developing late age onset depression. Potential indicators of long-standing vulnerabilities included in the initial baseline questionnaire for this study consist of information regarding the person's home environment (e.g., natural lighting); socioeconomic status (e.g., financial, education and housing situation); existing chronic conditions; religiosity or spirituality; perception of death (using the DAQ previously mentioned); pain and stoicism; resilience and coping style; personality; additional demographic items (e.g., gender, marital status); and a participant's Culturally and Linguistically Diverse (CALD) status. Previous research has demonstrated that people from CALD backgrounds are likely to have experienced, and attempting to recover from, loss, grief, torture, trauma, and the obstacles of resettlement [37,38]. Additionally, they may lack access to mental health services due to stigma, language difficulties, or unfamiliarity with the health system of Australia, thereby placing greater demands on them to cope with limited appropriate support regarding their mental health. Participants in this study will be classified as being from a CALD background if they answer "Yes" to two of the three following questions: (1) Were you born in a country other than Australia? (2) Do you speak a main language other than English at home? (3) Do you identify with a specific cultural group (other than Australian) or as an Indigenous Australian or Maori?

A participant's religiosity or spirituality will be assessed via the ISS, which is a 6 item measure designed to assess the degree to which an individual's spirituality functions as a "master motive" beyond a religious framework [23]. During piloting of items, only two of the six items in the ISS were considered to have face validity while the other four items were ambiguous. Therefore, only these two items have been included in the study questionnaire. Additionally, the PAQ-R will be included to measure pain and stoicism. The PAQ-R is a 24 item, 5-point rating scale (1 = "Strongly disagree" to 5 = "Strongly agree") of the attitudes of stoicism and cautiousness individuals may have towards perception and reporting of pain symptoms [24,39]. Within the proposed measure (PAQ-R) five of the possible 24 items, relating to the Stoic-Fortitude sub-scale, were identified as being appropriate for inclusion in order to reduce respondent burden.

Resilience refers to the "dynamic process that results in adaptation in the context of significant adversity" [40] (p. 60). The BRCS is a 4-item measure that uses a 5-point rating (1 = "Does not describe me at all" to 5 = "Describes me very well") designed to measure an individual's tendencies to cope with stress in a highly adaptive manner (an individual's competence of daily skills to meet everyday living demands) [25]. Lastly, personality will be briefly assessed via the TIPI. This measure is a 10 item personality scale utilizing a 7-point Likert scale (1 = "Disagree strongly" and 7 = "Agree strongly") [26]. The TIPI includes the identified "*Big Five*" dimensions of personality: "extraverted", "agreeable, warm", "conscientious", "emotionally stable", and "open to new experiences". The TIPI was developed for use in research screening where personality is not the primary topic of interest (as is the case for this project) and where brevity is required to reduce respondent burden [26].

2.3.5. Stressful Life Events and Loss of Social Roles Domain

This domain reflects events, largely external, that may impact on an older adult's propensity to develop late age onset depression; some may be sudden (e.g., loss of partner), while other events may take place over an extended period (e.g., loss of social role). This domain will be assessed via the LSNS-6 and Friendship Scale in addition to various social role factors. The LSNS-6 is an abbreviated version of the Lubben Social Network Scale (LSNS) to lessen respondent burden, and was produced to screen for social isolation [28]. The LSNS was specifically developed for use among older adult populations [28]. It uses a two factor structure (family and friends) to measure perceived social support from family (three items) and friends (three items) [41]. The LSNS-6 uses a six-point scale of the number of family or friends within the past month that the person reports seeing or hearing from in relation to the item asked (0 = "none" through to 5 = "nine or more"). The Friendship Scale is a short 6-item scale with a 5-point scale ("Almost always" to "Not at all") devised to assess social isolation in older adults [27]. Each item is scored 0–4 with a possible range of 0–24 overall. Scores between 0 and 15 indicate low friendship acuity, 16 and 18 moderate friendship acuity, and 19 and 24 high friendship acuity [27]. Four items were removed from the LSNS-6 for inclusion within this study as they overlapped with the Friendship Scale.

2.3.6. Changes in Health, Physical Ability, or Cognitive Ability Domain

This domain reflects changes to the internal health and capacity of the older adult to function. Cognition will be assessed via the COWAT-S and the CTT, and continence via the UDI-6. Additional items will assess a participant's Body Mass Index (BMI); reason for hospital admission and existing chronic conditions; intake of caffeine, alcohol, and/or tobacco; their connection with a regular general practitioner (GP); and consultations within the past month with their GP or other health professional. The COWAT-S is a category fluency task to assess executive functioning, semantic knowledge and memory retrieval ability [29]. Category fluency tasks require an individual to name as many animals (or supermarket items or similar) as possible within one minute from memory. The number of category items reported, repeated words and words not pertaining to the category are all recorded. Category fluency is believed to be appropriate for use with individuals across various backgrounds to allow for demographic correction relating to age, education and ethnicity. Norms for the COWAT-S have been developed to adequately address ethnicity, education and age [29]. The CTT consists of two timed trail tests where individuals are required to connect circles numbered 1 through to 25 in sequence with a pencil as fast as possible [30]. For the CTT 1 trail, the respondent has one set of numbers to connect (1–25). For the CTT 2 trail, the respondent is presented with duplicate colored numbers within the range (1–25). Participants are required to rapidly connect these in sequence, while alternating between pink and yellow colored circles. Both trail tests assess visual scanning, graphomotor skills, sustained visual attention and allow the assessor to also obtain information regarding eye-hand coordination speed and information processing speed as the respondent completes the trails [30]. To reduce cultural and linguistic bias, the CTT uses no letters and can be administered verbally or non-verbally through demonstration [30,42]. However, participants do need to be able to recognize Arabic numerals (1 to 25) and distinguish colors pink and yellow [30,43]. The time to complete both trails is recorded in seconds with errors, near misses, and prompts also recorded.

The UDI-6 is a 6-item, 4-point measure designed to assess the symptom distress and life impact of urinary incontinence [31]. It was developed from the Urogenital Distress Inventory—Long Form which consists of 19 items [44]. Respondents are asked whether they currently experience, and how much they are bothered by (0 = not at all, 1 = slightly, 2 = moderately, 3 = greatly), various urinary incontinence issues (e.g., urinary leakage related to the feeling of urgency). For the present study, only three items of the UDI-6 (2, 3, and 4) have been included along with an additional item ("problems with your bowels, like constipation or diarrhea") which was determined following piloting of the items. During piloting respondents indicated that bowel issues, not just bladder concerns, impacted on their likelihood of leaving their home or socializing with family or friends.

Additional questions will be asked at the baseline assessment phrased about the patient's current condition and questions phrased about the patient's recollection of their pre-morbid condition. Table 1 outlines the time periods for each measure and additional questions across the eight time periods (e.g., R: Retrospective, B: Baseline, 1–6: 1 month to 6 months). For example, a current condition question: "If you were to try today, could you walk up and down stairs without a handrail or assistance from someone else?" for pre-morbid condition would be rephrased: "Prior to coming into hospital, if you were to try, could you walk up and down stairs without a handrail or assistance from someone else?"

2.3.7. Qualitative Measurements—Semi Structured Interview

At completion of the 6 month follow-up, the investigators will specifically target participants that exhibit clinically significant symptoms of depression and/or anxiety and invite them to participate in semi-structured interviews. The interviews will be aimed at eliciting their narrative account of how they experienced their transition from hospital, their time course of symptoms of depression and anxiety, their explanation as to why they feel they experienced these symptoms, and their account of any strategies they used to try and manage this problem. A list of the questions and description of techniques that will be used to facilitate the discussion can be viewed in the Appendix Box A1 and Appendix Table A2.

2.4. Procedure

Potential participants will be identified by screening of ward discharge planning lists on the targeted hospital wards. Discharge dates are tentatively set within 48 h of admission, however, need to be confirmed at least 24–72 h before the actual discharge date. Those appearing to meet the study inclusion criteria will be screened by project research personnel to confirm eligibility and then be approached for consent to participate. Those consenting will have the baseline assessment completed within 48 h to the time of discharge, of the planned discharge date. The baseline assessment will include measurements as previously outlined.

Once the participant has been discharged from hospital, they will be asked to undertake a telephone interview follow-up asking about a subset of domains for the 1, 2, 4, and 5 month assessments. These domains were selected to be examined as they were either the primary study outcomes which the investigators are trying to describe the time-course to address research aim 1, or they were central to the limitation of activities model for explaining development of mood disturbance in this population. The follow-up assessments being undertaken at 3 and 6 months post-discharge will be undertaken using a face-to-face interview approach. Accredited language interpreters will be used in both studies when required.

2.5. Analysis

2.5.1. Aim 1. Time Course Symptomology

The mean and standard deviation in GDS15 and GAI scores will be plotted over the 6 month transition period. The influence of time since discharge on GDS15 and GAI scores will be examined using a multi-level generalized linear model with assessment nested within participant in the random effects part of the model, while time since discharge will be treated as a fixed factor. Data will also be visually inspected to determine if there are common patterns within the time-course in levels of these symptoms. A random sample of 50 participants will be selected to identify these patterns that will characterize the time-course of symptomology (e.g., participants who experience a short spike in symptoms of depression which then resolves). The remainder of the sample will be used to estimate the proportion of participants that fit into each of these categories. Binomial 95% confidence intervals will be used to represent the uncertainty in these estimates. Two assessors will classify each participant's time course pattern and the agreement between these assessors will be examined using Cohen's Kappa.

2.5.2. Aim 2. Factors That Increase Symptoms of Anxiety or Depression

A mixed methods analysis approach will be used to address this aim. A thematic analysis of qualitative data captured at the six month assessments will first be used to identify the factors participants' identified as causing their symptoms of anxiety or depression to increase. The interaction and effect modification that may exist between these individual factors will also be a point of focus for the analysis such that a model that explains the worsening of symptoms of depression and anxiety can be developed. This will be our preliminary explanatory model. The credibility and neutrality of this model will be examined by testing the explanatory power of this model using the quantitative dataset. It is anticipated that most, if not all, of the factors identified in the qualitative analysis will map onto domains being measured within our prospective cohort study dataset as the investigators used a leading model of development of late-age onset depression to guide the selection of these quantitative variables. The transferability of this model will be able to be tested using the quantitative data by examining whether the explanatory power of the model is consistent across male/female groupings and those from CALD/non-CALD backgrounds.

This quantitative dataset will be used to then test the preliminary explanatory model. Latent growth curve modelling will be used to examine the strength of associations between the factors included in our preliminary explanatory model and the study outcomes of depression measured using the GDS15, anxiety measured using the GAI, and a combination of the two measured using the EQ-5D-5L anxiety/depression item. The model fit will be refined by removing factors that do not have a significant association within the model. Factors not included in the original preliminary explanatory model will be added as it is possible that patients may not be aware of factors that were important in the development of their symptoms (e.g., the unknown self). Those that have significant associations within the model will be retained culminating in our definitive model to explain development of symptoms of anxiety and/or depression in this population.

2.5.3. Aim 3: Predictive Index Development

Participants will be categorized as to the "pattern" of anxiety or depression they have exhibited based on analyses to address aim 1. The investigators anticipate that participants will fit into one of six categories as displayed in Figure 2. Additional categories may be developed as are emergent from the data. These categorizations will be used as dummy dependent variables in logistic regression models developed to predict membership of these categories based on information captured at the baseline assessment. Data from 150 randomly selected participants will be used to develop these predictive models while data from the remaining participant cohort will be used to test the accuracy of these models. Sensitivity, specificity, positive predictive value, negative predictive value, calibration, and the Youden Index will be used to describe the accuracy of these models [45].

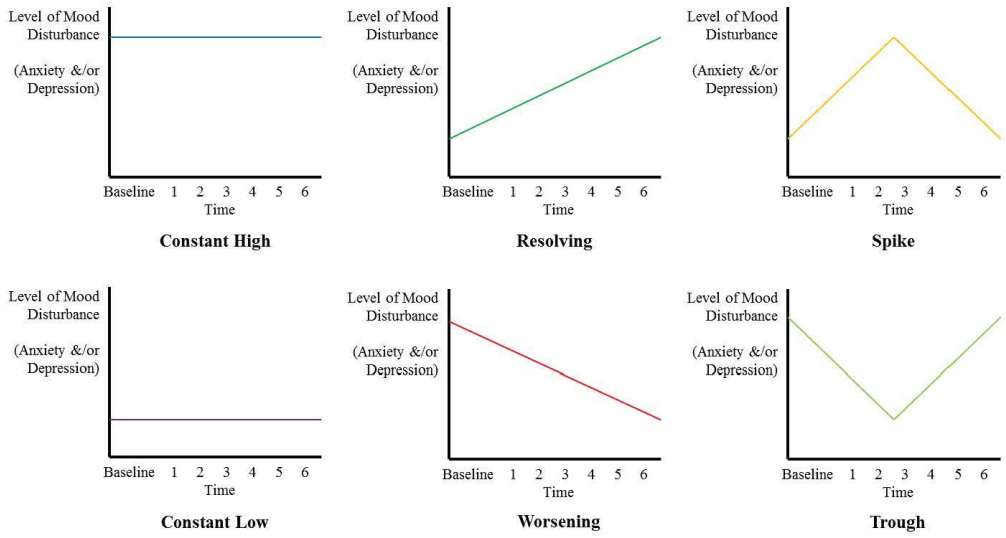

Figure 2. Anticipated "patterns" of anxiety or depression.

2.5.4. Sample Size

A sample size of 150 participants being analyzed in the development or the validation analyses of the predictive index will provide 80% power (assuming $\alpha = 0.05$) of identifying a sensitivity or specificity of 0.65 as being significantly more accurate than random chance (a sensitivity or specificity of 0.50) [46,47].

3. Discussion

This study will be the first to prospectively investigate the inter-relationships between factors that may cause older adults to experience symptoms of depression and anxiety during the six months following an extended period of hospitalization. Individual outcome data will be collected over the six

month time period to assist with assessment of the time-course of symptoms of anxiety and depression that older adults may experience post-discharge following at least two weeks of hospitalization.

The investigators anticipate that the development of a predictive index to identify older adults who are likely to experience clinically significant symptoms of anxiety or depression following discharge to the community will be of clinical importance. This will allow interventions to be targeted to those who need them most. Identification of factors that precipitate development of symptoms of depression or anxiety may also aid development of interventions targeted at these factors. This hopefully will also assist with reducing re-admissions to hospital, and impact on the functional outcomes of this patient group upon returning home. This study will also assist with understanding the explanatory power of the "Behavioral model depicting onset and maintenance of depression in late life" [15].

This study will provide important information regarding both causative mechanisms (such as social isolation, lack of resilience, and changes in sleep quality) and impacts of anxiety and depression amongst older adults [48−53]. It will enable health services to better address these issues and potentially break the vicious cycle represented in the Behavioral Model by the output feedback loop. Specifically, this study will identify patterns in symptoms of anxiety and depression and their relationship to physical capacity and falls which could be targets for intervention. It will enable early identification of those at risk of experiencing depression during the transition period, and will identify those unlikely to otherwise access mental health services to assist with management of their depressive symptoms. It will also permit exploration of how depression interacts with other geriatric conditions such as sleep problems and social isolation, while identifying opportunities for health care service delivery reform to enable more comprehensive management of the older adult who has recently had an extended period of hospitalization.

This study has several limitations that require acknowledgement. Firstly, due to the age of participants to be recruited and/or the length of time participants are to be engaged with the study, there is the potential for dropouts or participants to die. Participants are required to complete a baseline questionnaire prior to their discharge to community-living which takes approximately one hour to complete. Additional follow-up questionnaires will take between 10 and 30 min to complete depending on the month of follow-up. This time burden may affect initial recruitment and retention as well as potentially impact on recruitment for participants to take part in the qualitative semi-structured interview (whereby some potential participants may decline to participate in the second part of the study having completed the first six months of follow-up). Some tools included do not have research to establish whether they are able to detect change over each month or over a 3 month time frame.

Another limitation of this study was that the investigators made modifications to the content of previously developed and validated measures. This was necessary to minimize duplication and overall participant burden in completing the questionnaires as the investigators were concerned that a more burdensome survey would lead to greater participant attrition. [54,55] This means that analyses will be unable to use pre-existing summative scale scores in the analyses where scales have been modified. Instead, scores from individual items and/or factor analysis procedures will need to be used when building latent growth curve models.

One strength of this study lies in its prospective design with repeated measurement of constructs of interest. Information will be gained directly from participants rather than as a result of observations from a health professional allowing for participants to provide information from their own perspective. This is particularly important as participant-centered information can sometimes be lost in quantitative

research. Furthermore, the qualitative semi-structured interviews will drive the analysis of quantitative data. Future work that may emanate from this research should focus on development of interventions targeting factors found to precipitate symptoms of depression and/or anxiety in this population.

4. Conclusions

This study will provide important insights into the health and wellbeing of older adults while they transition to community-living following an extended period of hospitalization. This study will fill an important gap in our understanding of depression and anxiety symptoms and the associated comorbidities in this population. It will further provide a unique contribution to the existing research body of knowledge due to the unique prospective study design that incorporates both quantitative and qualitative data collection methods. This mixed methods design allows the patient reported experience of these issues to drive the quantitative data analysis, and be central to the overall study findings.

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Author Contributions

Terry P. Haines contributed to the overall project design, project management, development of the data collection approach, collection of qualitative data, development of the analysis plan, and critical review of the manuscript. Lauren Robins, Den-Ching Angel Lee, and Aislinn F. Lalor were involved in piloting, recruitment and quantitative and qualitative data collection. Aislinn F. Lalor also assisted with overall project management and drafted the first version of the manuscript. Daniel O'Connor, Grant Russell, Ted Brown, Rene Stolwyk, Fiona McDermott, and Christina Johnson all contributed to the project conception, development of the data collection approach, assisted in development of the analysis approach, and critical review of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Appendix

Table A1. Psychometric properties of proposed tools to be included.

Measure	Reliability/Validity	Sample Item
Short Geriatric Depression Scale (GDS15)	The GDS15 has a high level of internal consistency (Cronbach's $\alpha = 0.80$) [56] and strong sensitivity (81.3%) and specificity (78.4%) [57]. Additionally, the efficiency (fraction correctly identified) of the GDS15 is significantly higher than the GDS (77.6% *vs.* 71.2%, $Chi^2 = 24.8$, $p < 0.0001$) and the clinical utility of the GDS15 was rated as "good" for screening (UI—0.75) [57].	Individuals are asked to choose the best answer for how they have felt over the past week, e.g., "Are you basically satisfied with your life?"
Geriatric Anxiety Inventory (GAI)	The GAI has well established psychometric properties in various population groups within the older aged [58], with high test-retest reliability ($R = 0.91$) and inter-rater reliability ($R = 0.99$) [17] and demonstrated sensitivity (85.7%) and specificity (78.0%) [59].	Individuals are asked to choose the best answer for how they have felt over the past week, e.g., "I worry a lot of the time".
6-item Cognitive Inventory Test (6-CIT)	It takes less than 5 min to complete (mean 2.5 min) and has demonstrated high correlation ($R^2 = 0.911$) with the Mini-Mental State Examination [60–62]. Recent evidence has highlighted the advantages of using the 6-CIT over the MMSE in hospital settings [62]. It has also demonstrated good sensitivity and specificity of 78.57% and 100% (cut-off 7/8) for detecting mild dementia and when compared to the Mini-Mental State Examination (90% and 96%, respectively) [60,62]. It is recognized for being culturally unbiased and has further demonstrated not to be sensitive to educational level, nor require advanced language skills [62]. The 6-CIT has limited validation data available although stable reliability (*test-retest* immediate: *Pearson's* $r = 0.68$; *test-retest* delayed: *Pearson's* $r = 0.74$) has been reported [63].	Individuals are asked to "Count backwards from 20-1".
Phone-FITT	Preliminary evidence demonstrates substantial test-retest reliability (95% CI, intra-class correlation coefficients 0.74–0.88; Spearman's rho = 0.29–0.57), in addition to concurrent, convergent and discriminant validity [19].	Individuals are asked initially to answer Yes/No as to whether they completed an activity (e.g., Light housework such as tidying, dusting, laundry, or ironing). If the individual answers yes, they are then asked "How many times in the past week did you complete this activity?" Individuals are also asked "About how much time did you spend on each occasion completing this activity?"

Table A1. *Cont.*

Measure	Reliability/Validity	Sample Item
2.3.19. EuroQol-5 Dimensions-5 Levels (EQ-5D-5L)	The EQ-5D-5L was recently developed following revision of the EQ-5D-3L to improve sensitivity and reduce possible ceiling effects previously found in the EQ-5D-3L. [18] Recent research has supported the revised version for sensitivity [64].	Measures 5 dimensions of health including: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression across a five point scale (0 = "No problems" to 5 = "Extreme problems") [18].
Intrinsic Spirituality Scale (ISS)	The overall measure reports strong internal consistency (Cronbach's $\alpha = 0.96$), strong reliability (0.80), and strong construct validity ($r = 0.91$, $p < 0.001$) [23].	The ISS uses a ranking scale from 0 to 10 where 0 = "Plays absolutely no role" to 10 = "Is always the over-riding consideration". Individuals are asked to rank themselves in response to each item (e.g., "When I am faced with an important decision my spirituality…").
Death Anxiety Questionnaire (DAQ)	Initial research suggests discriminative validity of the items, construct and concurrent validity of the scale as a whole, and applicability over a broad age range ranging from 30 to 82 years [22]. Subsequent research has indicated excellent internal consistency (Cronbach's $\alpha = 0.90$) and strong factor structure [65].	Individuals are asked to respond either "not at all", "somewhat", or "very much" in relation to each item (e.g., "Do you worry about dying?")
Pain Attitudes Questionnaire (Revised) (PAQ-R)	Previous evidence suggests chronic pain sufferers attempt to preserve their self-esteem and maintain acceptance socially by exhibiting stoicism and reduce negative (expected or real) social consequences of disclosure [66,67].	Individuals are asked to select the best answer for them (e.g., "I do not see any good in complaining when I am in pain") [39].
Brief Resilient Coping Scale (BRCS)	Initial evidence exists relating to adequate reliability of the tool (Cronbach's $\alpha = 0.69$; test-retest correlation = 0.68–0.71, $p < 0.001$) and validity ($r = 0.37$, $p < 0.01$), given the brevity of the measure [25,67,68]. Preliminary evidence demonstrates that the BRCS is a reliable and valid measure of resilient coping in non-English speaking elderly populations [69].	Individuals are asked to select the extent to which they agree to each of the statements (e.g., "I tend to bounce back quickly after hard times").
Ten-Item Personality Inventory (TIPI)	Initial evidence reports adequate psychometric levels for the tool. [26]	Individuals are asked to rate how they perceive themselves across various personality traits (e.g., "I see myself as: extraverted/enthusiastic").
Lubben Social Network Scale Abbreviated (six items; LSNS-6)	The two factor (family and friends) structure was confirmed across three European community samples and loaded highly on each factor indicating strong construct validity. [70] The LSNS-6 has high levels of internal consistency (Cronbach's $\alpha = 0.83$) and correlations with criterion variables. [70]	Individuals are asked to rate, where 0 = None and 5 = Nine or more, "considering the people to whom you are related either by birth or marriage, how many relatives (including spouses, partners, children, *etc.*) do you see or hear from at least once a month?"

Table A1. *Cont.*

Measure	Reliability/Validity	Sample Item
Friendship Scale	Developed in Australia, the Friendship Scale comprises six of the seven identified dimensions that are believed to contribute to social isolation or social connectedness. [27] While the Friendship Scale has limited related publications at present, initial evidence suggest it has excellent internal structures (CFI = 0.99, RMSEA = 0.02), strong reliability (Cronbach's $\alpha = 0.83$), and concurrent discriminant validity suggesting sensitivity to known social isolation correlates. [27]	Individuals are asked to rate, on a 5-point scale from "Almost always" to "Not at all", over the past 4 weeks "It has been easy to relate to others"
Color Trails Test (CTT)	Research has been conducted comparing the utility of the CTT to three other tests for assessing executive functioning in older adults and was found to be the highest loading for the executive function domain (factor loading = 0.57). [71] Further evidence also suggests that the CTT is appropriate for cross-cultural and clinical assessment of mental processing speed, sequencing, and visual scanning in non-English-speaking adults and adults with limited education. [72]	N/A
Urogenital Distress Inventory (UDI-6)	Research has demonstrated that the UDI-6 has strong psychometric properties (Cronbach's $\alpha = 0.93$) and is considered more useful in clinical and research settings. [31] High internal consistency (Cronbach's $\alpha = 0.74$) and test-retest reliability (Spearman's rho = 0.99, $p<0.001$) was demonstrated with a sample of 302 Turkish speaking women with urinary issues. [73] Furthermore, while predominantly utilized with women, the UDI-6 has been used in studies with both males and females and identified high levels of distress relating to urinary issues in males that had not previously been detected. [74]	Individuals are asked whether they currently experience: "Urine leakage related to the feeling of urgency" (Yes or No).
Epworth Sleepiness Scale (ESS)	The ESS has high internal consistency (Cronbach's $\alpha = 0.88$) and test-retest reliability ($r = 0.82$) [20,35,74–76].	Individuals are asked to choose the most appropriate response, on a 4 point scale where 1 = would NEVER doze or sleep to 4 = HIGH chance of dozing or sleeping, for various situations (e.g., "Sitting and reading").

Table A1. *Cont.*

Measure	Reliability/Validity	Sample Item
Pittsburgh Sleep Quality Index (PSQI)	Initial development of the PSQI was conducted with patients with major depression and patients with a sleep disorder. [21] It has subsequently become a widely used, recognized and validated tool for assessing sleep quality with participants presenting with a variety of medical diagnoses. [77,78] More recently, the PSQI has been further validated for use with community-dwelling older men and older women. [79,80] Adequate internal consistency was reported for total PSQI scores (Cronbach's $\alpha = 0.69$). Previous research also demonstrated good internal consistency (Cronbach's $\alpha = 0.78$) for the PSQI in both black ($n = 306$) and white ($n = 2662$) community-dwelling women aged 70 years and over. [79] Adequate test-retest reliability (0.85), strong criterion validity, and responsiveness to have also been established for the PSQI. [21,81] The global score has a strong diagnostic sensitivity (89.6%) and specificity (86.5%). [82]	Individuals are asked to answer various items relating to their usual sleep habits during the past month. (e.g., "During the PAST month, what time have you usually gone to bed at night?")

Box A1. Qualitative Questions and Technique.

The second part of this study involves selected participants engaging in a qualitative semi-structured interview to relate their experiences of their transition home from extended hospitalization and the implications for their mental health and wellbeing. The purpose of the qualitative interviews is to capture the participant's narrative account of why they felt they experienced mood disturbance during their transition from hospital. The question set was developed following a meeting with the project reference group consisting of health practitioners, service providers and consumer advocacy group representatives. A semi-structured interview will be undertaken using the question set in Table A2 as a guide for each interview.

Table A2. Proposed question set for the qualitative semi-structured interviews at completion of the overall study.

Area/Construct	Potential Questions
Build rapport with the participant	1. How has your week been? 2. How are you feeling? 3. How do you feel about us doing this interview? 4. Did you have thoughts about what we are going to talk about today? Activity: Have "visual" graphic of their GDS15 and GAI results over the 6 month period to aid participant to visualize their change in symptoms of depression and anxiety

Table A2. *Cont.*

Area/Construct	Potential Questions
Establish participant's expectation for the interview	1. Looking back over the past 6 months are you at where you expected? 2. What is it that hasn't met your expectation(s)? 3. Did you even consider what you would expect? 4. Do you think you were prepared for what has happened over the past 6 months? 5. What were you not prepared for?
Narrative—establish the participants experience	1. Would you say you've had some tricky times?/Would you say you've had some up's and down's? 2. We've noticed that during the study you've ...(refer to visual graph of GDS15 over the 6 month period) Can you tell us about this...? * Was there something happening at that point of time for you? * Did you do something at that time to assist you with coping? * Was there a particular strategy that worked for you?
Functional Decline/Falls Experience of the participant and how this relates to their symptoms of depression or anxiety	1. How would you feel about asking your GP about this...*(and highlight whichever is relevant, i.e., falls, their functional decline, or depressive symptoms)* 2. Do you feel different about asking your GP about other issues? 3. Does your GP ever ask you about...?
Establish the Health Care Resources that the participant has sought/engaged with to assist with their symptoms	**The following section is split depending on whether the participant answers Yes or No to accessing services** 1. Are your symptoms a problem for you? 2. Have you been to see anyone to assist with your symptoms? **If Yes:** 1. What prompted you to go?/Were you told of anyone to go to that could assist you?/What were you told? 2. How did you feel about going? Did you feel "comfortable" or did you feel "embarrassed"? 3. Do you have a Case Manager? (Did your Case Manager tell you about anyone you could go to?) **If No:** 1. Were you told of anyone to go to that could assist you? 2. Do you not know where to go?/Why do you think you did not know where to go? 3. Do you have a Case Manager? Did your Case Manager tell you about anyone you could go to? 4. What were you told? 5. Did you think there was no one to help you with this? **Other:** 1. What did they receive? 2. What did they feel about what they received? 3. Would they encourage others to seek assistance with their symptoms? 4. What would they recommend? 5. What was helpful?
Establish what advice/changes the participant would recommend	Now that you've experienced what you have over the past 6 months what is some advice that you would give someone currently in hospital?

Participants who consent will be videoed and audiotaped during their interview. Participants will be provided with a visual display of their reported depressive and anxiety symptoms for each month during their involvement in the study to assist the interviewer with ascertaining what events may have been occurring at each time period and assisting the participant to remember how they had reported to be feeling at those time periods. Ethical approval has been received to undertake audio and visual recording following consent from the participant to be involved. Audiotapes will be transcribed at the end of the study and thematic analysis will be undertaken. Strategies will be put in place to ensure credibility (in preference to internal validity), transferability (in preference to external validity), dependability (in preference to reliability), and confirmability (in preference to objectivity). [83] Visual recordings will be edited to create a short recording that may be used for future patients prior to their discharge home from hospital to hear first person what factors may impact on their transition home and what factors may assist with this transition to enable positive functional, physical and mental outcomes.

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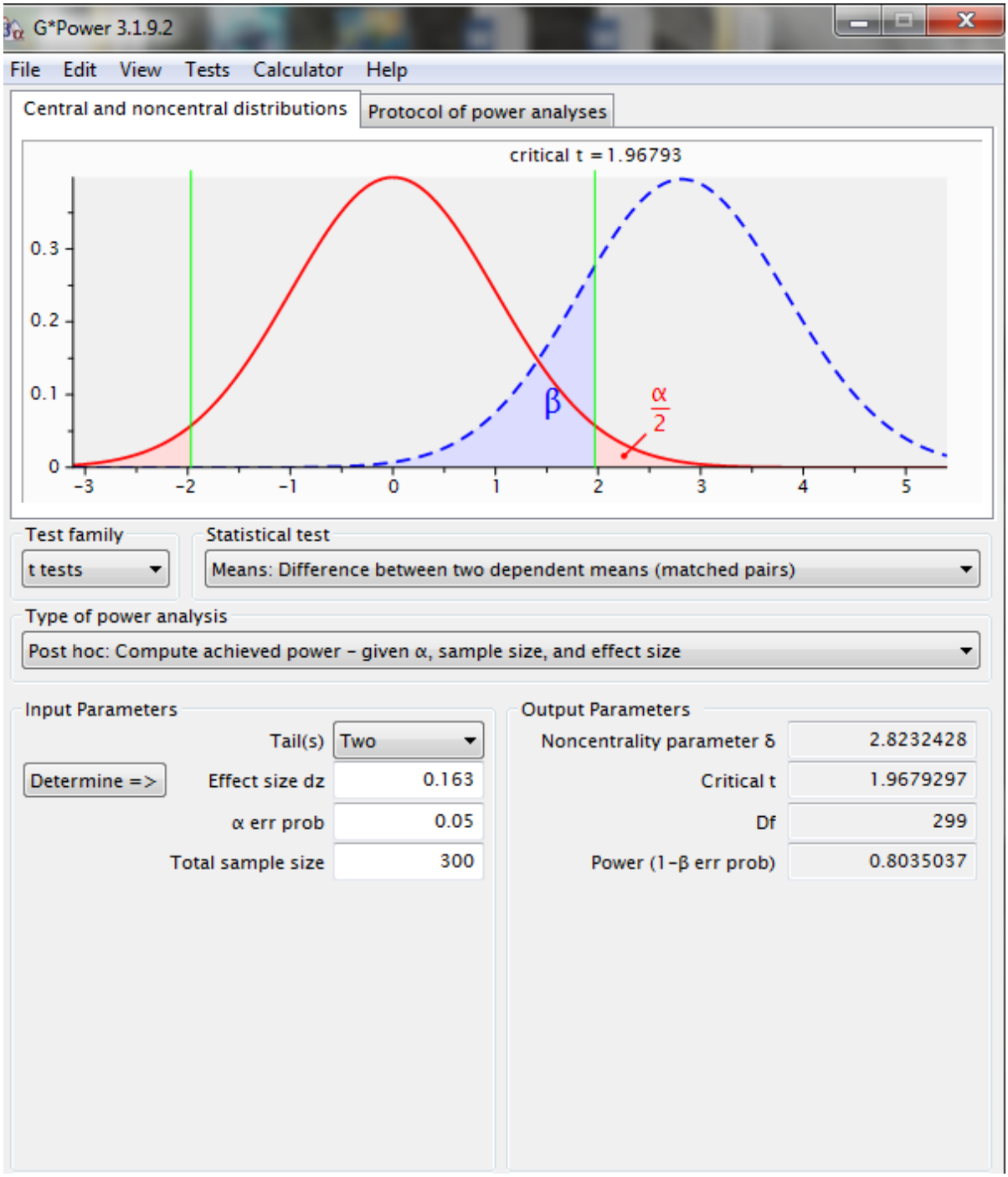
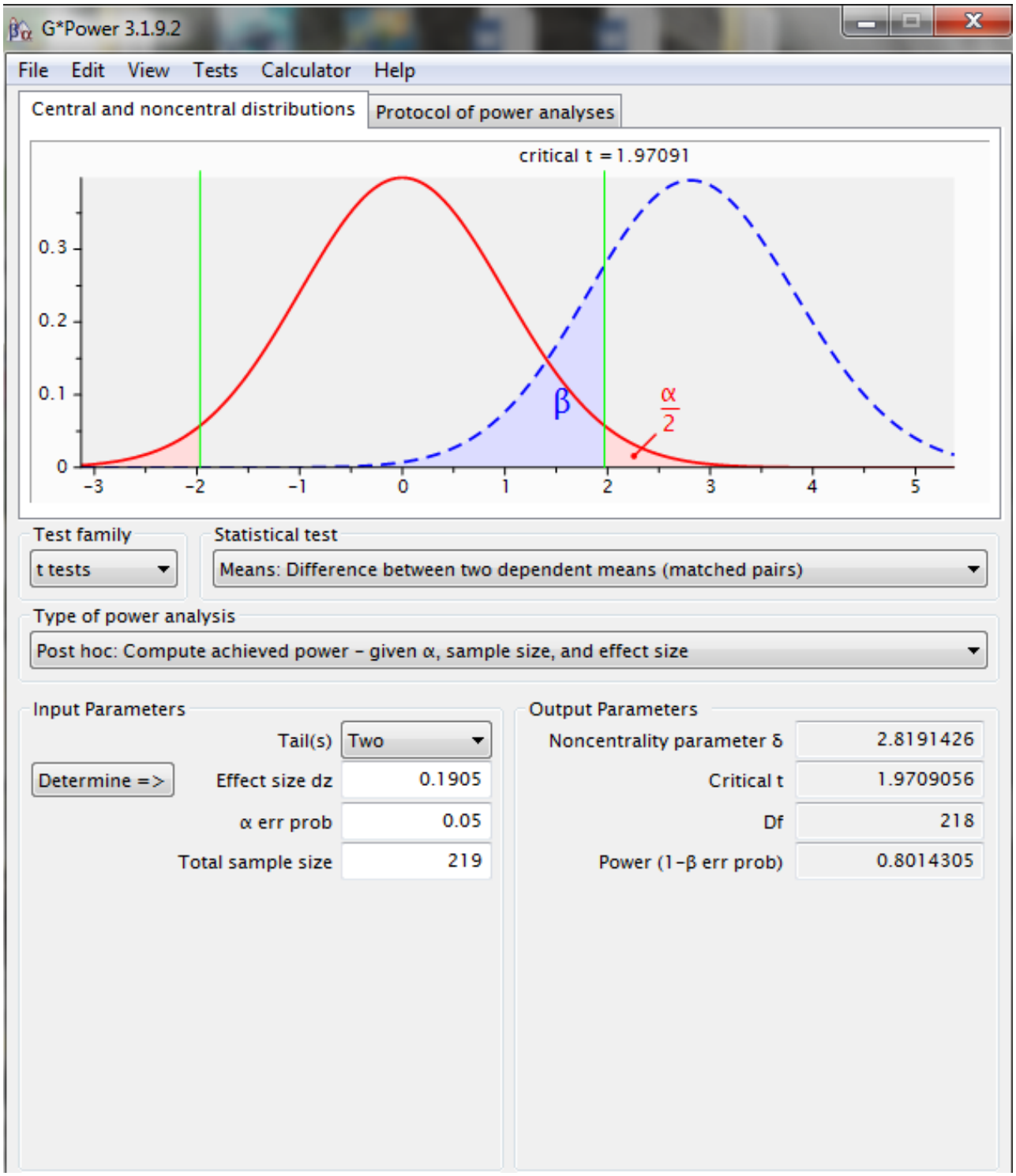
D. Screenshots of power analysis relevant to Chapter 2 Methods



Power analysis for paired t-test with expected sample size N=300 at baseline.



Power analysis for paired t-test with sample size N=219 based on final participants who completed all questionnaire time periods.

E. Copyright clearance and permission for reproduction: “Behavio[u]ral model depicting onset and maintenance of depression and anxiety”

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Number of charts/graphs /tables/figures	1
Title or numeric reference of the portion(s)	Figure 2. Behavioral model depicting onset and maintenance of depression and anxiety
Title of the article or chapter the portion is from	Depression in Older Adults
Editor of portion(s)	N/A
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F. Initial cognitive screen: 6-item Cognitive Impairment Test (6-CIT; Katzman et al., 1983).

1. What year is it?
(Correct – 0 points; Incorrect – 4 points)

2. What month is it?
(Correct – 0 points; Incorrect – 3 points)

3. Give the patient an address phrase to remember with five components.
I.e., **"I am going to give you a name and address. After I have said it, I want you to repeat it. Remember this name and address because I am going to ask you to tell it to me again in a few minutes: John, Brown, 42, West St, Kensington"**
(Item scored at later point in assessment)

4. About what time is it?
(Correct (within 1 hour) - 0 points; Incorrect – 3 points)

5. Count backwards from 20-1.
(Correct – 0 points; 1 error – 2 points; More than 1 error – 4 points)

6. Say the months of the year in reverse.
(December, November, October, September, August, July, June, May, April, March, February, January)
(Correct – 0 points; 1 error – 2 points; More than 1 error – 4 points)

7. Repeat address phrase.
(Correct – 0 points; 1 error – 2 points; 2 errors – 4 points; 3 errors – 6 points; 4 errors – 8 points; All incorrect – 10 points)

Total correct: _____ (score out of 28)

Cut-off for this doctoral research:
If patient scores 14 and above – excluded from involvement in the project.
If patient scores 13 or less – included for involvement in the project.

G. Overall survey items at baseline (pre-hospital and during hospital items), three- and six-months post-discharge combined

Note. Questions highlighted in black were asked at all three time points: during hospital, and three- and six-months post-hospital. Questions highlighted in green were only asked at baseline. Questions highlighted in red were only asked at three and six months post-hospital. Questions highlighted in blue were asked in the six-month survey only.

Please clarify with the participant their consent to continue with the study (as required).
1. Data Collector name:
_____
2. Respondent's Unique ID (ie. first three letters of surname and date of birth: LAL12121978):
_____
3. Gender of participant:
Female Male
4. Is an interpreter required to complete this study with the participant?
Yes No
5. Please state the specific language interpreter required by the participant to proceed with the study:
_____
6. What is your country of birth?
_____
7. Do you speak a main language other than English at home?
Yes No
8. Do you identify with a specific cultural group (other than Australian) or as an Indigenous Australian or Maori?
Yes No
9. If yes, what group do you identify with?
_____
10. What is your present marital status?
Married
Defacto (in a relationship)
Widowed
Separated
Divorced
Never married
11. How long have you lived at your current address?
____ Years ____ Months
12. Which of the following best describes your housing situation? Do you live in:
Own home (owned by you)
Own home (owned by family)
With your family (owned by family)
A rental property or tenancy
A property that you have paid a bond for (i.e. hostel)
Other, please specify:
_____
13. On a clear day, do you sometimes need to turn on the lights during the day light hours because the natural lighting of the dwelling is not sufficient?
Yes No Don't know
14. Are you satisfied with the amount of natural day light that you get through your windows?
Yes No
15. Which of the following types of cover do you have for health services (excluding your Medicare card)?
Private Health insurance for hospital cover
Private Health insurance for ancillary services/extras cover
Department of Veterans' Affairs Gold Card
Department of Veterans' Affairs White Card
Commonwealth Seniors Health Card
Pensioner Concession Card
None of these
16. What sources of income/financial support do you have?
Prefer not to answer

Employment
Pension
Superannuation
Rental
Support from relatives/friends
Other investments

_____

17. How do you manage on the income you have available?
    It is impossible
    It is difficult all the time
    It is difficult some of the time
    It is not too bad
    It is easy
18. What is your primary occupation?

    _____

19. How many years of education did you complete?

    _____

20. Do you wear visual aids (i.e., reading glasses, etc)
    Yes No
21. Please state which visual aids you wear:
    Multi focus lenses
    Single focus lenses
    Bi-focal lenses
    Reading glasses
    Contact lenses
    Other, please specify:

    _____

22. Please state which activities you need to use your visual aids for (i.e., to watch TV):

    _____

23. Have you ever had any surgery on your eyes to aid your eyesight?
    Yes No
24. Please elaborate on the surgery you have had to aid your eyesight (i.e., cataracts):

    _____

25. What is your height?
    ____ cm OR ____ feet and inches
26. What is your weight?
    ____ kg OR ____ stone and pounds
27. Has this person been readmitted to hospital since last month?
    Yes No
28. How many days have they been re-admitted for in total? (Total days for all admissions since last follow up):

    _____

29. Is this person currently in hospital?
    Yes No
30. Reason for readmission/additional information regarding admission:

    _____

31. Assessment Date:

    _____

Geriatric Depression Scale – Short Form

The following questions will relate to your mood. Choose the best answer for how you have felt over the PAST WEEK. Choose *Yes* if you mostly agree that the item describes you; state *No* if you mostly disagree that the item describes you.

32. Are you basically satisfied with your life?
33. Have you dropped many of your activities and interests?
34. Do you feel that your life is empty?
35. Do you often get bored?
36. Are you in good spirits most of the time?
37. Are you afraid that something bad is going to happen to you?
38. Do you feel happy most of the time?
39. Do you often feel helpless?
40. Do you prefer to stay at home, rather than going out and doing new things?
41. Do you feel you have more problems with memory than most?
42. Do you think it is wonderful to be alive now?

43. Do you feel pretty worthless the way you are now?
44. Do you feel full of energy?
45. Do you feel that your situation is hopeless?
46. Do you think that most people are better off than you are?
47. Do you feel like you are a burden on others?

Geriatric Anxiety Inventory

The following statements also relate to your mood. Choose the best answer for how you have felt over the PAST WEEK. Choose *Agree* if you mostly agree that the statement describes you; state *Disagree* if you mostly disagree that the statement describes you.

48. I worry a lot of the time.
49. I find it difficult to make a decision.
50. I often feel jumpy.
51. I find it hard to relax.
52. I often cannot enjoy things because of my worries.
53. Little things bother me a lot.
54. I often feel like I have butterflies in my stomach.
55. I think of myself as a worrier.
56. I can't help worrying about even trivial things.
57. I often feel nervous.
58. My own thoughts often make me anxious.
59. I get an upset stomach due to my worrying.
60. I think of myself as a nervous person.
61. I always anticipate the worst will happen. I often feel shaky inside.
62. I think that my worries interfere with my life.
63. My worries often overwhelm me.
64. I sometimes feel a great knot in my stomach.
65. I miss out on things because I worry too much.
66. I often feel upset.
67. I worry that I will become a burden on others I worry that I will lose my independence.

Falls

In the study that we are conducting a fall is considered to be:

• 'An event, which results in a person coming to rest inadvertently on the ground or other lower level' - World Health Organisation

Keeping this in mind can you please answer the following questions in relation to your falls history over the LAST MONTH? In the LAST MONTH have you:

68. Slipped, tripped, or stumbled (not including a fall to the ground)?
    Yes No
69. Fallen over? - that is, unexpectedly come to the ground, floor, or lower level?
    Yes No
70. Did you expect to?
    Yes No
71. How many falls have you had in the LAST MONTH?

    _____
72. Were you injured as a result of a fall?
    Yes No
73. What injuries did you sustain? (Please state if injuries were due to different falls, i.e., if you had more than one fall)

    _____
74. Did you need to seek medical attention (ie, doctor, hospital) for an injury from a fall?
    Yes No

Please answer the following questions in regards to the injury/injuries you sustained from your first fall which required you to seek, or were provided, medical attention.

75. Did you need to visit a local GP/Doctor?
    Yes No
76. Please state number of visits to your local GP/Doctor in relation to the injury from your fall:

    _____
77. Did you need to visit a health professional OTHER than a GP/Doctor?
    Yes No
78. Please state the number of visits and the health professional you visited (i.e., physiotherapist x2, psychologist x1, etc):

    _____
79. Did you (or someone on your behalf) call an ambulance and you were attended to by paramedics but were not taken to hospital?

Yes No

80. Did you (or someone on your behalf) call an ambulance and you were transported to hospital?
Yes No

81. Did you attend an Emergency Department but then were sent home?
Yes No

82. Did you attend an Emergency Department and were admitted to hospital as a result of your fall?
Yes No

83. How many days were you in hospital?

_____

84. What was the diagnosis for your admission?

_____

85. Did you need to seek medical attention (i.e., doctor, hospital) for an injury from another fall in the last month?
Yes No

*(** The above questions were repeated for subsequent second and third falls the participant had in the month prior **)*

86. Please state below any details below regarding any medical attention you sought, or were provided with, in relation to injuries sustained to falls during the LAST MONTH other than the three already stated:

_____

87. Prior to coming into hospital did you have any falls in the past 12 months?
Yes No

88. Did you seek medical attention in relation to injuries sustained from a fall in months earlier to this last month?
Yes No

89. How many times did you visit your GP in relation to this/these previous fall(s)?

_____

90. Did you see any other health professional (i.e., physiotherapist, etc) as a result of this/these previous fall(s)?
Yes No

91. How many times did you visit this health professional in the past month?

_____

92. If possible, please advise which health professional(s) you saq (i.e., occupational therapist, psychologist, physiotherapist, etc):

_____

93. In the LAST MONTH have you had any other injury from an accident at your home not as a result of a fall (i.e., burns, bruises)?
Yes No

94. What injuries did you sustain?

_____

95. What were you doing when this accident occurred?

_____

96. Have you had any falls whilst in hospital? Please state how many (i.e., 0=No; 1+= Yes)

_____

97. Any additional notes that may be relevant (i.e., that the participant volunteers regarding their falls):

_____

PhoneFITT

Now I'd like to ask you about some physical activities and find out how often you do them and for how long. First, I'd like you to think about household activities you did in the last week. *[Interviewer: Ask about each activity listed in the following 2 tables. If respondent answers zero to how many times in the week they did the activity, then skip the second question for that activity and proceed to the next activity. Record answers in each table.]*

98. Household Activities	How many times in the week did you do this?	About how much time did you spend on each occasion?
A. Light housework such as tidying, dusting, laundry, or ironing		
B. Making meals, setting and clearing the table, and washing dishes		
C. Shopping (for groceries or clothes, for example)		

D. Heavy housework such as vacuuming, scrubbing floors, mopping, washing windows, or carrying rubbish		
E. Home maintenance such as painting, mowing, or raking leaves		
F. Caring for another person (such as pushing a wheelchair or helping person in/out of a chair/bed)		

Next, I'd like you to think about activities you did for recreation or conditioning in the last week.

99. Recreational & Conditioning Activities	How many times in the week did you do this?	About how much time did you spend on each occasion?
G. Lifting weights to strengthen your legs		
H. Other exercises designed to strengthen your legs (such as standing up/sitting down several times in a chair or climbing stairs)		
I. Lifting weights to strengthen your arms or other exercises to strengthen your arms (such as wall push-ups)		
J. Other home exercises not already mentioned such as stretching or balance exercises		
K. Walking for exercise		
L. Dancing		
M. Swimming		
N. Bicycling		

Now I would like to ask you about two specific activities that are seasonal and about any other activities that you do*. [Interviewer: Ask about each activity listed in the following table. If the respondent answers zero to engaging in activity, skip to the next activity. Record answers in table.]*

100. Seasonal Recreational Activities	When you do this activity, how many times in a typical week, in the LAST MONTH, do you do it?	How many months in this past year did you do this activity?	About how much time did you spend on each occasion?
Oi. Golf - using a cart			
Oii. Golf - without using a cart			
P. Garden			

101. Do you participate in any other regular physical activities that we haven't asked you about?

_____

102. Please state the other physical activity you regularly participate in:

#1. _____
#2. _____
#3. _____

103. Other Physical Activities	When you do this activity, how many times in the LAST WEEK, did you do it?	How many months in this past year did you do this activity?	About how much time did you spend on each occasion?
#1.			
#2.			
#3.			

The following set of questions is about your mobility and activities that you can perform. Thinking about how you have been in the last month please report your answer to the following 4 questions as to how believe you would be able to complete the activity.

104. Can you physically get on and off public transport such as buses, trams or trains without assistance from someone else? If you have not done this recently, say what you think would happen if you were to try.

Can do without difficulty without someone else
Can do but with difficulty without someone else
Cannot do without someone else

105. Can you walk up and down stairs WITHOUT A HANDRAIL or assistance from someone else? If you have not done this recently, say what you think would happen if you were to try.
    Can do without difficulty
    Can do but with difficulty
    Cannot do
106. Can you bend and pick up an object from the floor without any assistance from someone else?
    Can do without difficulty
    Can do but with difficulty
    Cannot do (WITHOUT pickup stick/reacher)
107. Can you move about your room/bathroom without any assistance from someone else?
    Can do without difficulty
    Can do but with difficulty
    Cannot do without an aide/walker
108. Do you think you are back to the level of physical activity that you were prior to hospital?
    Yes No

Pre-hospital PhoneFITT

Now I'd like to ask you about some physical activities and find out how often you did them and for how long, prior to coming into hospital. First, I'd like you to think about household activities you did in a typical week prior to coming to hospital (i.e., before you became ill or had surgery). *[Interviewer: Ask about each activity listed in the following 2 tables. If respondent answers zero to how many times in the week they did the activity, then skip the second question for that activity and proceed to the next activity. Record answers in each table.]*

109. Household Activities	In a typical week before you came into hospital, how many times in the week did you do this?	About how much time did you spend on each occasion?
A. Light housework such as tidying, dusting, laundry, or ironing		
B. Making meals, setting and clearing the table, and washing dishes		
C. Shopping (for groceries or clothes, for example)		
D. Heavy housework such as vacuuming, scrubbing floors, mopping, washing windows, or carrying rubbish		
E. Home maintenance such as painting, mowing, or raking leaves		
F. Caring for another person (such as pushing a wheelchair or helping person in/out of a chair/bed)		

Next, I'd like you to think about activities you did for recreation or conditioning in a typical week before you came into hospital (i.e., before you became ill or had surgery).

110. Recreational & Conditioning Activities	In a typical week before you came into hospital, how many times in the week did you do this?	About how much time did you spend on each occasion?
G. Lifting weights to strengthen your legs		
H. Other exercises designed to strengthen your legs (such as standing up/sitting down several times in a chair or climbing stairs)		
I. Lifting weights to strengthen your arms or other exercises to strengthen your arms (such as wall push-ups)		
J. Other home exercises not already mentioned such as stretching or balance exercises		
K. Walking for exercise		
L. Dancing		
M. Swimming		
N. Bicycling		

Now I would like to ask you about two specific activities that are seasonal and about any other activities that you did prior to coming to hospital (i.e., before you were ill or had surgery). *[Interviewer: Ask about each activity listed in the following table. If the respondent answers zero to engaging in activity, skip to the next activity. Record answers in table.]*

111. Seasonal Recreational Activities	When you do this activity, prior to coming into hospital, how many times did you typically do it per month?	How many months in this past year did you do this activity?	About how much time did you spend on each occasion?
Oi. Golf - using a cart			
Oii. Golf - without using a cart			
P. Garden			

112. Did you participate in any other regular physical activities, prior to coming to hospital, that we haven't asked you about?

_____

113. Please state the other physical activity you regularly participate in:

#1. _____
#2. _____
#3. _____

114. Other Physical Activities	When you do this activity, how many times in a typical week, prior to your hospitalisation, did you do it?	How many months in this past year did you do this activity?	About how much time did you spend on each occasion?
#1.			
#2.			
#3.			

The following set of questions is about your mobility and activities that you can perform. Thinking about how you were prior to coming into hospital, i.e., before you were ill or required surgery, please report your answer to the following 4 questions as to how believe you would be able to complete the activity.

115. Can you physically get on and off public transport such as buses, trams or trains without assistance from someone else? If you have not done this recently, say what you think would happen if you were to try.

Can do without difficulty without someone else
Can do but with difficulty without someone else
Cannot do without someone else

116. Can you walk up and down stairs WITHOUT A HANDRAIL or assistance from someone else? If you have not done this recently, say what you think would happen if you were to try.

Can do without difficulty
Can do but with difficulty
Cannot do

117. Can you bend and pick up an object from the floor without any assistance from someone else?

Can do without difficulty
Can do but with difficulty
Cannot do (WITHOUT pickup stick/reacher)

118. Can you move about your room/bathroom without any assistance from someone else?

Can do without difficulty
Can do but with difficulty
Cannot do without an aide/walker

119. Do you expect to be able to get better than your current level of physical activity:

	Not sure	Yes	No
by 3 months?	_____	_____	_____
by 6 months?	_____	_____	_____

120. Do you think your walking is..... than when you left hospital?

better
the same

worse
Comment box (if specific to one particular activity)

_____

121. Is it taking you ..... to do your daily activities? (whatever that might be i.e. chores, making meals, showering, dressing, etc.)
less time
the same amount of time
more time

122. Do you think your general health is..... 6 months ago?
better than
worse than
the same as

123. Have you fallen over in the last 6 months?
Yes (please state how many below) No
How many falls have you had in the last 6 months? _____

124. Do you feel your participation in physical activities has reduced over the past 6 months?
Yes No

(** Six-month follow-up survey only **)

If the person you are interviewing has had scores for their GDS and GAI less than the cutoff's over the previous months since discharge AND they've answered YES to either of the above questions, please proceed to the next question. Otherwise, please select to continue to the next page.

125. In this study we've noticed that some people that have fallen over or have had reduced participation in physical activity have experienced symptoms of depression or anxiety. You've said you've had a fall or have had reduced participation in physical activity yet you do not appear to have reported experiencing symptoms of depression or anxiety since leaving hospital. We would like to know why some people like yourself are more resilient to having symptoms of depression or anxiety subsequent to experiencing falls or reduced participation in physical activity. Can you tell us why this is the case for you?

_____

Color Trails Test (CTT)

Now I'd like you to complete a task for me. Firstly, can I get you to count aloud from 1-25?

_____

If there is a speech impairment, have them write the numbers 1 to 25. If unable to complete either of these tasks do not administer the CTT.

126. Was the participant able to count aloud (or write) from 1-25?
Yes No

127. Please record the raw scores for the participant to complete the CTT 1:
Time (in seconds) to complete 1-25

_____
Errors

_____
Near-misses

_____
Prompts

_____

128. Please record the raw scores for the participant to complete the CTT 2:
Time (in seconds) to complete 1-25

_____
Total errors

_____
Colour errors

_____
Number (sequence) errors

_____
Near-misses

_____
Prompts

_____

Controlled Oral Word Association

Have a stopwatch or a timer on your phone ready. Ask the participant to produce/state as many different animals as they can within 1 minute. Record the number of animals that they produce, the number repeated, and the number of words not an animal.

129. Animal Category results in 1 minute:

Number of Animal Category words

_____

Number of repeated words

_____

Number of words not pertaining to Animal Category

_____

Ask the participant to produce/state as many different items that can be found within a supermarket as they can within 1 minute. Record the number of supermarket items that they produce, the number repeated, and the number of words that are not items that would be found in a supermarket.

130. Supermarket Category results in 1 minute:

Number of Supermarket Category words

_____

Number of repeated words

_____

Number of words not pertaining to Supermarket Category

_____

Pre-hospital Services

Need to ascertain (where possible) any service that the participant was receiving prior to hospitalisation. These may include, but not limited to, PAC, RITH, MoW, or other HACC services. If possible, ascertain the frequency of this/these service(s).

131. Were you receiving any meals on wheels, home help, council or other supports services prior to coming into hospital?

Yes No

132. What services were you receiving prior to hospitalisation?

Service	How often?	For how long?
_____	_____	_____

133. Prior to coming hospital were these services and supports meeting your needs?

Yes No

134. Are you aware of any social services you will receive after discharge?

Yes No

Post-hospital Services

135. What services do you understand you will receive when you go home?

Service	How often?	For how long?
_____	_____	_____

136. Given what you have been told will happen when you are discharged home, do you think you will be able to manage when you go home with the services (if any) proposed?

Yes No Not sure

Pre-hospital Friendship Scale (Social Isolation)

137. Ok, the following questions will relate to your family and friends. The next few questions have five possible options. These are: Almost always, Most of the time, About half the time, Occasionally, Not at all. Please select the option that best answers the statement for you, over the past FOUR WEEKS, prior to coming into hospital:

	Almost always	Most of the time	About half the time	Occasionally	Not at all
It has been easy to relate to others:					
I felt isolated from other people:					
I had someone to share my feelings with:					
I found it easy to get in touch with others when I needed to:					
When with other people, I felt separate from them:					
I felt alone and friendless:					

Lubben Social Network Scale-6

Ok, a couple more questions regarding your social network, prior to coming into hospital...

138. Considering the people to whom you are related either by birth or marriage, how many relatives (including spouses, partners, children, etc) do you see or hear from at least once a month?

0 = none
1 = one
2 = two
3 = three or four
4 = five thru eight
5 = nine or more

139. Considering all of your friends, including those who live in your neighbourhood, how many of your friends do you see or hear from at least once a month?

0 = none
1 = one
2 = two
3 = three or four
4 = five thru eight
5 = nine or more

140. Who lives with you? (mark all that apply)

No one, I live alone
Spouse or partner
Own children
Other family member(s)
Non-family member(s)

Friendship Scale (Social Isolation)

141. Ok, the following questions will relate to your family and friends. The next few questions have five possible options. These are: Almost always, Most of the time, About half the time, Occasionally, Not at all. Please select the option that best answers the statement for you, over the past FOUR WEEKS:

	Almost always	Most of the time	About half the time	Occasionally	Not at all
It has been easy to relate to others:					
I felt isolated from other people:					
I had someone to share my feelings with:					
I found it easy to get in touch with others when I needed to:					
When with other people, I felt separate from them:					
I felt alone and friendless:					

Lubben Social Network Scale-6

Ok, a couple more questions regarding your social network...

142. Considering the people to whom you are related either by birth or marriage, how many relatives (including spouses, partners, children, etc) do you see or hear from at least once a month?

0 = none
1 = one
2 = two
3 = three or four
4 = five thru eight
5 = nine or more

143. Considering all of your friends, including those who live in your neighbourhood, how many of your friends do you see or hear from at least once a month?

0 = none
1 = one
2 = two
3 = three or four
4 = five thru eight
5 = nine or more

144. Who lives with you? (mark all that apply)

No one, I live alone
Spouse or partner
Own children
Other family member(s)
Non-family member(s)

Caring/Volunteering

145. Over the last month prior to coming to hospital, how often did you undertake any volunteer work for any community or social organisations (i.e, fundraising, church activities, organising groups or classes, etc)?

_____

146. Over the last month prior to coming to hospital, how often did you regularly provide (unpaid) care for another person (i.e., spouse, child, grandchildren, other)?

_____

147. Prior to coming to hospital how often would you usually go to meetings of clubs, religious meetings, or other groups that you belong to in the past week?

None
1
2
3
4
5
6
7
8+

148. Which of the following groups have you sought help or advice from in the last 3 months?

Food services (i.e., Meals on wheels)
Nursing or community health services
Respite service (in home, day centre, or inpatient)
Homemaking services (i.e., home care services, laundry services)
Home maintenance services (i.e., gardening, odd jobs)
Support and advisory groups (i.e., Arthritis Foundation, Pensioner Advisory Service, ARAFEMI, etc)
Other health and wellbeing, please specify:

_____

Pre-hospital Epworth Sleepiness Scale

The next set of questions will focus on your sleepiness during the day, prior to your hospitalisation. How likely are you to doze off or fall asleep in the situations described below in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently try to work out how they would have affected you. Use the following scale (never, slight, moderate, high chance of dozing or sleeping) to choose the most appropriate number for each situation:

N/A (ie. not driving)
would NEVER doze or sleep
SLIGHT chance of dozing or sleeping
MODERATE chance of dozing or sleeping
HIGH chance of dozing or sleeping

149. Sitting and reading

_____

150. Watching TV

_____

151. Sitting inactive in a public place (ie, a theatre or a meeting)

_____

152. As a passenger in a car for an hour without a break

_____

153. Lying down to rest in the afternoon when circumstances permit

_____

154. Sitting and talking to someone

_____

155. Sitting quietly after a lunch without alcohol

_____

156. In a car, while stopped for a few minutes in traffic (while driving)

_____

Pre-hospital Pittsburgh Sleep Quality Index

The following questions relate to your usual sleep habits during the PAST MONTH prior to hospitalisation. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. (Please answer all questions).

157. During the PAST month (prior to hospitalisation), what time have you usually gone to bed at night?

Hour : Minute : AM/PM

____ : _____ : _____

158. During the PAST MONTH (prior to hospitalisation), how long (in minutes) has it usually taken you to fall asleep each night?

_____

159. During the PAST MONTH (prior to hospitalisation), what time have you usually gotten up in the morning?

Hour : Minute : AM/PM

____ : _____ : _____

160. During the PAST month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed).

_____

For each of the remaining questions, check the one best response. Please answer all questions using the following options:

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

During the PAST month (prior to hospitalisation), how often have you had trouble sleeping because you:

161. Cannot get to sleep within 30 minutes?
162. Wake up in the middle of the night or early morning?
163. Have to get up to use the bathroom?
164. Cannot breathe comfortably?
165. Cough or snore loudly?
166. Feel too hot?
167. Feel too cold?
168. Have bad dreams?
169. Have pain?
170. Other reason (please state below):

_____

171. During the PAST month (prior to hospitalisation), how would you rate your sleep quality overall?

Very good
Fairly good
Fairly bad
Very bad

172. During the PAST month (prior to hospitalisation), how often have you:

- Taken medicine to help you sleep (prescribed or 'over the counter')?

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

- Had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

173. During the PAST month (prior to hospitalisation), how much of a problem has it been for you to keep up enough enthusiasm to get things done?

Not a problem at all
Only a very slight problem
Somewhat of a problem
A very big problem

174. Do you usually have a bed partner or roommate?

No bed partner or roommate
Partner/room mate in other room
Partner in the same room, but not the same bed

Partner in the same bed

Use the following options for the following questions for Q 175.

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

175. If you have a roommate or bed partner, ask how often in the PAST month (prior to hospitalisation) you have had:

Loud snoring
Long pauses between breaths while asleep
Legs twitching or jerking while you sleep
Episodes of disorientation or confusion during sleep
Other restlessness while you sleep (please describe below)

_____

176. During the PAST month (prior to hospitalisation), how many hours of sleep do you typically get during the day? (including any hours you sleep, i.e., in your lounge chair, not just bed)

_____

177. Prior to your hospitalisation, do you feel like you did not have enough sleep?

Yes No

178. Prior to your hospitalisation, do you feel like you had TOO MUCH sleep?

Yes No

179. Has your sleep pattern changed at all in the three months prior to your hospitalisation?

Yes No

180. What about it has changed?

_____

181. Do you think you know what lead to this change for you?

Yes No

182. What do you believe lead to this change in your sleep pattern?

_____

Epworth Sleepiness Scale

The next set of questions will focus on your sleepiness during the day. How likely are you to doze off or fall asleep in the situations described below in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently try to work out how they would have affected you. Use the following scale (never, slight, moderate, high chance of dozing or sleeping) to choose the most appropriate number for each situation:

N/A (ie. not driving)
would NEVER doze or sleep
SLIGHT chance of dozing or sleeping
MODERATE chance of dozing or sleeping
HIGH chance of dozing or sleeping

183. Sitting and reading

_____

184. Watching TV

_____

185. Sitting inactive in a public place (ie, a theatre or a meeting)

_____

186. As a passenger in a car for an hour without a break

_____

187. Lying down to rest in the afternoon when circumstances permit

_____

188. Sitting and talking to someone

_____

189. Sitting quietly after a lunch without alcohol

_____

190. In a car, while stopped for a few minutes in traffic (while driving)

_____

During hospital Pittsburgh Sleep Quality Index

The following questions relate to your usual sleep habits DURING your hospitalisation. Your answers should indicate the most accurate reply for the majority of days and nights DURING your hospitalisation. (Please answer all questions).

191. During your hospitalisation, what time have you usually gone to bed at night?

Hour : Minute : AM/PM

____ : _____ : _____

192. During your hospitalisation, how long (in minutes) has it usually taken you to fall asleep each night?

_____

193. During your hospitalisation, what time have you usually gotten up in the morning?

Hour : Minute : AM/PM

____ : _____ : _____

194. During your hospitalisation, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed).

_____

For each of the remaining questions, check the one best response. Please answer all questions using the following options:

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

During your hospitalisation, how often have you had trouble sleeping because you:

195. Cannot get to sleep within 30 minutes?
196. Wake up in the middle of the night or early morning?
197. Have to get up to use the bathroom?
198. Cannot breathe comfortably?
199. Cough or snore loudly?
200. Feel too hot?
201. Feel too cold?
202. Have bad dreams?
203. Have pain?
204. Other reason (please state below):

_____

205. During your hospitalisation, how would you rate your sleep quality overall?

Very good
Fairly good
Fairly bad
Very bad

206. During your hospitalisation, how often have you:

- Taken medicine to help you sleep (prescribed or 'over the counter')?

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

- Had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

207. During your hospitalisation, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

Not a problem at all
Only a very slight problem
Somewhat of a problem
A very big problem

208. Do you have a roommate?

No roommate – single or sole occupant
Yes, one other roommate
Yes, several other roommates

209. During your hospitalisation, how many hours of sleep do you typically get during the day? (including any hours you sleep, i.e., in your lounge chair, not just bed)

_____

210. During your hospitalisation, do you feel like you did not have enough sleep?

Yes No

211. During your hospitalisation, do you feel like you had TOO MUCH sleep?

Yes No

212. Has your sleep pattern changed at all during your hospitalisation?

Yes No

213. What about it has changed?

_____

Pittsburgh Sleep Quality Index

The following questions relate to your usual sleep habits during the PAST MONTH. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. (Please answer all questions).

214. Do you use a C-Pap machine or similar to assist your sleep?

Yes No

Other (please specify any equipment or technique used to aide their sleep)

_____

215. During the PAST month, what time have you usually gone to bed at night?

Hour : Minute : AM/PM

____ : _____ : _____

216. During the PAST MONTH, how long (in minutes) has it usually taken you to fall asleep each night?

_____

217. During the PAST MONTH, what time have you usually gotten up in the morning?

Hour : Minute : AM/PM

____ : _____ : _____

218. During the PAST month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed).

_____

For each of the remaining questions, check the one best response. Please answer all questions using the following options:

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

During the PAST month, how often have you had trouble sleeping because you:

219. Cannot get to sleep within 30 minutes?
220. Wake up in the middle of the night or early morning?
221. Have to get up to use the bathroom?
222. Cannot breathe comfortably?
223. Cough or snore loudly?
224. Feel too hot?
225. Feel too cold?
226. Have bad dreams?
227. Have pain?
228. Other reason (please state below):

_____

229. During the PAST month, how would you rate your sleep quality overall?

Very good
Fairly good
Fairly bad
Very bad

230. During the PAST month, how often have you:

- Taken medicine to help you sleep (prescribed or 'over the counter')?

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

- Had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

231. During the PAST month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

Not a problem at all
Only a very slight problem
Somewhat of a problem
A very big problem

232. Do you usually have a bed partner or roommate?

No bed partner or roommate
Partner/room mate in other room
Partner in the same room, but not the same bed
Partner in the same bed

Use the following options for the following questions for Q 233.
Not during the past month
Less than once a week
Once or twice a week
Three or more times a week

233. If you have a roommate or bed partner, ask how often in the PAST month you have had:
Loud snoring
Long pauses between breaths while asleep
Legs twitching or jerking while you sleep
Episodes of disorientation or confusion during sleep
Other restlessness while you sleep (please describe below)
_____

234. During the PAST month, how many hours of sleep do you typically get during the day? (including any hours you sleep, i.e., in your lounge chair, not just bed)
_____

235. In the last 3 months, do you feel like you did not have enough sleep?
Yes No

236. In the last 3 months, do you feel like you had TOO MUCH sleep?
Yes No

237. Has your sleep pattern changed at all in the three months since your hospitalisation?
Yes No

238. What about it has changed?
_____

239. Do you think you know what lead to this change for you?
Yes No

240. What do you believe lead to this change in your sleep pattern?
_____

Stressful Life Events

The next question relates to possible life events that may have occurred in the last three months.

241. Can you tell me which of the following major events, if any, you have experienced in the LAST THREE MONTHS? (mark all that apply)
Major personal illness or injury
Major decline in health of spouse or partner
Death of spouse or partner
Death of your child
Major decline in health of other close family member or friend
Death of other close family member or friend
Decreased income
Major conflict with children or grandchildren
An event in your children or grandchildren's life that has caused you anxiety
Moving house
Moving into hostel / nursing home
Spouse / partner moving into hostel / institution
Been robbed or similar event
Been pushed, grabbed, shoved, kicked, hit or threatened
Death of a pet
None of these events

242. In the next 12 months are you worried about experiencing any of the following major events? (mark all that apply)
Major personal illness or injury
Major decline in health of spouse or partner
Moving house
Moving into hostel / nursing home
Spouse / partner moving into hostel / institution
None of these events
Other major event (please specify below)
_____

Personality – Pain Attitudes Questionnaire (revised)

243. The following questions relate to your pain. Please respond to all statements. Bear in mind that there are no right or wrong answers. Use the scale provided where 1 is strongly disagree and 5 is strongly agree, to rate how much you agree or disagree with each statement.
(1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree)

I am seldom emotional when in pain
I do not see any good in complaining when I am in pain
I go on as if nothing has happened when I am in pain
I make light of the pain; I refuse to get too serious about it when in pain
I get on with life despite being in pain

Personality – Brief Resilience Coping Scale

244. Consider how well the following statements describe your behaviour and actions on a scale from 1 to 5, where 1 means the statement does not escribe you at all and 5 means it describes you very well.

I actively look for ways to replace the losses I encounter in life
I believe that I can grow in positive ways by dealing with difficult situations
I look for creative ways to alter difficult situations
Regardless of what happens to me, I believe I can control my reaction to it

- The Ten-Item Personality Inventory (TIPI)

245. Here are a number of personality traits that may or may not apply to you. In relation to each statement, please indicate the extent to which you agree or disagree with the statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.
(1= Disagree strongly, 2=Disagree moderately, 3=Disagree a little, 4=Neither agree nor disagree, 5=Agree a little, 6=Agree moderately, 7=Agree strongly).

Extraverted. enthusiastic
Critical, quarrelsome
Dependable, self-disciplined
Anxious, easily upset
Open to new experiences, complex
Reserved, quiet
Sympathetic, warm
Disorganised, careless
Calm, emotionally stable
Conventional, uncreative

Caffeine, Alcohol, and Cigarettes

246. How many caffeinated drinks do you usually have in a day? (including tea, coffee, coke, energy drinks, etc)

_____

247. How many days of the week do you usually drink alcohol (ie, cider, beer, wine, spirit, etc)?

Never
Less than 1 day per week
1 day per week
2 days per week
3 days per week
4 days per week
5 days per week
6 days per week
Every day per week (7 days)

248. How many alcoholic drinks do you usually have in a day on the days that you usually drink? (including beer, spirits, wine)

_____

249. Do you ever drink more than 6 (alcoholic) drinks at any one time?

Yes No

250. Do you smoke?

Yes No

251. On average, how many cigarettes do you smoke EACH DAY?

_____

Consultations

252. Have you consulted any of the following health professionals in the LAST 3 MONTHS?

GP / Doctor

Yes No

Psychiatrist

Yes No

Other medical practitioner
Yes No
Occupational therapist
Yes No
Physiotherapist
Yes No
Psychologist
Yes No
Podiatrist or chiropodist
Yes No
Social worker
Yes No
Nutritionist or Dietician
Yes No
Sleep Clinic
Yes No
An alternative health practitioner (ie, herbalist, chiropractor, naturopath, meditation, acupuncture) (Please state which, if known)
Yes No
_____
Other (than those listed, please state which, if known)
Yes No
_____
None
Yes No
If the person has selected No to all health professionals in the last 3 months then proceed to the next section "Consultations - Mental Wellbeing".
253. Did you discuss falls?
Yes No
If not, any particular reason why not?
_____
254. Who did you discuss falls with?
GP / Doctor
Yes No
Psychiatrist
Yes No
Other medical practitioner
Yes No
Occupational therapist
Yes No
Physiotherapist
Yes No
Psychologist
Yes No
Podiatrist or chiropodist
Yes No
Social worker
Yes No
Nutritionist or Dietician
Yes No
Sleep Clinic
Yes No
An alternative health practitioner (ie, herbalist, chiropractor, naturopath, meditation, acupuncture) (Please state which, if known)
Yes No
_____
Other (than those listed, please state which, if known)
Yes No
_____
255. Who initiated the discussion about falls?
I did
They did
Family member/carer

Can't remember
Other (please specify)

_____

256. Can you tell me what was discussed in relation to falls?

_____

257. What was done or decided to address this issue (i.e., falls) either by yourself or the health professional?

_____

258. Have you come across information about falls from other sources? (Such as TV, internet, magazines, friends, etc)

Yes No

259. What did you find out about falls?

_____

260. Did you do anything as a result of this information regarding falls?

_____

261. Did you discuss your mental health and wellbeing? (ie, if you've been feeling down or other feelings)?

Yes No

If not, any particular reason why not?

_____

262. Who did you discuss your mental health and wellbeing with?

GP / Doctor
Yes No

Psychiatrist
Yes No

Other medical practitioner
Yes No

Occupational therapist
Yes No

Physiotherapist
Yes No

Psychologist
Yes No

Podiatrist or chiropodist
Yes No

Social worker
Yes No

Nutritionist or Dietician
Yes No

Sleep Clinic
Yes No

An alternative health practitioner (ie, herbalist, chiropractor, naturopath, meditation, acupuncture) (Please state which, if known)
Yes No

_____

Other (than those listed, please state which, if known)
Yes No

_____

263. Who initiated the discussion about your mental health and wellbeing?

I did
They did
Family member/carer
Can't remember
Other (please specify)

_____

264. Can you tell me what was discussed in relation to your mental health and wellbeing?

_____

265. What was done or decided to address this issue (i.e., your mental health and wellbeing) either by yourself or the health professional?

_____

266. Have you come across information about mental health and wellbeing from other sources? (Such as TV, internet, magazines, friends, etc)

Yes No

267. What did you find out about mental health and wellbeing?

_____

268. Did you do anything as a result of this information regarding mental health and wellbeing?

_____

269. Did you discuss your sleep with any of the health professionals you consulted over the last 3 months at all?

Yes No

If not, any particular reason why not?

_____

270. Who did you discuss your sleep with?

GP / Doctor
Yes No

Psychiatrist
Yes No

Other medical practitioner
Yes No

Occupational therapist
Yes No

Physiotherapist
Yes No

Psychologist
Yes No

Podiatrist or chiropodist
Yes No

Social worker
Yes No

Nutritionist or Dietician
Yes No

Sleep Clinic
Yes No

An alternative health practitioner (ie, herbalist, chiropractor, naturopath, meditation, acupuncture) (Please state which, if known)
Yes No

_____

Other (than those listed, please state which, if known)
Yes No

_____

271. Who initiated the discussion about your sleep?

I did
They did
Family member/carer
Can't remember
Other (please specify)

_____

272. Can you tell me what was discussed in relation to your sleep?

_____

273. What was done or decided to address this issue (i.e., sleep) either by yourself or the health professional?

_____

274. Did you discuss feeling lonely or isolated with any of the health professionals you consulted over the last 3 months at all?

Yes No

If not, any particular reason why not?

_____

275. Who did you discuss feeling lonely or isolated with?

GP / Doctor
Yes No

Psychiatrist
Yes No

Other medical practitioner
Yes No

Occupational therapist
Yes No

Physiotherapist
Yes No
Psychologist
Yes No
Podiatrist or chiropodist
Yes No
Social worker
Yes No
Nutritionist or Dietician
Yes No
Sleep Clinic
Yes No
An alternative health practitioner (ie, herbalist, chiropractor, naturopath, meditation, acupuncture) (Please state which, if known)
Yes No
_____
Other (than those listed, please state which, if known)
Yes No
_____
276. Who initiated the discussion about feeling lonely or isolated?
I did
They did
Family member/carer
Can't remember
Other (please specify)
_____
277. Can you tell me what was discussed in relation to feeling lonely or isolated?
_____
278. What was done or decided to address this issue (i.e., feeling lonely or isolated) either by yourself or the health professional?
_____
279. Have you been told by a doctor or other health professional that you have previously had an episode of depression?
Yes No
280. Have you been told by a doctor or other health professional that you have previously had an episode of anxiety?
Yes No
281. Prior to hospitalisation, were you taking any medications to assist with management of anxiety?
Yes No
282. Prior to hospitalisation, were you taking any medications to assist with management of depression?
Yes No
283. What medications was the participant prescribed prior to hospital?:
Medication Name?
_____
Dosage/How much? (mg/mL)
_____
When taken? (x/day)
_____
Other information to clarify medication intake (if needed to clarify)
_____
284. Was the participant prescribed any new medications whilst in hospital?
Yes No
285. Has the participant's medication prior to hospital been altered (i.e., dosage, frequency, etc) whilst in hospital for discharge?
Yes No
286. What medications is the participant prescribed for discharge? (including all medications - i.e., those commenced during hospital and any continuing from prior to hospital):
Medication Name?
_____
Dosage/How much? (mg/mL)
_____
When taken? (x/day)

_____

Other information to clarify medication intake (if needed to clarify)

_____

Medication

287. Are you currently TAKING any medications that are prescribed to YOU?
Yes No
288. Do you find you need to use more of a medication that is prescribed to you?
Yes No
289. Please state why you find you need to use more of a medication that is prescribed to you:
Pain relief
Anti-anxiety
Anti-depressant
Benzos / Sedatives
290. Do you find you need to use a medication that is not prescribed to you?
Yes No
291. Please state why you find you need to use a medication that is not prescribed to you:
Pain relief
Anti-anxiety
Anti-depressant
Benzos / Sedatives

For data collector: The next question relates to where a pharmacist goes to the person's home to complete a review of their medicine. This review requires a referral from the GP initially.

292. Have you had a medicine review done by a pharmacist?
Yes No
293. Are there any other non-prescription medications, drugs, or other substances that you use to help your health and wellbeing?
Yes (please state below) No
Other non-prescription medications, drugs, or other substances that are used:
_____
294. Is there one particular doctor that you consider to be your regular personal doctor?
Yes No
295. How long has this regular personal doctor been your doctor?
Years : Months
_____ : _____
296. How long since you last visited your regular personal doctor or clinic?
Years : Months : Weeks : Days
_____ : _____ : _____ : _____
297. Have you tried to see your regular GP in the last 3 months and not been able to?
Yes No
298. Please state the reason why you were not able to see your GP:
No transport
Home visit not offered
No appointments available
Unable to attend due to ill health
Other (please specify)
_____
299. How many times have you consulted a family doctor or another general practitioner in the LAST 3 MONTHS?
None
1 or 2 times
3 or 4 times
5 to 8 times
9 to 12 times
13 to 15 times
16 or more times
300. Have you been prescribed an exercise program by a health professional?
Yes No
301. Does the physical activity focus on:
Challenging your balance
Strengthening your legs
Other, please state focus:
_____

302. Are you currently doing the exercise program as it was prescribed (i.e., the amount AND the frequency)?

Yes, I'm adhering to it exactly as prescribed
Yes, I'm partially adhering to it (change in amount or frequency)
No, I'm not adhering to it (please state why not below)

_____

Perceptions of Death – Death Attitudes Questionnaire

303. The following questions are going to relate to dying and your thoughts relating to this:

	Not at all	Somewhat	Very much
- Do you worry about dying?	_____	_____	_____
- Does the thought worry you that with death you may be gone forever?	_____	_____	_____
- Are you worried about not knowing what to expect after death?	_____	_____	_____

Religiosity/Spirituality – Intrinsic Spirituality Scale

For the following three questions, spirituality is defined as one's relationship to God, or whatever you perceive to be Ultimate Transcendence. The questions use a sentence completion format to measure various attributes associated with spirituality. An incomplete sentence fragment is provided, followed directly below by two phrases that are linked to a scale ranging from 0 to 10. The phrases, which complete the sentence fragment, anchor each end of the scale. The 0 to 10 range provides you with a continuum on which to reply, with 0 corresponding to absence or zero amount of the attribute, while 10 corresponds to the maximum amount of the attribute. In other words, the end points represent extreme values, while five corresponds to a medium, or moderate, amount of the attribute. Please select the number along the continuum that best reflects your initial feeling.

304. When I am faced with an important decision…

…my spirituality:

plays absolutely no role 0 1 2 3 4 5 6 7 8 9 10 is always the overriding consideration

305. My spiritual beliefs…

…afffect:

absolutely every aspect of my life 0 1 2 3 4 5 6 7 8 9 10 no aspect of my life

306. Have you recently lost weight that was unexplained?

Yes No

307. Have you recently gained weight that was unexplained?

Yes No

308. How many main meals (ie, breakfast, lunch, dinner) do you usually eat each day?

_____

Chronic Illnesses

309. Have you ever been diagnosed with, or treated for:

Cancer
Stroke (including TIA)
Other neurological (i.e., Parkinson's disease)
Heart disease (i.e., Congestive Heart Failure)
Osteoperosis or osteopenie
Arthritis
Diabetes
COAD/Chronic lung disease
Kidney disease

310. What was the reason for coming to hospital? (i.e., your diagnosis)

_____

Continence

311. Do you currently experience:

	Yes	No
- Urine leakage relating to the feeling of urgency	____	____
- Urine leakage related to physical activity/coughing	____	____
- Small amounts of urine leakage (drops)	____	____
- Problems with your bowels (like constipation)	____	____

312. For those that you experience, how much are you bothered by it?

	Not at all	Slightly	Moderately	Greatly	N/A
- Urine leakage relating to the feeling of urgency	____	____	____	____	__
- Urine leakage related to physical activity/coughing	____	____	____	____	__
- Small amounts of urine leakage (drops)	____	____	____	____	__
- Problems with your bowels (like constipation)	____	____	____	____	__

313. Do any problems with your bowel or bladder make you anxious about leaving your home?

Yes No

Quality of Life/Self Rated Health (EQ-5D-5L)

Under each heading, please select one option that best describes your health TODAY.

314. MOBILITY
- I have no problems in walking about
- I have slight problems in walking about
- I have moderate problems in walking about
- I have severe problems in walking about
- I am unable to walk about

315. SELF-CARE
- I have no problems in washing and dressing myself
- I have slight problems in washing and dressing myself
- I have moderate problems in washing and dressing myself
- I have severe problems in washing and dressing myself
- I am unable to washing and dressing myself

316. USUALACTIVTIES (work, study, housework, family or leisure)
- I have no problems in doing my usual activities
- I have slight problems doing my usual activities
- I have moderate problems doing my usual activities
- I have severe problems doing my usual activities
- I am unable to do my usual activities

317. PAIN AND DISCOMFORT
- I have no pain or discomfort
- I have slight pain or discomfort
- I have moderate pain or discomfort
- I have severe pain or discomfort
- I have extreme pain or discomfort

318. ANXIETY/DEPRESSED
- I am not anxious or depressed
- I am slightly anxious or depressed
- I am moderately anxious or depressed
- I am severely anxious or depressed
- I am extremely anxious or depressed

SELF RATED HEALTH (0-100)

We would like to know how good or bad your health is TODAY - This scale is numbered from 0 to 100 - 100 refers to the best overall health you can imagine. 0 refers to the worst health you can imagine. Please point to the *scale [show scale to participant]* to indicate how you would rate your overall health TODAY

319. How your health is TODAY:

_____

Driving/Transportation

320. Were you driving before you came to hospital?
- Yes
- Yes - but have limited my driving (i.e., local area only, daylight only, etc)
- No – no longer driving at all

321. Are you currently driving?
- Yes
- Yes - but have limited my driving (i.e., local area only, daylight only, etc)
- No - have ceased driving in past three months or recently
- No - has never driven or has ceased prior to hospitalisation

322. What best describes why you stopped or have limited your driving?
- Vision problem
- Lost licence
- Other health problem
- Don’t need to drive anymore
- Feel unsafe with driving
- Had an accident
- Too expensive
- Other, please state:

_____

323. Do you have any concerns about your ability to continue driving?
- I have no concerns
- I have some concerns however I don’t think they will limit my driving

I have some concerns and think they will limit my driving
I have some concerns that exist and know that I will not be able to return to driving at all
I have been told not to drive

324. How satisfied are you with your ability to get to and from the places you want to go on your own? (i.e., without relying on friends or family)
Very satisfied
Moderately satisfied
Neither satisfied nor dissatisfied
Somewhat dissatisfied
Very dissatisfied

325. What transport options do you use?
Friends
Family
Neighbours
Public transport
Taxi - full fare
Taxi with half-price discount voucher
Other, please state:
_____

326. What is your main (or most common) means of transport?
Car (you drive)
Car (someone else drives)
Taxi
Bus
Train or Tram
Other, please state:
_____

327. Do you use any aids for getting around?
Yes No

328. Which aids do you use for getting around? (please select all that apply)
Motorised scooter
Wheelchair (motorised or not)
Walking or wheeled frame
Walking or quad stick
Other, please state:
_____

329. Do you have a problem with transport…

	Yes	No	Not applicable
Getting to places at night:	____	____	____
Getting to local shops and services:	____	____	____
Getting beyond your local neighbourhood:	____	____	____

Computer

330. Do you:
- Own a computer?
Yes No
- Know how to use a computer?
Yes No
- Use the internet?
Yes No

331. Do you use a computer?
Yes No

332. What do you use your computer for? (Select all that apply)
- To play games
Yes No
- Type letters
Yes No
- Email friends
Yes No
- Search websites
Yes No
- Other, please state:
Yes No
_____

333. Any additional relevant information?

_____

334. What medications is the participant currently prescribed? (including all medications - i.e., those commenced during hospital and any continuing from hospital):

Medication Name?

_____

Dosage/How much? (mg/mL)

_____

When taken? (x/day)

_____

Other information to clarify medication intake (if needed to clarify)

_____

Thank you for completing this survey today and for the last 6 months. Your involvement is very much appreciated! A one page summary will be sent to you once the study is completed and your responses are compared with other participants. We hope this has been a positive experience for you.
THANK YOU!!!

H. Ethics approval: Monash Health (previously Southern Health)

Southern Health

246 Clayton Road
Clayton, Victoria 3168
Australia

Postal address:
Locked Bag 29
Clayton South, Victoria 3169
Australia

[redacted]

3 August 2012

A/Prof Terry Haines
Director Allied Health Clinical Research Unit
Allied Health Clinical Research Unit
Kingston Centre
Cheltenham Vic 3192

Dear A/Prof Haines

Study title: Mixed Methods Investigation of Anxiety and Depression, Contributing Factors, and Health Services Provided to Manage it Amongst Older Adults Discharged From Hospital
Southern Health HREC Ref: 12182B

The Southern Health HREC B reviewed the above application at the meeting held on 21 June 2012 In addition; the HREC is satisfied that the responses to our correspondence of 28 June 2012 have been sufficiently addressed.

The HREC approved the above application on the basis of the information provided in the application form, protocol and supporting documentation.

This reviewing HREC is accredited by the Consultative Council for Human Research Ethics under the single ethical review system.

Approval

The HREC and Site Specific Authorisation approval is from 3 August 2012.

Approval is given in accordance with the research conforming to the *National Health and Medical Research Council Act 1992* and the *National Statement on Ethical Conduct in Human Research (2007)*. The HREC has ethically approved this research according to the Memorandum of Understanding between the Consultative Council and the participating organisations conducting the research.

Approval is given for this research project to be conducted at the following sites and campuses:

- Southern Health
  - Clayton Hospital
  - Kingston Centre
  - Dandenong Hospital
  - Casey Hospital

You must comply with the following conditions:

The Chief Principal Investigator is required to notify the Administrative Officer, Research Directorate, Southern Health of:

1. Any change in protocol and the reason for that change together with an indication of ethical implications (if any)

2. Serious or unexpected adverse effects of project on subjects and steps taken to deal with them
3. Any unforeseen events that might affect continued ethical acceptability of the project
4. Any expiry of the insurance coverage provided in respect of sponsored trials
5. Discontinuation of the project before the expected date of completion, giving reasons
6. Any change in personnel involved in the research project including any study member resigning from Southern Health &/or the study team.

At the conclusion of the project or every twelve months if the project continues, the Principal Investigator is required to complete and forward an annual report to the Committee.

Annual report forms will be forwarded to the researcher.

Approved documents

Documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Participant Information and Consent Form – Study 1 Six Months Follow-up	4.0	26 July 2012
Participant Information and Consent Form – Study 2 Participants Interview	4.0	26 July 2012
Participant Information and Consent Form – Study 3 Health Service Providers	4.0	26 July 2012

If you should have any queries about your project please contact Deborah Dell or Julie Gephart by email deborah.dell@southernhealth.org.au /julie.gephart@southernhealth.org.au

The HREC wishes you and your colleagues every success in your research.

Yours sincerely

[redacted]

Dr James Doery
Medical Administrator

cc: MUHREC

I. Ethics approval: Peninsula Health

Research Program | Human Research Ethics Committee

HREC REVIEW OUTCOME AND RESEARCHER RESPONSE TEMPLATE

INSTRUCTIONS

The document has three sections. Section 1 details the outcome of the Peninsula Health Human Research Ethics Committee (PH HREC) and Research Governance review, Section 2 is to be completed by the researcher and Section 3 details the submission procedure.

Please use this template to resubmit the requested documents to the PH HREC. Failure to do so may delay review of resubmitted documents.

Please note: you must not commence your research until you have received an Approval to Commence letter signed by the Executive Sponsor, Research.

SECTION 1 | HREC OUTCOME | Research Program Use Only

HREC Reference	HREC/13/PH/51	**SSA Reference (if known)**	
Full Project Title	Mixed methods investigation of anxiety and depression, contributing factors, and health services provided to manage it amongst older adults discharged from hospital.		
Ethics Review Outcome			
APPROVED CONDITIONALLY and subject to: ▪ Clarification regarding services and follow-up procedures provided to participants who are screened as having a possible cognitive impairment and who do not meet the criteria for participation.			
Research Governance Review Outcome			
Revision of Participant Information and Consent Form (Study 1) ▪ Section 11 - Add PH contact ▪ Section 9 - Include information corrected as per NHMRC template (below). *In accordance with relevant Australian and/or [name of state/territory] privacy and other relevant laws, you have the right to request access to the information about you that is collected and stored by the research team. You also have the right to request that any information with which you disagree be corrected. Please inform the research team member named at the end of this document if you would like to access your information.* ▪ Section 10 - Add has been approved by *Peninsula Health Research Ethics Committee.* **Revision of Participant Information and Consent Form (Study 2)** ▪ As per Study 1 (above) **SSA** ▪ Sign off from Dhiren Singh as Head of Supporting Department to acknowledge project as aged Mental Health falls within his area of responsibility. **Provision of signed hard copy of NEAF, SSA and Victorian Specific Module as per submission requirements.**			
Resubmitted documents to be reviewed by	Reviewers and Secretariat		
Response from researcher to be submitted by	**Earliest Convenience**		

Please note that the Research Program Office will be closed from 5pm on Wednesday 18 December 2013 and will re-open on Monday 6 January 2014.

PENINSULA HEALTH

Research Program | Human Research Ethics Committee

HREC REVIEW OUTCOME AND RESEARCHER RESPONSE TEMPLATE

SECTION 2 | RESPONSE TO OUTCOME | Completed by Researcher

Please include your response to the conditions of approval outlined in your outcome notification below by including each point raised by HREC followed by your response. Only include responses here that are not covered in your revised documents to be attached. Please see below for example

Example

[*HREC Condition of approval*]
Registration on an approved Clinical Trial Registry such as www.clinicaltrials.gov or www.anzctr.org.au.

[*Researcher Response*]
The study is now registered with clinicaltrials.gov. Registration number: ABCD1234

Insert response here

Please complete the checklist below before responding back to the PH HREC	Yes	N/A
Have you included the HREC Reference Number on all resubmitted documents? (ie HREC/[Year]/PH/[number])	☐	Required
Changes to National Ethics Application Form (NEAF)	☐	☐
Have you uploaded all resubmitted/additional supporting documentation (if required) to your application?	☐	
Have you created a new submission code and generated a PDF with text changes between the last three submission codes? The new submission code is	☐	
Have you attached the generated PDF with text changes to your reply email to researchethics@phcn.vic.gov.au	☐	
Changes to Site Specific Assessment (SSA) Form	☐	☐
Have you uploaded all resubmitted/additional supporting documentation (if required) to your application?	☐	
Have you created a new submission code and generated a PDF with text changes between the last three submission codes? The new submission code is	☐	
Have you attached the generated PDF with text changes to your reply email to researchethics@phcn.vic.gov.au	☐	
Changes to Participant Information and Consent Form(s) (PICF)	☐	☐
Have you tracked all changes in Microsoft Word (Tools -> Track Changes or Ctrl+Shift+E)	☐	
Does the footer contain a revised Version No. and Date?	☐	
Are all pages (including attachments) numbered in the footer (page X of Y)?	☐	
Have you uploaded this to your NEAF/SSA form using the Online Forms website?	☐	
Other documents	☐	☐
Have you included other resubmitted documents? Please specify below	☐	
Have you provided a new version number and date for each resubmitted document?	☐	
Have you tracked changes (in Microsoft Word (Tools -> Track Changes or Ctrl+Shift+E))?	☐	
Have you uploaded these to your NEAF application via Online Forms website?	☐	
List of attachments *(press the 'tab' button multiple times at end of table to create a new line for each new document if space provided is not sufficient)*	☐	☐
Please indicate each of the documents to be submitted as part of your application?		
Are each of these documents uploaded to you NEAF/SSA Form? (Excluding NEAF/SSA Form)		

Document Type	**Version No**	**Date** (DD/MM/YY)		

Aislinn Lalor

Research Program | Human Research Ethics Committee

HREC REVIEW OUTCOME AND RESEARCHER RESPONSE TEMPLATE

Name of person submitting this document		Date	/ /
Email		Telephone	
Has the Principal Investigator approved the resubmission?		Yes ☐ No ☐ (only resubmissions approved by the PI will be assessed)	

SECTION 3 | Submission procedure

Please reply to outcome notification email sent by Research Program via [redacted] and attach this document, your NEAF and/or SSA PDF (if required) which is marked with text changes. You are not required to attach any other documents to this email as these are accessible to the Research Program via the Online Forms facility if you have followed the instructions above.

Resubmitted documents which are to be reviewed by full HREC are required to be submitted in hard copy in addition to electronic submission. The hard copy is to be forwarded to the Research Program by the researcher response date listed in section 1. The hard copy is to be submitted single-sided, unstapled.

Please note: All signatures are to be original ink signatures unless otherwise agreed.

For further information contact

Research Program
Peninsula Health
[redacted]

PENINSULA HEALTH

Research Program | Low Risk Research Subcommittee

NEAF RESEARCH APPLICATION FORM

Declaration by Head of Supporting Department

This form is to be completed by the Head of any Department that is providing support or services to the research project, but which does not have any member(s) on the research team. Include also departments that your research findings may significantly impact on.

Project Title (in full):	Mixed methods investigation of anxiety and depression, contributing factors, and health services provided to manage it amongst older adults discharged from hospital
LNR Reference Number:	**HREC/13/PH/51**
Principal Investigator:	**A/Prof Terry Haines**
Associate Investigator(s):	**Prof Daniel O'Connor** Prof Grant Russell A/Prof Fiona McDermott Dr Rene Stolwyk Dr Ted Brown Dr Christina Johnson Dr Cylie Williams

I have discussed this project with the Principal Investigator and have read the research project. I am: (*tick whichever applies*)

☐ Able to perform the investigations/services indicated, within the present resources of the Department;

☐ Able to perform the investigations/services indicated if the following financial assistance is provided

☐ Unable to undertake the investigations/services indicated, on the following grounds:

☒ Am aware of the research and the implications it may have for my department:

PENINSULA HEALTH

Research Program | Low Risk Research Subcommittee

NEAF RESEARCH APPLICATION FORM

Name	DHIREN SINGH		
Department	AGED MENTAL HEALTH		
Position	DIRECTOR		
Signature	[redacted]	**Date**	08 / 01 / 2014

J. Ethics approval: Monash University (mutual recognition of ethics approval via partnership with recognised Human Research Ethics Committee)

MONASH University

Monash University Human Research Ethics Committee

Confirmation of Registration

Project Number:	0834
Project Title:	Mixed methods investigation of anxiety and depression, contributing factors, and health services provided to manage it amongst older adults discharged from hospital
Chief Investigator:	Professor Terence Haines
Expiry Date:	02/09/2021

Terms:

1. Registration is valid whilst you hold a position at Monash University and approval at the primary HREC is current.
2. End of project: You should notify MUHREC at the conclusion of the project or if the project is discontinued before the expected date of completion.
3. Retention and storage of data: The Chief Investigator is responsible for the storage and retention of the original data pertaining to this project in accordance with the *Australian Code for the Responsible Conduct of Research*.

Thank you for your assistance.

Professor Nip Thomson

Chair, MUHREC

K. Participant Information and Consent Form (PICF)

PARTICIPANT INFORMATION AND CONSENT FORM (PICF)

Mental Health and Wellbeing during Transition back to Community Living amongst Hospitalised Older Adults – Study 1 Six Month Follow Up

Chief Investigators:
Assoc. Professor Terry Haines
Professor Daniel O'Connor
Professor Grant Russell
Assoc. Professor Fiona McDermott
Dr Rene Stolwyk
Dr Ted Brown
Dr Christina Johnson
Dr Cylie Williams
Student Investigators:
Aislinn Lalor
Lauren Robins
Angel Lee
Katherine Kittelty
Research Assistants:
Maddie Hand
Hannah Williams
Leonie Souter
Haylee Lane
Mitch Sarkies
Laura Tirlea
Steve Caddy

1. Introduction

You are invited to take part in this research project. This study is about older adults (aged 65 years and over) in South-East Melbourne who have been hospitalised for 2 weeks or more and who will be transitioning back to community living (ie, home). The study is about your mental and physical health, life events and general access to health services. This study is conducted by the Allied Health Research Unit at Monash Health in conjunction with the Department of Physiotherapy at Monash University and Peninsula Health.

This Participant Information and Consent Form tells you about the research project. It explains what is involved to help you decide if you want to take part. Please read this information carefully. Ask questions about anything that you don't understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative, friend or your local health worker.

Participation in this research is voluntary. If you don't wish to take part, you don't have to. If you decide you want to take part in the research project, you may be asked to sign the consent section. By signing it you are telling us that you:

- Understand what you have read, or has been read to you;
- Consent to take part in the research project;
- Consent to be involved in the procedures described;
- Consent to the use of your personal and health information as described.

You will be given a copy of this Participation Information and Consent Form to keep.

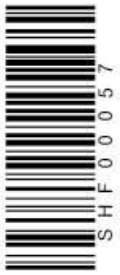
2. What is the purpose of this research project?

The research project aims to investigate the links between an older adults mood with their ability to perform daily activities and the impact on their physical health. It also aims to enhance our understanding of how and why older adults who experience mental and physical health issues access health care services to assist their management, and the barriers and enablers to this.

The team of investigating researchers will be assisted in better understanding older adults who have had a severe medical illness or extended stay in hospital and the factors that affect their transition home over a 6 month period. Through this understanding, the investigators can advise policy, service development and health care professionals about what helps and what hinders the health of older adults when going home from hospital.

3. What does participation in this research project involve?

This research is being undertaken across three sites of Monash Health: the Kingston Centre in Cheltenham, Dandenong Hospital and Casey Hospital; and across sites of Peninsula Health: Golf Links Road Rehabilitation Centre, the Mornington Centre, and Rosebud Rehabilitation Centre. Potential participants will be advised about the study whilst in hospital by a Monash Health or Peninsula Health health professional. This research, if you wish to participate, requires you to complete an interview each month with a researcher for six months. Face to face interviews will be conducted whilst you are still in hospital (or rehabilitation), and in your home at 3 and 6 months after you leave hospital. We will also call you on the phone in the between months to ask you a smaller number of questions about how you are going. We estimate that the initial interview, whilst still in hospital, will take about an hour to complete. Subsequent interviews when you go home will be shorter: approximately 10 minutes over the phone, and 45 minutes in person at home. You will only be contacted once per month over the 6 month period. At the completion of the 6 month interview your participation in this study ends. That is the total time that participation in this research project will take. You are being approached as you have been hospitalised for 3 or more weeks and you will be going back to community living. The project investigators aim to interview 400 older adults in this study.



If English is not your first language we can provide an interpreter in your own language to assist with the data collection and to ensure that we get an accurate reflection of your results. You will not incur any charge in relation to this service as we appreciate any participants being involved.

This research has been funded over a 3 year period by BeyondBlue. BeyondBlue is a national, independent, not-for-profit organisation working to address issues associated with depression, anxiety and related disorders in Australia.

There is no payment for this research although your participation is sincerely appreciated. There will be no financial cost to you if you consent to being involved in this project.

4. What are the possible benefits?

There is not immediate personal benefit for people who take part in this study.

The future benefits to older adults who have experienced an extended hospitalisation include more tailored health and education services, improved understanding of professionals about the health and life situation of older adults, and the development of pathways to assist older adults to access health care services when home following hospitalisation.

5. What are the possible risks?

There is a very low level of risk that reflecting on your health, how you are feeling, and details about life events and social engagement, you may become upset. You can still access Monash Health services as a public patient at no cost whether you participate or not. The researcher will provide you with opportunity to rest during interviews and you do not have to answer questions that you do not wish to. There are no other risks or potential risk associated with the research.

6. Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at a later stage.

If you decide to withdraw, please notify a member of the research team. This notice will allow that person or the research supervisor to inform you if there are any special requirements linked to withdrawing.

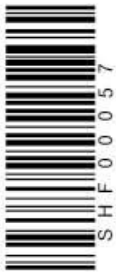
If you decide to leave the project, the researchers would like to keep the personal and/or health information about you that has been collected. This is to help them make sure that the results of the research can be measured properly. If you do not want them to do this, you must tell them before you withdraw from the research project.

Being in this study is voluntary and you are under no obligation to consent to participate. You will not be disadvantaged if you choose not to participate in this study or if you choose at any time to withdraw from the study.

Your decision whether to take part or not, or to take part and then withdraw, will not affect your relationship with the researchers or Monash Health, Peninsula Health, Monash University or BeyondBlue.

7. How will I be informed of the final results of this research project?

At the completion of the project all participants will be provided with a one page summary of the research findings. This summary will be an overall report of all participants in the research project and therefore will not identify any individual results.



8. What will happen to information about me?

Any information obtained for the purpose of this research project that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or as permitted by law.

After you agree to participate in this research project your details will be kept in accordance with the National Health and Medical Research Council (NHMRC) guidelines: kept in the Allied Health Research Unit at Monash Health, in a locked filing cabinet for 7 years. Only researchers involved in the project will have access to your details in order to contact you for follow up. At no time will your details be provided to any third party. At completion of the study your data will be de-identified and your name and address will not be recorded elsewhere. Your personal results will not be identifiable at completion of this study. At this time there will be no way to identify you and remove your data and therefore withdrawal would not be possible.

A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

9. Can I access research information kept about me?

In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to access the information collected and stored by the researchers about you. You also have the right to request that any information with which you disagree be corrected. Please contact one of the researchers named at the end of this document if you would like to access your information.

10. Is this research project approved?

The ethical aspects of this research project have been approved by the Human Research Ethics Committees of Monash Health and Peninsula Health. This project will be carried out according to the *National Statement on Ethical Conduct in Human Research (2007)* produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

11. Who can I contact?

The person you may need to contact will depend on the nature of your query. Therefore, please note the following:

For further information or appointments: During the project if you would like any additional information concerning this project or if you have any problems which may be related to your involvement in the project (for example, feelings of distress) please contact the Principal Investigator:

Associate Professor Terry Haines

Director, Allied Health Research Unit, Monash Health, Kingston Centre

[redacted]

Or the Associate Investigator:

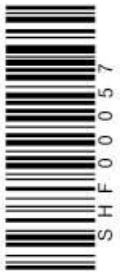
Dr Cylie Williams
Research and Evaluation Coordinator, Peninsula Health, Frankston

[redacted]

If you have a complaint concerning the manner in which this research is being conducted, please contact:

Ms Malar Thiagarajan
Director of Research Services

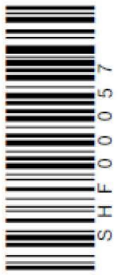
[redacted]



PARTICIPANT INFORMATION AND CONSENT FORM (PICF)

Mental Health and Wellbeing during Transition back to Community Living amongst Hospitalised Older Adults – Study 1 Six Month Follow Up

Consent



I have read, or have had this document read to me in a language that I understand, and I understand the purposes, procedures and risks of this research project as described within it.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project, as described.

I understand that I will be given a signed copy of this document to keep.

Participant's name (printed) .....

Signature Date

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) .....

Signature Date

Note: All parties signing the consent section must date their own signature.

L. Non-technical language project information provided to staff at recruitment locations

Mixed methods investigation of anxiety and depression, contributing factors, and health services provided to manage it amongst older adults discharged from hospital

What we know:

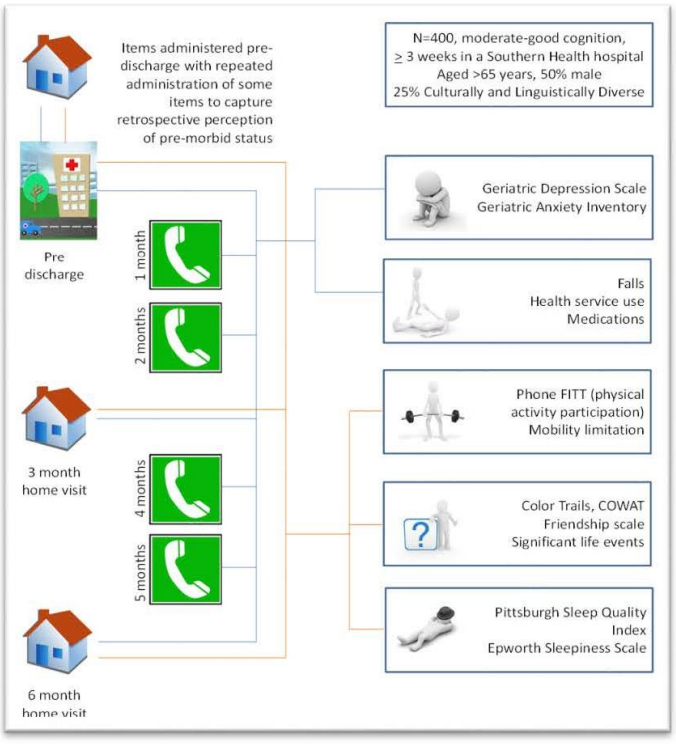
- The transition between extended hospitalisation and discharge home to community-living contexts for older adults is a critical period characterised by poor health outcomes, hospital re-admissions and gaps in healthcare service provision.
- This is also a period of change and adjustment for the patient, their carers and family and social support network, and the health care system that provides services to them.
- Screening for anxiety or depression is not routinely employed at discharge from hospital, however, symptoms of anxiety and depression have recently been found to be common at this point in their continuum of care.

What we don't know:

- Whether these symptoms are transient, persist or worsen over the months that follow (though indications from disease-specific research are that they are likely to persist and that these patients are not inclined to specifically seek mental health services to assist in their management)
- Anxiety and depression could be common mental health concerns that are not systematically being identified nor adequately managed despite prolonged immersion of these patients within the health care system.

What we propose:

Part 1: Presently at Monash Health we have commenced Part 1 of this project. This involves recruiting 400 older adults (65 years and over) who have been hospitalised (acute and sub-acute) for at least 2 weeks and who are cognitively intact. The older adults also need to be returning home to community dwelling, although can be returning home via Transitional Care Programs. The project aims to recruit 50% male (n=200) and 25% from culturally and linguistically diverse backgrounds (n=100). Once participants have consented to their involvement they are interviewed face to face whilst still in hospital to gain a baseline of them. They are also followed up face to face in their homes at the 3 and 6 month period. Intermittent months (months 1, 2, 4 and 5) participants will receive a follow up phone call. The follow up pathway is outlined in the figure over the page. Specific aspects are included in the project to consider depression, anxiety, physical activity, falls, sleep, social engagement, and general background demographic information.



Part 2: Involves participants from Part 1 to have the option of being involved in a 1 hour qualitative interview regarding their 6 month experience since hospitalisation. These interviews will be recorded and will form part of an educational DVD to assist with future patient transitions home.

What we hope to achieve:

Overall we aim to improve transition home from hospital for older adults.
We hope that through the collaboration of Monash Health and Peninsula Health that this will be advantageous to a broader population based on the research outcomes.

M. Frequency of consultation responses.

Question One:

If not, any particular reason why not?	category	base line		3 mth		6 mth	
Issue causing sleep issue (ie pain) is resolving	1	1	1		1	1	1
It's better than it was in hospital	1			1			
Didn't think anything/anything else could be done	2	1	6		7	6	22
Doesn't want to take pills to sleep / they only prescribe pills to help	2	2		1		1	
I don't think they can help me	2	1				2	
I put up with the problems I have (even though annoying) as previous treatments causes other problems	2					2	
It won't get any better	2			2			
Nothing else can be done (it is due to my myeloma)	2			1			
Previous treatment (relaxation tape) didn't work so don't bother discussing again	2					3	
They can't help me	2			2			
They just want me in bed	2	1					
Told to relax when previously discussed	2			1			
What's the point? / No point in talking about it now / I cannot bother with these things	2	1				8	
No reason provided even if they answered no.	3	205	205	133	133	82	82
Been the same for a while (having to get up frequently for toilet during the night)	4		2	1	2		10
Part of ageing / getting older / normalised / I'm used to it / learnt to live with it	4	2		1		10	
Doesn't' want to make a fuss / hard to break the cycle	5	2	6		2	1	8
It could be worse	5			1			
It's my business / personal - I wouldn't tell them if I did - I don't bother	5	3		1		5	
Try not to dwell on things or let them become an issue	5	1				2	
Haven't thought about discussing it / I haven't asked	6	3	21	5	26	5	29
I can only talk so much	6	1					
I forget to ask	6			1		1	
I just answer the questions they ask me	6	1					
Never been discussed	6	2		2		5	
Not sure / don't know why	6	1		2		1	
Other things were a greater priority/higher concern with my health - too much else to worry about	6	1		3		1	
There is no opportunity to discuss it / want you in and out as quick as they can / you're lucky to be seen	6	1		2		2	
They did not ask / it wasn't brought up / If they ask I will tell them / not sure if it is relevant to them	6	10		10		11	
They expect me to ask if I need any help	6					1	
They don't get to this question of asking about my sleep	6			1			
Would like to talk to someone about it but haven't / I do think if I could then it might improve my life	6	1				2	
They dismiss it when it has been discussed	7		0	2	4		0
Told I don't need any tablets	7			2			
GP/sleep specialist is already aware of their sleep - no discussion in last 3 mths	8	2	4	3	9	8	26
I have sleeping tablets if I need them	8			2			
They know I'm on sleeping medication	8	1		3		6	
Tries to manage it themselves / Puts up with it / I can handle it myself	8	1		1		12	
If I had a problem I would bring it up with my GP	9		39	1	51		52
No issue / no reason / never had a problem with my sleep / I sleep well	9	39		50		52	

Question Two:

Can you tell me what was discussed in relation to your sleep?	category	base line		3 mth		6 mth	
Depends on weather	1			1			
Dr aware sleeping issues exist	1	1		8		5	
Gets asked every morning how they slept the night before / Asked every appointment if I've had a good sleep	1	2		1		1	
Haven't slept well since menopause	1	1					
having poor sleep / can't sleep / disturbances over night / restless	1	23		24		26	
Issues are due to PD	1			1			
Nervous about getting up so many times at night	1					1	
Not getting 'full sleep' / sleep hours not right	1					4	
Participant reports sleep issues due to predator outside her house/bedroom window	1			1			
Participant was asked how their sleep was in hospital - not since	1			1			
Participant told GP she has been having difficulty sleeping	1					1	
Participant was asked if they were sleeping well	1	1	38		45	10	63
Racing heart due to loss of wife - dealing with grief	1					1	
Sleep in general at initial consultation in hospital	1	1				5	
Sleep interrupted by use of diuretics	1	1					
Sleep issues are due to my anxiety - thinking too much	1	1					
Sleep issues due to back pain / other pain	1	1		1		3	
Sleep trouble only when first home from hospital	1			1			
there are good days and others not so good	1			2			
Told no sleep apnoea but lung funtion low	1			1			
waking frequently during the night / up during the night	1	3		3		6	
Wants to know their diagnosis - what is wrong with them?	1	1					
What sleep was like prior to coming into hospital	1	1					
Why I am up so early	1	1					
Discussed less than I've been asked today!	2		1	1	1		0
No real opportunity to "discuss" it - just mentioned	2	1					
"Need help"	3	1	1		1		0
KC Dr says to speak to GP - GP says to speak to KC - just goes back and forth	3			1			
Advised that up to patient to help themselves by taking the medication prescribed - that's as much as the Dr can help	4	1	1		0		0
Reassurance regarding overall test results	5	1	2		0		2
Says sleep "not bad"	5	1				2	
"needs" to talk to their own GP	6	1	2		3		0
Having a review of their sleep	6			1			
Sleep apnoea test undertaken or to be undertaken	6	1		2			
basically there's nothing else that can be done	7		0	1	6		4
nothing they can do	7			2			
Sleeping medication doesn't work	7					3	
There's nothing they can do for me	7					1	
what else can be done?	7			3			
"how to get it right?" - what is the remedy?	8	1	16	2	13		5
Cramps at night from medication disrupting sleep	8					1	
Discussed different medications already tried and yet to try	8	1		1			
Discussed use of CPAP during the night / was it working right /replacing faulty parts	8	3		1			
Doesn't want to risk side effects of medication recommended	8			1			
Doesn't want to take sleeping medication	8			1			
Dr apprehensive to prescribe meds due to side effects (dizziness, falls, memory loss)	8			2			
I need medication sometimes	8			1			
Need to try different techniques	8					1	
Participant request for sleep medication	8			2			
Participant taking herbal remedies but not sure they're actually doing anything to help sleep	8					1	
Participant was asked if they wanted a sleeping tablet	8	2					
Previously had sleeping tablets but had side effects (ie, memory loss, contribute to falls)	8			2			
Request for sleep medication	8	9				2	
Advised that it would go away once they leave hospital	9	1	1		0		0
I am sleeping better	10		0		0	4	4

Question Three:

What was done or decided to address this issue (ie, your sleep) either by yourself or the health professional?	category	base line		3 mth		6 mth	
"Same routine" as usual	1		9	1	16		33
Can't prescribe sleep meds as it will affect their PD	1			1			
Can't take muscle relaxant as needs to be alert (ie to attend to husband)	1			1			
due to my age	1					1	
He doesn't take too much notice of me about it these days	1					1	
he said I was ok	1					1	
I don't get tired - still can't sleep	1					1	
I don't know why they won't do anything for me	1					1	
It's too hard	1			1			
It is what it is	1					1	
No answer or solution provided	1	7		7		10	
No magic fix	1			1			
Nothing can be done about it - have tried everything	1					3	
Nothing helps my pain - it's chronic	1					2	
Nothing needed - I've moved on as there's no issue	1	2		3		8	
Nothing they could offer me	1			1			
People don't understand	1					1	
Previous physio review for continence hasn't helped	1					1	
Relaxation techniques and textbook stuff is "bullshit"	1					1	
Sleep getting better but still have to get up frequently (ie, due to prostate)	1					1	
Unsure	2	1	1		0		0
Medication reduced	3		32		21	1	19
Not given sleeping tablet although asked for one	3	3		1		1	
Participant declined sleeping tablets	3	1				1	
Prescribed/given sleeping tablets - or increased existing dose	3	20		12		10	
Prescribed other medication (ie, for pain or restless legs) to assist with sleep - or increased existing dose of pain meds, patches for continence prescribed, etc	3	2		2		1	
prescribing drugs is a guessing game - they don't work	3					1	
Sleeping tablets don't work	3	1		3		2	
Suggested to trial different medications (anti-depressants)	3	2		1			
Taken off other medication (ie, for cholesterol)	3			1			
Taken off sleeping medication they were on	3	1				1	
There is nothing that can be done as the tablets don't work	3	1		1			
They wouldn't give any sleeping medication out - worries me - I don't know why they're reluctant to give them to me	3					1	
Timing of medication (diuretics) altered - no difference	3	1					
Attend a sleep clinic for use of a CPAP machine	4.5		0	1	3		4
discussed my sleep hygiene and routine - how I can help my wife without waking her; using medication to help; mobilising without freezing up; taking time to think it through	4.5					1	
Having heart monitor to measure my racing heart	4.5					1	
I'm not interested (in sleep apnoea test)	4.5			1			
Nurse review at home re: continence (so I don't have to get up every 2hours)	4.5			1			
To have a sleep apnoea review (polysomnography)	4.5					1	
Ultrasound and injection for pain	4.5					1	
Breathing & calming tecniques	6	1	1		1		0
Pelvic floor exercises	6			1			
I will speak to Dr's at KC when I am next in	7		0	1	1		1
thinking of changing doctors	7					1	
On a soft diet	8	1	2		0		0
Reduce caffeine intake	8	1					
To use CPAP at night	9	1	1	4	4	1	2
To use O2 overnight to help me breathe	9					1	
Go to bed earlier	10.5		1		3	1	2
I just turn over and change my position!	10.5					1	
Increase sleep hours at night (?)	10.5			1			
Stop sleeping during the day (no tips given how to do this)	10.5			1			
To sleep on my side	10.5	1		1			
"Stop thinking about things and you'll be able to sleep better" - the same thing, the usual response.	12		0		2	1	2
relax (but it's hard)	12			1			
told to try and relax	12					1	
Try not to think about the spinal pain	12			1			
Provided results of other health tests	13	1	1		0		0
It will gradually get better over time - due to grief	14		1		1	1	1
Reassurance that someone will keep an 'eye' on them	14	1		1			